

**Final
Five-Year Review Report
Camp Navajo, Bellemont, Arizona**



Prepared for:

Army National Guard
Camp Navajo
Bellemont, Arizona
and
U.S. Army Environmental Command
Fort Sam Houston
San Antonio, Texas

Prepared by:
U.S. Army Corps of Engineers
Louisville District
Louisville, Kentucky

30 October 2015

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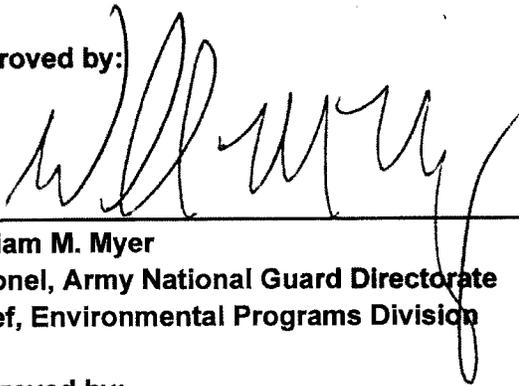
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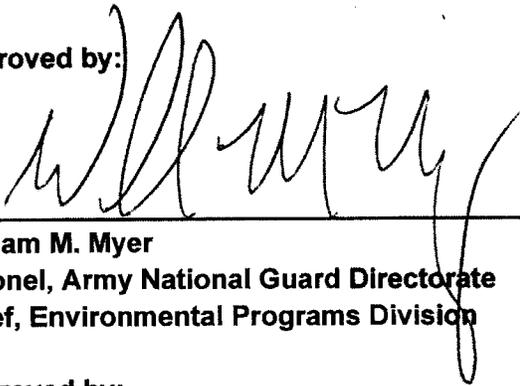
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LIST OF ACRONYMS/ABBREVIATIONS

1,3-DNB	1,3-dinitrobenzene
1,3,5-TNB	1,3,5-trinitrobenzene
1Q06	first quarter 2006
2,4-DNT	2,4-dinitrotoluene
2,4,6-TNT	2,4,6-trinitrotoluene
2-A-4,6-DNT	2-amino-4,6-dinitrotoluene
2Q06	second quarter 2006
3Q06	third quarter 2006
4-A-2,6-DNT	4-amino-2,6-dinitrotoluene
4Q05	fourth quarter 2005
AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ARAR	Applicable or Relevant and Appropriate Requirement
ARS	Arizona Revised Statutes
amsl	Above mean sea level
ARNG	Army National Guard Directorate
AWQS	Aquifer Water Quality Standard
AZARNG	Arizona Army National Guard
B&C	Brown and Caldwell
bls	below land surface
BRAC	Base Realignment And Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemicals of Concern
COPEC	Contaminant of Potential Ecological Concern
DD	Decision Document
DDESB	Department of Defense Explosive Safety Board
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EE/CA	Engineering Evaluation and Cost Analysis
EOD	Explosive Ordnance Disposal
ERA	Ecological Risk Assessment
FCDL	Former Construction Debris Landfill
FSL	Former Sanitary Landfill
ft	feet
GPL	Groundwater Protection Level
HA	Hazard Assessment
HE	High Explosive
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HRA	Human Health Risk Assessment
ICRMP	Installation Cultural Resources Management Plan
INRMP	Installation Natural Resources Management Plan
IRA	Interim Removal Action
IRP	Installation Restoration Program

ITC	IT Corporation
J	estimated value
LTM	Long-Term Management
LTM/PCC WP	Long-Term Management/Post Closure Care Work Plan
LUC	Land Use Control
LUCIP	Land use control implementation Plan
MC	Munition Constituents
MCL	Maximum Concentration Levels
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MDL	Method Detection Limit
MKM	MKM Engineers, Inc.
MRL	Method Reporting Limits
MRS	Munitions Response Site
MRWA	Munitions Response Work Area
MRA	Munitions Response Action
MW	Monitoring Well
NAAD	Navajo Army Depot Installation Restoration Program site
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
ND	Not Detected
NJ	tentatively identified
NPL	National Priorities List
NRHP	National Register of Historical Places
NR-SRL	nonresidential soil remediation level
OB/OD	Open Burn/Open Detonation
ORNL	Oak Ridge National Laboratory
O&M	Operation and Management
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated biphenyl
PCC	Post- Closure Care
P.E.	Professional Engineer
PRG	Preliminary Remediation Goal
PSG	Preliminary Screening Guidance
Qal	Quaternary Alluvium
QASAS	Quality Assurance Surveillance Ammunition Specialist
QTg	Quaternary/ Tertiary Gravel
RAO	Remedial Action Objective
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine)
RECs	Records of Environmental Consideration
RFA	RCRA Facility Assessment
RPDP	Real Property Development Plan
RSL	Regional Screening Level
R-SRL	Residential Soil Remediation Level
SAG	Stakeholder Advisory Group

SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historical Preservation Office
SL	Screening level
SOP	Standard Operation Procedure
SRI	Supplemental Remedial Investigation
SRL	Soil Remediation Levels
SVOC	Semivolatile Organic Compound
TNT	2,4,6-trinitrotoluene
TPH	Total petroleum hydrocarbon
TRPH	Total recoverable petroleum hydrocarbon
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USAEHA	United States Army Environmental Hygiene Agency
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound
WP	Work Plan
µg/L	microgram per liter

EXECUTIVE SUMMARY

This Five-Year Review evaluates the remedies implemented for the following five Installation Restoration Program (IRP) sites (identified by Navajo Army Depot [NAAD] site numbers) at Camp Navajo, Bellemont, Arizona:

- NAAD 01 (Old Explosive Ordnance Disposal [EOD] Demolition Area);
- NAAD 11B (Former 2,4,6-trinitrotoluene [TNT] Washout Facility);
- NAAD 20 (Pyrotechnic Range);
- NAAD 40 (Former Sanitary Landfill); and
- NAAD 43 (Former Construction Debris Landfills).

This is the first Five-Year Review developed for NAAD Sites 01 and 20, and the second Five-Year Review for NAAD Sites 11B, 40, and 43. The review was conducted in accordance with the *Comprehensive Five-Year Review Guidance* (540-R-01-007, 2001) issued by the United States Environmental Protection Agency (USEPA). The purpose of the review is to determine whether the remedies at the five IRP sites are functioning as designed and are protective of human health and the environment. The trigger date for this review is the previous Five-Year Review report which was finalized on 22 April 2011.

Camp Navajo is situated on 28,347 acres of forest and prairie lands approximately 10 miles west of Flagstaff, Arizona, south of Interstate 40, at Exit 185 in Bellemont, Coconino County, Arizona (Figure 1-1, Appendix A). Commercial, industrial, and private properties border the northern portions of the installation. The majority of land bordering the western, southern, and eastern portions of the installation is owned by the State of Arizona or the United States Department of Agriculture (USDA) Forest Service. A few private parcels are interspersed throughout the area.

Camp Navajo is currently an active Arizona Army National Guard (AZARNG) installation under the federal administration of the Army National Guard Directorate (ARNG). The installation provides a military training mission, including provision of facilities and training capabilities to enhance the mobilization readiness of AZARNG and other military units. In addition, Camp Navajo performs a depot-level storage service for Department of Defense (DoD) and other governmental and civilian entities.

An environmental investigation at Camp Navajo in 1979 identified potential areas of concern that warranted further investigation. An installation-wide remedial investigation/feasibility study was initiated in 1995 for Defense Environmental Restoration Program (DERP) eligible sites. Following removal actions and treatability studies, all but 5 DERP-eligible sites have been closed with approval from the Arizona Department of Environmental Quality (ADEQ).

Decision documents (DDs) were completed for NAAD Sites 01 and 20 in 2009 and for NAAD Sites 11B, 40 and 43 in 2010. The selected remedy for the sites is Long Term Management (LTM) which includes Land Use Controls (LUCs) and inspections. LTM at two sites, NAAD 11B and NAAD 40 also includes groundwater monitoring.

Based on a review of documents, interviews and site inspection, this Five-Year Review found the following:

NAAD 01

NAAD 01 is located on approximately 640 acres of largely forested area on the southern portion of Camp Navajo. NAAD 01 was actively used for ordnance demolition and disposal from 1942 until 1961. Site-related chemical constituents in soil, sediment, surface water and groundwater were address separately from Munitions and Explosives of Concern (MEC) in a DD dated 2014.

This Five-Year Review addresses MEC at NAAD 01. The selected remedy for site-related chemical constituents was closure because there was no unacceptable risk to human health or the environment associated with chemical constituents in soil, sediments, surface water and groundwater, The IRP status is considered response complete (RC) for chemical constituents.

NAAD 01 is identified as Munitions Response Work Area 01 (MRWA 01) for the purpose of MEC investigations and response actions. MRWA 01 is sub-divided into the former operations area (MRWA 01-01 and the kick out area (MRWA 01-02).

MEC removal actions conducted in 1995, 2003 and 2007 mitigated potential hazards associated with MEC in surface soils at NAAD 01 and allow for land use consistent with military training. However, MEC is suspected or has the potential to remain in the subsurface. Therefore, the remedy for NAAD 01 was designed to prevent exposure to potential MEC remaining in the subsurface. The selected remedy for NAAD 01 is LTM, consisting of LUCs and inspections.

The remedy is in place. LUCs include restricted access to the Former OB/OD Area, fences and warning signs around the former operations area, and security patrols. Additional LUCs include restriction on residential development and requirements for a dig permit and a Record of Environmental Consideration (REC) before intrusive activity. The Environmental Office reviews digging permits and RECs at Camp Navajo. The LUCs will be recorded in the update to the Camp Navajo Real Property Development Plan (RPDP), scheduled in 2015-2016. The LTM program also includes inspections to monitor physical conditions and ensure that land use is consistent with military training.

This is the first Five-Year Review for NAAD 01. Based on this review, the remedy is functioning as intended by the DD and is protective of human health and the environment. No issues were identified during this Five-Year review.

NAAD 11B

NAAD 11B was a former TNT washout facility that operated between the 1940s and 1972. It encompasses Building 318, former Building 319, surrounding area, and former wastewater lagoons. The chemicals of concern (COCs) identified at NAAD 11B include explosive compounds and metals (arsenic, beryllium, and chromium). Removal actions were conducted at NAAD 11B in 1995, 2000, and 2002 and have remediated soils at NAAD 11B to residential levels.

Groundwater has been monitored at NAAD 11B since 1998. The monitoring data indicates that impacted groundwater appears to be limited to shallow discontinuous water-bearing zones with no apparent connection to the regional aquifer. There are no water supply wells in the vicinity of NAAD 11B that draw water from this shallow water-bearing source.

Explosive compounds continue to be detected in groundwater at concentrations that exceed screening levels. Historical trends indicate that the plume appears to be stable and is not migrating from the source area. Changes in the plume appear to be primarily influenced by the seasonal presence or absence of groundwater.

The remedy selected to address COCs in groundwater at NAAD 11B is LTM, which consists of LUCs, groundwater monitoring, and inspections to ensure LUCs are maintained. LUCs restrict access and residential development of NAAD 11B. Permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office to ensure no activities reduce the protectiveness of the remedy.

This is the second Five-Year Review for NAAD 11B. The previous Five-Year Review in 2010 concluded that the remedy was functioning as intended and was protective of human health and the environment. Recommendations made in the previous review included updating the screening levels (SLs) for COCs, revising the ramp down decision matrices for closure, and conducting annual groundwater monitoring in the spring to increase the chances of encountering water in monitoring wells. These recommendations have been implemented. The previous Five-Year review also recommended that the LUCs be recorded in the updated Camp Navajo RPDP. The Camp Navajo RPDP is scheduled to be updated in 2015-2016.

Annual monitoring events were conducted at NAAD 11B in 2012, 2013, and 2014. The results indicated that only one explosive compound, Royal Demolition Explosive (RDX), has exceeded the SL consistently in wells in the immediate vicinity of the former Building 319. Time-series and Mann-Kendall statistical analysis confirm that the plume is stable and is not migrating away from the site. Sampling of water supply wells also confirm that regional groundwater has not been impacted.

Based on the review of documents, interviews and site inspection, the remedy at NAAD 11B is functioning as intended and is protective of human health and the environment. No issues were identified during this Five-Year review.

NAAD 20

NAAD 20 is a 40 acre, former range used for munitions surveillance testing, located in the southeast portion of Camp Navajo. Site-related chemical constituents in soil, sediment, surface water and groundwater were address separately from Munitions and Explosives of Concern (MEC) in a DD dated 2014.

This Five-Year Review addresses the remedy for MEC at NAAD 20 addressed in the DD dated 2009. The selected remedy for site-related chemical constituents was closure because there was no unacceptable risk to human health or the environment associated with chemical constituents in soil, sediments, surface water and groundwater, The IRP status is considered response complete (RC) for chemical constituents.

NAAD 20 is identified as MRWA 20 for the purpose of MEC investigations and response actions.

MEC removal actions were conducted at NAAD 20 in 1995 and 2003. These actions mitigated potential hazards associated with MEC in surface soils and allowed for land use consistent with military training. However, MEC is suspected or has the potential to remain in the subsurface. Therefore, the remedy for NAAD 20 was designed to prevent exposure to potential MEC remaining in the subsurface.

The selected remedy for NAAD 20 is LTM, consisting of LUCs and inspections. LUCs include the installation fence, restricted access, prohibition on residential development, and the requirement for a permit and a REC before intrusive activity. The Environmental Office reviews digging permits and RECs before intrusive activities at Camp Navajo. The LUCs will be recorded in the update to the Camp Navajo RPDP scheduled in 2015-2016. The LTM program includes inspections to monitor physical conditions and ensure that land use is consistent with military training.

This is the first Five-Year Review for NAAD 20 since LTM was initiated. LUCs are in place and restrict access to the area. Inspections were conducted at NAAD 20 in 2012, 2013, and 2014. The inspections did not identify changes in physical conditions at the site that might adversely impact the protectiveness of the remedy. No evidence of intrusive activities were observed during the site inspection.

Based on the review of site-related documents, site inspection, and interviews during this Five-Year Review, the remedy is functioning as intended by the DD and remains protective of human health and the environment. No issues were identified during this Five-Year review.

NAAD 40

NAAD 40 is a former sanitary landfill that reportedly received trash and garbage from Navajo Army Depot activities from the 1940s to 1966. Dried sewage sludge from the wastewater treatment plant was also disposed at the NAAD 40 from 1966 until 1981. Other wastes that may have been disposed include motor oil, paint cans, and medical waste. Geophysical surveys and waste delineation estimated approximately 60,000 cubic yards of waste in place at NAAD 40.

Remedial Investigations at NAAD 40, conducted between 1981 and 2000, included geophysical surveys, trenching, and soil, groundwater, and surface water sampling. The COCs identified at NAAD 40 included metals (arsenic, barium, beryllium, cadmium, chromium and lead), nitrate, polynuclear aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), and one polychlorinated biphenyl (PCB), Arochlor 1248.

An Engineering Evaluation/Cost Analysis (EE/CA) was performed for NAAD 40 in 2001. Based on the results of the EE/CA, an engineered soil cap was installed over the waste to limit exposure to the waste as well as to minimize infiltration of water.

The human health and ecological risk assessments concluded that there were no unacceptable risks associated with soil, groundwater, and surface water media. The only potential risk identified to on-site workers that was not related to a chemical compound, was exposure to medical wastes, which was determined to be minimal since the engineered cap was installed. The ecological risk assessment (ERA) concluded that the organic contaminants of potential ecological concern (COPECs) present in surface soils posed negligible risk for adverse impacts to terrestrial receptors.

According to the DD, no unacceptable risk is associated with site-related chemical constituents present in surface soil, groundwater, and surface water at NAAD 40. No further remedial action is planned and the site IRP status is considered remedy in place. However, the presence of hazardous substances that remain on-site necessitate periodic inspections, maintenance as necessary, and LUCs to protect the integrity of the landfill cap.

This is the second Five-Year Review for NAAD 40. The previous Five-Year Review in 2010 concluded that the remedy appeared to be functioning as intended and was protective of human health and the environment. However, it also recommended that the LUCs be recorded in the Camp Navajo RPDP. The Camp Navajo RPDP is scheduled to be updated in 2015-2016.

This Five-Year Review evaluated groundwater monitoring data since 2010. No concentrations of site-related COCs exceeded SLs between 2010 and 2014. The landfill cap was inspected in 2012, 2013 and 2014 with repairs made to the cap and erosion controls, as necessary. The site inspection conducted during this Five-Year Review indicated that the landfill cap is well vegetated and in good condition with no evidence of intrusive activities. The monitoring data indicated that only minimal concentrations (0.1-0.3%) of carbon dioxide were detected in landfill gas monitoring wells. LUCs are in place that restrict access and warning signs are located around the boundary.

Based on the review of documents, interviews and the site inspection, the remedy appears to be functioning as intended and is protective of human health and the environment. No issues were identified during this Five-Year review.

NAAD 43

NAAD 43 is a group of five separate former construction debris landfills (FCDLs) located on the northern part of Camp Navajo. The operational history of the five landfills is unknown, but analysis of aerial photographs indicated that they were active from 1959 through 1974.

Initial site inspections of FCDLs #1-4 in 1997 indicated no visual evidence of distressed vegetation, chemical staining, excavations, burial, disposal of municipal or potentially hazardous wastes, or features of environmental concern. Inspections concluded that no sampling of FCDLs #1-4 was necessary because there was no evidence of potential chemical releases and that the four FCDLs were not likely to have adverse impacts on soil or groundwater. Therefore, no further action at FCDLs #1-4 was recommended. ADEQ concurred with this assessment in 1998.

At FCDL #5, inspections in 1997 identified areas where material was deposited in trenches. Materials disposed at FCDL #5 included wood, concrete, brick, metal, glass, asphalt, roofing materials, ceramic tiles, and asbestos-containing shingles. Much of the material disposed at FCDL #5 appeared to have been burned, then consolidated in a mound at the center of the landfill area. It has become common to use the term NAAD 43 when referring specifically to FCDL #5.

Removal actions were conducted at FCDL #5 in multiple phases between 1998 and 2001. The purpose of the removal actions was to mitigate unacceptable risks associated with non-residential use. Based on confirmation sampling following the removal actions, there are no unacceptable risks to human health for current and reasonably anticipated future land use. The removal actions also mitigated the adverse risks to the Mexican vole, elk, cattle, fescues, and other herbaceous plants identified in the ERA.

Shallow groundwater was not identified at FCDL #5 during removal actions and no additional investigation of groundwater was conducted based on a fate and transport model that demonstrated remaining COCs would not adversely impact groundwater. Regional groundwater is found at depths ranging from 1,000 to 1,500 feet.

The remedy selected for FCDL #5 is LTM, consisting of LUCs and inspections. LUCs include access restrictions, warning signs, and non-residential use. Periodic inspections ensure that LUCs remain appropriate for future land use and site conditions. Inspections also address exposure to pieces of debris scattered across the surface and shallow subsurface outside the excavation boundaries.

This is the second Five-Year Review for NAAD 43. The previous Five-Year Review in 2010 concluded the remedy appeared to be functioning as intended and was protective of human health and the environment. However, it also recommended that the LUCs be recorded in the Camp Navajo RPDP Plan. The Camp Navajo RPDP is scheduled to be updated in 2015-2016.

This Five-Year Review included review of annual inspections (2012, 2013, and 2014), interviews, and a site inspection. The inspection reports document that the volume of pieces of debris

exposed by frost heave are decreasing over time. No intrusive activities were observed during the site inspection. Maintenance and repair of storm water controls are conducted, as necessary.

The remedy at NAAD 43 is functioning as intended by the DD and is protective of human health and the environment. No issues were identified during this Five-Year review.

CONCLUSION

Based on the findings of this Five-Year Review, the remedies for NAAD Sites 01, 11B, 20, 40, and 43, are working as intended and are protective of human health and the environment.

The next Five-Year Review will be conducted in October 2020.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Installation Name: Camp Navajo		
EPA Region: 9	State: AZ	City/County: Bellemont, Coconino
SITE STATUS		
NPL Status: Non-NPL	RCRA Permit: AZ7213820635	
	Other State Authority: ADEQ	
Number of Sites: 5	Lead Regulatory Agency: State	
REVIEW STATUS		
Major Command: Army National Guard Directorate		
Author name(s): LTC Brian Saunders		
Author affiliation: Army National Guard Directorate		
Review period: 28 April 2015 – 31 October 2015		
Date of site inspection: 21 May 2015		
Review number: 2		
Initial Triggering action date: 31 October 2005		
Due date (<i>five year cycle</i>): 31 October 2015		
Issues/Recommendations		
No issues were identified during the Five-Year Review. No actions are recommended for the Five-Year Review sites.		
Site(s) without Issues/Recommendations Identified in the Five-Year Review:		
NAAD 01 (Old EOD Demolition Area), NAAD 11B (Former TNT Washout Facility), NAAD 20 (Pyrotechnic Range), NAAD 40 (Former Sanitary Landfill), NAAD 43 (Former Construction Debris Landfill #5)		

Site:	Effectiveness/Protectiveness Determination:	15 September 2015
NAAD 01 Old EOD Demolition Area	Protective	

Effectiveness/Protectiveness Statement:

The remedy at NAAD 01 is protective of human health and the environment. The remedy is LTM consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Primary MEC areas within NAAD 01 have been investigated and removal actions have been completed. No additional source areas are suspected to be present to a depth of one-foot;
- Soil and surface water were investigated, and soil removal actions were completed in 2007. No unacceptable risks due to site-related chemical constituents remain;
- The surface MEC removal action completed at NAAD 01 in 2007 reduced the exposure hazard to allow for military training;
- There are no complete exposure pathways for humans or wildlife. Subsurface exposure to MEC is limited by LTM which includes LUCs and inspections;
- LUCs include access restrictions, MEC awareness training, and non-residential land use;
- Warning signs are installed at 100-foot or less intervals around the boundary;
- Dig permits and Records of Environmental Consideration (RECs) are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office; and
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions.

Site:	Effectiveness/Protectiveness Determination:	
NAAD 11B Former TNT Washout Facility	Protective	15 September 2015

Effectiveness/Protectiveness Statement:

The remedy at NAAD 11B is protective of human health and the environment. The remedy is LTM consisting of LUCs, groundwater monitoring, and inspections. The remedy is protective for the following reasons:

- Soil and groundwater were investigated, and soil removal actions completed in 2002 have mitigated potential risks associated with soils;
- There are no complete exposure pathways for humans or wildlife.
- Exposure to shallow groundwater is limited by LUCs and inspections;
- LUCs include access restrictions and non-residential land use;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office;
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions; and
- Groundwater monitoring is conducted annually to confirm the protectiveness of the remedy.

Site:	Effectiveness/Protectiveness Determination:	15 September 2015
NAAD 20 Pyrotechnic Range	Protective	

Effectiveness/Protectiveness Statement:

The remedy at NAAD 20 is protective of human health and the environment. The remedy is LTM consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Soil and surface water were investigated. No unacceptable risks due to site-related chemical constituents are present;
- The MEC investigation covered 46% of NAAD 20 to a depth of two feet. Based on the lack of MEC, no further investigation or removal was warranted for NAAD 20 in order to be used for military training.
- There are no complete exposure pathways for humans or wildlife. Subsurface exposure to MEC is limited by LUCs and inspections.
- LUCs include access restrictions, MEC awareness training, and non-residential land use;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office; and
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions.

Site:	Effectiveness/Protectiveness Determination:	15 September 2015
NAAD 40 Former Sanitary Landfill	Protective	

Effectiveness/Protectiveness Statement:

The remedy at NAAD 40 is protective of human health and the environment. The remedy is LTM consisting of LUCs, groundwater monitoring, and inspections. The remedy is protective for the following reasons:

- There are no complete exposure pathways for humans and wildlife. The landfill cap prevents direct exposure to waste and protects groundwater quality;
- No COCs exceed screening levels in groundwater and surface water. Very low levels of carbon dioxide (0.1 to 0.3%) were detected in gas monitoring probes and groundwater wells. No carbon monoxide, organic vapors, or explosive gases have been detected;
- LTM includes landfill cap inspections and maintenance, landfill gas and groundwater monitoring) is conducted annually to identify changes in site conditions;
- LUCs include non-residential use and access restrictions.
- "No Unauthorized Admittance" signs are installed at 100-foot intervals around the boundary; These signs were observed to be in good condition during the site inspection;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office;
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions; and
- Groundwater monitoring is conducted annually to confirm the protectiveness of the remedy.

Site: Effectiveness/Protectiveness
Determination:

NAAD 43
Former Construction
Debris Landfill

Protective

15 September 2015

Effectiveness/Protectiveness Statement:

The remedy at NAAD 43 is protective of human health and the environment. The remedy is LTM consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Soil and surface water were investigated, and soil removal actions completed in 2001 mitigated risks associated with soils.
- There are no complete exposure pathways for humans and wildlife. Shallow groundwater was not identified during investigations and removal actions. Regional groundwater is found at depths greater than 1,000 feet;
- Exposure to potential COCs in the subsurface is limited by LUCs and inspections;
- LUCs include non-residential use and restricted access; Warning signs are installed at 100-foot intervals around the boundary.
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office; and
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions.

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has completed a Five-Year Review of five sites administered under the U.S. Army's Installation Restoration Program (IRP) at Camp Navajo (installation), Coconino County, Arizona (Figure 1-1, Appendix A). The five IRP sites (identified by Navajo Army Depot [NAAD] site numbers) included in this review are:

- NAAD 01, Old Explosive Ordnance Disposal(EOD) Demolition Area;
- NAAD 11B, Building 318/319; 2,4,6-Trinitrotoluene (TNT) Washout Facility;
- NAAD 20, Pyrotechnic Range;
- NAAD 40, Former Sanitary Landfill (FSL); and
- NAAD 43, Former Construction Debris Landfill (FCDL #5).

This Five-Year Review evaluates the remedies implemented for five sites at Camp Navajo under standards that do not allow for unlimited use and unrestricted exposure (UU/UE). The purpose of the review is to determine if the remedies are functioning as intended, meeting the remedial action objectives, and remain protective of human health and the environment.

The Five-Year Review of the remedies implemented at NAAD Sites 01, 11B, 20, 40, and 43 was conducted for the five-year period November 2010 through October 2015, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). CERCLA §121 states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

The U. S. Environmental Protection Agency (USEPA) interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

This is the first Five-Year Review for NAAD 01 and NAAD 20, and the second Five-Year Review for NAAD 11B, NAAD 40, and NAAD 43. The trigger date for this review was the previous Five-Year Review report that was finalized on 22 April 2011 (*Final Five-Year Report for Five IRP Sites (NAAD 11B, 14D, 14G, 40, and 43) at Camp Navajo, Bellemont, Arizona, October 2010, MKM Engineers [MKM]*).

The Five-Year Review was conducted in accordance with the *Comprehensive Five-Year Review Guidance* (540-R-01-007) (USEPA, 2001) issued by the USEPA. This report documents the methods, findings, and conclusions of the Five-Year Review.

Five-Year Review Process

The site review was initiated on 28 April 2015 with a conference call between representatives from USACE, U.S. Army Environmental Command (USAEC), the Army National Guard Directorate (ARNG) and the Arizona Army Air National Guard (AZARNG).

Document Review

The documents reviewed for this evaluation included Decision Documents (DDs), groundwater monitoring data, and landfill inspection reports. Regulatory standards were reviewed to identify changes that could potentially impact the validity of the assumptions used for the remedies. Key documents associated with the NAAD sites are identified in site-specific sections of the report.

Interviews

Personnel familiar with the history, operations and maintenance, and regulatory status of the five sites were interviewed in person or by phone between 30 April and 30 September 2015. Personnel interviewed included the ARNG project manager, AZARNG restoration program manager, and project managers at the Arizona Department of Environmental Quality (ADEQ). The interview records are included in Appendix C. Information concerning individual sites is discussed in site specific sections of the report.

Site Inspection

USACE personnel conducted a site inspection of the five NAAD sites on 21 May 2015. The purpose of the inspection was to visually confirm and document the conditions of the remedy, the site, and the surrounding area. Photographs of the sites are included in Appendix B. The site inspection checklists are included in Appendix D.

Community Involvement

As required by the Five-Year Review Guidance (USEPA, 2001), notification was made to the community that a Five-year Review was to be conducted of the five sites at Camp Navajo. A public notice was placed in two newspapers, Williams-Grand Canyon News and Arizona Daily Sun, on 20 and 27 May 2015, respectively. The notice identified the anticipated completion date as 31 October

2015, as well as the location of the information repository where the report would be available for review by the public. Copies of the public notices are provided in Appendix E.

2.0 CAMP NAVAJO GENERAL BACKGROUND INFORMATION

Location

Camp Navajo is situated on 28,347 acres (45 square miles) of forest and prairie lands located approximately 10 miles west of Flagstaff, Arizona, south of Interstate 40 at Exit 185 in Bellemont, Coconino County, Arizona. Commercial, industrial, and private properties border the northern portions of the installation. The community of Bellemont, Arizona, is located along the northern boundary of the installation and has an estimated population of approximately 600 people. The majority of land bordering the western, southern, and eastern portions of the installation is owned by the State of Arizona or the National Forest Service. A few private parcels are interspersed throughout the area. The surrounding land is characterized as undeveloped conifer forest interspersed with grassland meadows used for grazing. The closest residential dwelling is approximately 1 mile east of the Camp Navajo boundary.

Camp Navajo is subdivided into multiple areas with operations relating to storage, training, and administration, including the following:

- Former Open Burn/Open Detonation (OB/OD) Area
- Limited Area
- Buffer Areas

The Former OB/OD Area is located in the southern portion of Camp Navajo. NAAD 01, NAAD 02, and NAAD 20 are located within the Former OB/OD Area. When MEC investigations began, the initial study area was the approximate 5,000-acre area shown in yellow on Figure 2-1 (Appendix A). NAAD 02 is undergoing Resource Conservation and Recovery Act (RCRA) closure, and will require RCRA post-closure care for residual MEC. It is not DERP-eligible and is not included in this Five-Year Review.

The Limited Area is a large, secured area of Camp Navajo specifically designated and set aside from other sectors of the installation for the primary purpose of processing, storing, and handling explosives and munitions. Within the Limited Area was the Ammunition Workshop Area, which consisted of numerous facilities used for ammunition maintenance and demilitarization. NAAD 11B and NAAD 40 are located within the Limited Area.

The Buffer Areas provide an explosive safety arc for the storage facilities as well as a natural setting for military training. Portions of the southern Buffer Area also provided explosive safety arcs for the Former OB/OD operations. NAAD 43 is located in the northwestern Buffer Area.

The five sites evaluated in this Five-Year Review are shown on Figure 2-1 (Appendix A).

Mission

Camp Navajo serves three concurrent missions: to operate an AZARNG military training site, to provide command and control of the AZARNG force structure in northern Arizona, and to provide depot-level storage services to various Department of Defense (DoD), other government, and civilian customers.

History

Camp Navajo was initially established as Navajo Ordnance Depot in 1942 during World War II by the purchase of privately-owned land and the transfer of land from the Kaibab and Coconino National Forests. The principal mission was to operate as a reserve supply depot for the receipt, shipping, storage, surveillance, minor maintenance, and demilitarization of ammunition and assigned commodities. It was re-designated as Navajo Army Depot in 1965 (Brown & Caldwell [B&C], 2010).

On 1 March 1971, the Navajo Army Depot was placed under reserve status and renamed as Navajo Depot Activity under the command of the Pueblo Army Depot. In 1975, the installation was reassigned to the command of the Tooele Army Depot. In February 1975, DA license No. DACA09-3-75-553 was granted to the State of Arizona for the use of the land and buildings for National Guard training and support activities (CH2M Hill, 2009).

Camp Navajo was transferred to the AZARNG under license from the Secretary of the Army in 1982, to allow training opportunities for National Guard and Reserve components. From 1982 through 1993, the installation operated under the terms of an Intra-Service Support Agreement. In the Base Realignment and Closure Act (BRAC) of 1988, the commission recommended closure of the Federal ammunition mission and complete transfer to the AZARNG. Closure and transfer to the AZARNG occurred in 1993 and the installation was re-designated Camp Navajo (CH2M Hill, 2009).

General Physical Setting

Climate

The months of greatest precipitation are July, August, and December. The average annual precipitation is approximately 20 inches, and the average annual snowfall is approximately 82 inches. Lowland areas occasionally flood after a heavy accumulation of snow followed by a rapid melt. Because of the dry climate, water losses due to surface water evaporation can greatly exceed precipitation levels (CH2M Hill, 2009).

Topography and Surface Water

Camp Navajo consists of small, relatively flat prairie areas surrounded by rolling hills, with typical elevations ranging from 7,000 to 7,200 feet above mean sea level (amsl). Volunteer Wash is the major surface water drainage, and has formed the deeply incised Volunteer Canyon in the southern portion of Camp Navajo. Volunteer Wash and its tributaries are considered intermittent, flowing only

after heavy rainstorms or after snowmelt following winters with significant snow accumulation. Volunteer Wash exits the southern boundary of Camp Navajo and eventually intersects Sycamore Canyon (CH2M Hill, 2009).

Geology

Camp Navajo is located along the southern edge of the Colorado Plateau, where the geology is characterized by volcanic units of the San Francisco volcanic field overlying sedimentary rock units of Paleozoic, Mesozoic, and Tertiary age. The Colorado Plateau is bordered by the Transition Zone to the south, separated by the physiographic boundary of the Mogollon Rim approximately six miles to the south of Camp Navajo. Multiple volcanic features are present in-, and around Camp Navajo. The majority of the igneous units at Camp Navajo are basaltic flows that originated from the numerous vents distributed over most of the installation.

The uppermost bedrock at Camp Navajo consists of a thin veneer of Tertiary- and Quaternary-age volcanic cinder cones and lava flows overlying the Late Permian-age Kaibab Formation. The Kaibab Formation is a yellow-gray, silty to sandy, cherty, dolomitic limestone.

The strata at Camp Navajo are relatively undeformed, except where volcanic features or faults have disrupted older sedimentary units. The structural features consist of faults, fractures, and joints, with dissolution features in the limestone bedrock. The installation is located on an uplifted structural block that is bounded on the east by the Oak Creek fault and on the west by the Volunteer fault (B&C, 2010).

Hydrogeology

Shallow saturated zones are found under both perched and unperched conditions in the vicinity of Camp Navajo. They occur within thin permeable beds and in alluvial aquifers of limited extent. Depth to shallow groundwater at Camp Navajo typically ranges from 10 to 20 feet below land surface (bls) (MKM Engineers [MKM], 2010).

The Wild Bill Hill Basalt hosts the shallowest drinking water source in the area of Camp Navajo. It is highly dependent on seasonal precipitation, the only source for the Belmont Water Company, and the preferred source by Camp Navajo and the Belmont Travel Center water systems. However, none of the Five-Year Review site boundaries overlie the Wild Bill Hill aquifer. The shallowest dependable aquifer for drinking water in the area is the regional aquifer (MKM, 2010).

The regional aquifer is composed of stratigraphic units, such as the Kaibab Formation, Coconino Sandstone, and Schnebly Hill/Supai Formations. The regional aquifer is the primary source of drinking water in the Flagstaff area, with a highly variable depth to water ranging from 100 feet to over 2,000 feet bls. In the Camp Navajo area, the depth to water in the regional aquifer is 1,500 to 1,700 feet bls (MKM, 2010).

Hydrographs plotting the seasonal and long-term groundwater fluctuations in monitoring wells in the LTM program are provided in Appendix G. Red data points identify absence of water or questionable measurements.

Ecological Resources

Large portions of Camp Navajo are moderately to heavily forested, assigned to the Rocky Mountain (Petran) Montane Conifer Forest biome. Remaining portions consist of open prairies with vegetation characteristic of the Great Basin Shrub-Grassland biome (CH2M Hill, 2009).

The principal vegetation community type on Camp Navajo is ponderosa pine forest. Other tree species in this community include Douglas fir, white fir, blue spruce, alligator juniper, one-seed juniper, and Gambel oak. Grass species include Arizona fescue, blue grama, mountain muhly, western wheatgrass, pine dropseed, cheatgrass, and squirreltail (CH2M Hill, 2009).

Floral and faunal inventories of Camp Navajo documented the following special-status species on Camp Navajo: Arizona leather flower, Arizona cinquefoil, Arizona toad, osprey, bald eagle, northern goshawk, ferruginous hawk, Mexican spotted owl, and peregrine falcon. Winter (late September to mid-April) roost habitat for bald eagle and potential nesting, roosting, and foraging habitat for Mexican spotted owl have been observed in Volunteer Canyon. Surveys have located Mexican spotted owl in the southern Buffer Area along the rim and side drainages of Volunteer Canyon, near the installation's southern boundary with Coconino National Forest (CH2M Hill, 2009).

The Integrated Natural Resources Management Plan (INRMP) is the primary tool for ARNG and AZARNG to manage natural resources at Camp Navajo. The purpose of the INRMP is to summarize the AZARNG plan that will maximize training opportunities at Camp Navajo, while managing and preserving the natural resources on the installation by complying with environmental laws and regulations.

Cultural Resources

Cultural resource surveys have been conducted throughout Camp Navajo, and have identified sites considered eligible for the National Register of Historic Places (NRHP). Site-disturbing activities conducted proximal to NRHP-eligible sites must be planned and managed to ensure that appropriate cultural resource management practices are incorporated, and to provide assurance that these activities would be conducted in compliance with federal and state laws that govern the treatment of these resources. Under the Memorandum of Agreement between the Army and Arizona's State Historic Preservation Office (SHPO), cultural resource compliance at Camp Navajo is regulated by the SHPO. Among the administrative and procedural requirements is the requirement for consultation and coordination among the AZARNG, ARNG, SHPO, and interested stakeholders (CH2M Hill, 2009).

The Integrated Cultural Resource Management Plan (ICRMP) describes the cultural resources that are known at Camp Navajo, describes the various regulatory requirements that AZARNG must

comply with, and gives process and protocol guidance for activities that could impact cultural resources (CH2M Hill, 2009).

Current Land Use

Camp Navajo is currently an active AZARNG installation under the federal administration of the ARNG. The installation provides a military training mission, including provision of facilities and training capabilities to enhance the mobilization readiness of the 157th Ordnance Battalion and other units. In addition, Camp Navajo performs a depot-level storage service for DoD and other governmental and civilian entities. The Buffer Areas around the outer portion, including the former OB/OD Area, serve as an explosive safety zone for the storage facilities as well as a natural setting for training purposes.

Ancillary facility activities also include natural and cultural resources management, security and fire protection services, road and railroad maintenance, and recreational activities. Surrounding land outside of the southern Camp Navajo boundary is managed by the Coconino and Kaibab National Forests for cattle grazing and recreational hunting. The closest residence is approximately 1 mile east of the installation boundary (B&C, 2010).

Reasonably Anticipated Future Land Use

The reasonably anticipated future land use will continue to support the installation missions and remain non-residential as defined in the Arizona Revised Statutes section 49-151. Approximately half of the Camp Navajo work force is employed to support the mission of providing depot-level storage services. Because of the munitions storage mission, Camp Navajo personnel are trained and experienced in explosives safety. Since its inception, Camp Navajo has retained an excellent explosives safety record in support of this mission (MKM, 2010).

Military training is a growing mission at Camp Navajo. The goal is to be a major regional training and readiness center. Camp Navajo is currently a Collective Training Center. The AZARNG recently received approval of the Camp Navajo Range Development Plan by the ARNG Training Division. This approval acknowledges the need for additional firing ranges, but federal funding for their design and construction may not be available for several more years. Therefore, in the short term, future land use may include such activities as maneuver, navigation, and bivouac training. In the long term, activities may include additional firing ranges and other training activities (MKM, 2010).

Camp Navajo Mission-Related Land Use Controls

The five sites addressed in this Five-Year Review are managed in accordance with CERCLA requirements for long-term management (LTM). Mission-related LUCs are a component of the LTM remedy used to maintain protection of human health and the environment at the sites. Site-specific LUCs are discussed in the respective sections. However, the following Mission-related LUCs are applicable to all sites.

As a federally-owned installation, certain environment-related Army and DoD policies and procedures are applicable to active installations regardless of the mission. They include the following:

- Army Regulation 210-20, *Real Property Development Planning for Army Installations* (Army, 2005), which requires that site information be included in the Camp Navajo Real Property Development Plan (RPDP) to address land use restrictions and the compatibility and flexibility to allow for changes in the training mission. The Camp Navajo RPDP details all existing real property at Camp Navajo and tracks changes made to real property.
- Army Regulation 405-90, *Disposal of Real Estate* (Army, 1985), which is applicable to Camp Navajo and establishes authority, responsibilities, policies, and procedures for the disposal of military and industrial real estate under the custody and control of the Army. This regulation states that explosive-contaminated real property cannot be transferred to the public sector. Real property that is known to be contaminated with munitions and explosives, which could endanger the public, would not be released from Army custody until the most stringent efforts have been made to assure appropriate protection of the public.

Installation Fences and Signs

- The Camp Navajo boundary fence surrounds the installation and delineates Camp Navajo property. This fence serves as a physical barrier and includes posted signs to warn potential trespassers. This fence and signage serve as the primary installation marker and would continue to be maintained regardless of the Camp Navajo mission.
- Authorization to enter Camp Navajo is at the discretion of the Garrison Commander. Authorization is obtained by complying with standard operations procedures (SOPs) (for instance, employees, training units, contractors, hunters) or on a case-by-case basis (for instance, some recreational uses).
- The Limited Area boundary fence prevents personnel who use the Buffer Areas from entering the Limited Area and personnel who use the Limited Area from entering the Buffer Areas. Specific authorization is required for access to the Limited Area given the nature of storage operations. This access authorization does not extend to the area outside of the Limited Area fence, to the Buffer Areas. Conversely, training units and other personnel authorized to use the Buffer Areas are not permitted to enter the Limited Area.
- Authorization for entering Camp Navajo is enforced by Security at Post 3. Depending on the purpose of their entry and appropriate authorization, personnel may proceed to the Administration Area, Limited Area, west Buffer Area through Gate 6, or east Buffer Area through Gate 21. Personnel do not have to pass through the Limited Area to access Gates 6 and 21. The southern Buffer Area is accessible from the western and eastern Buffer Areas by a series of forest roads.

- Depending on the purpose of their visit, personnel generally have no need to access both the Limited Area and Buffer Areas, or to pass through the Limited Area fence. Only particular Camp Navajo employees (i.e., security, fire, natural resources, and maintenance personnel) have regular access to the gate keys to pass through the Limited Area fence. All others must have authorization to access both areas, which is generally authorized on a case-by-case and as-needed basis.

Security Measures

- Camp Navajo security patrols monitor and have jurisdiction over Camp Navajo lands. Public access is restricted and enforced by the Garrison Commander and Camp Navajo Security.
- Camp Navajo implements security measures and access restrictions to support the training and storage missions. The installation boundary and Limited Area are patrolled by security personnel. Entry into the Limited Area is through a manned guard post, and personnel are subject to identification checks, security clearances, and vehicle inspections. Access to the Buffer Areas through the Limited Area is controlled by the same Limited Area security measures.
- In July 2008, the Arizona Legislature passed House Bill 2194, which classifies criminal trespassing on a military installation or facility as a Class 6 felony. Camp Navajo Security is authorized to detain unauthorized persons trespassing on Camp Navajo property. Because trespassing on a military installation is a felony offense, National Guardsmen patrolling Camp Navajo are also authorized to detain trespassers. In 2012, new signs were installed on the Camp Navajo boundary fence that warn potential trespassers about the consequences.

Mission-Related Munitions and Explosives of Concern (MEC) LUCs

Military policies and procedures have been developed to mitigate the explosive hazards associated with the training and storage missions. Mission-related MEC LUCs are implemented to support the military training and storage missions, and are generally applicable to NAAD 01 and NAAD 20. Mission-related MEC LUCs include the following:

Range Safety Program:

- Army Regulation 385–63, *Range Safety* (Army, 2012) requires that Range Safety Programs be established and must protect civilian and military populations who live and work near live-fire operational ranges, and minimize, to the extent practical, both potential explosive hazards and harmful environmental impacts;
- Range safety training (maps showing restricted areas, safety training for installation personnel and military units);
- Land use restrictions (access restrictions, Unexploded Ordnance (UXO) construction support for intrusive activities);

- Administrative Controls (Range Control oversight of training unit activities and risk assessment); and
- Physical controls (installation fence and signs).

Explosives Safety Program:

- Explosives safety training (safety training for installation personnel, tenants, contractors, recreationalists, and visitors);
- Security (background checks, vehicle inspections and roving patrols);
- Administrative controls, including Department of Defense Explosive Safety Board (DDESB) approval of transfer of real property with explosive hazards, Quality Assurance Surveillance Ammunition Specialist (QASAS) oversight of explosives safety and first response to MEC discoveries, dig permits and Records of Environmental Consideration (RECs) for intrusive work; and
- Physical controls (Limited Area fence, signs, and locked gates).

Safety Education Program

In compliance with DoD Directive 6055.09-STD (DoD, 2008), Camp Navajo has a munitions and explosives safety program. This program includes employee training via periodic safety meetings and an annual Safety Day with a presentation on explosives by the QASAS.

Ground-disturbing activities conducted at Camp Navajo require a permit, and a REC prior to execution. Excavation permits are issued by the Facilities Engineering Department and RECs are reviewed by the Environmental Office for potential impacts to natural and cultural resources and for potentially hazardous site conditions.

Hunters are required to attend a Camp Navajo hunter safety briefing prior to hunting on Camp Navajo.

The Camp Navajo SOP No. 24, *Security Division, Lost Arms, Ammunition, and Explosives* (AZARNG, 2008c) outlines reporting procedures if an item of MEC is discovered on the installation. The SOP includes requirements for immediate notification to security personnel who would contact the Camp Navajo QASAS. The QASAS would determine actions to be taken for the safe management of the item.

Camp Navajo Long Term Management Program

A LTM Work Plan (WP) (MKM, 2005a) was developed in 2005 for five IRP sites at Camp Navajo based on the review of remedial investigation reports, interim removal reports, and construction

completion reports for NAAD sites. The LTM WP described the processes, procedures, and methods to be used to develop and implement ramp-down or exit strategies at NAAD Sites 11B, 14D, 14G, 40, and 43 (Note: NAAD 14D and 14G were closed in 2011 with concurrence from ADEQ because no contaminants remained above residential screening levels).

Decision matrices were developed for LTM Performance Monitoring-Well Ramp Down Frequency, Ramp Down Each Analytical Suite (By Well), and Site Ramp Down Frequency. Based on the recommendations following the Five-Year Review in 2010, the decision matrices were modified. The revised decision matrices are depicted on Figures 2-2, 2-3 and 2-4 (Appendix A). In addition to groundwater monitoring, the plan also described the inspection and maintenance of the NAAD 40 landfill cap and monitoring of LUCs at NAAD 40 and NAAD 43.

According to the LTM WP, wells that have been sampled for six monitoring events, without exceedences of screening criteria for Chemicals of Concern (COCs), may be removed from LTM with ADEQ concurrence. If minor exceedences (below 15% based on Laboratory Control Sample criteria in Master Quality Assurance Project Plan) are observed in onsite or adjacent monitoring wells and COCs are not detected at concentrations above the screening criteria in downgradient well(s), the site may be removed from LTM with ADEQ concurrence.

If the situations described above are not applicable, professional judgment can be used to determine whether the sample locations and/or their respective analytes require continued monitoring. For locations that require continued monitoring, an appropriate frequency for monitoring can be established. Wells and analytes removed from the program would not be monitored for the remainder of the program; however, monitoring wells would not be abandoned until well and water quality status have been reviewed and approved by ARNG, AZARNG, and ADEQ.

Groundwater monitoring was performed on a semi-annual basis until 2010. Annual sampling began in 2012. Sampling was not conducted in 2011 because of contracting delays. Site conditions and land use did not change between 2010 and 2012. Groundwater monitoring and inspections conducted in 2012, 2013, and 2014 were evaluated for this Five-Year Review. Groundwater monitoring and inspections were also conducted in May 2015. However, the analytical data were not reviewed or approved by ARNG until August 2015, after the data compilation for this Five-Year Review report.

In 2010, ADEQ enacted a procedural policy that all final technical documents must have a seal and signature of an Arizona registrant. Arizona Revised Statutes (A.R.S.) section 32-144 and A.R.S. section 32-101 specifically exempts officers or employees of the Federal Government acting as such. For non-National Priority List sites (NPL), the Federal Government complies with state environmental laws that fit the definition of substantive, not procedural, applicable or relevant and appropriate requirements (ARARs). Congress has not waived its sovereign immunity in this arena.

Note. Investigations of COCs in soil, groundwater, and surface water at NAAD sites were conducted over multiple years. During that time, the screening levels (SLs) in effect at the time were used in evaluations and remedial decision making. Over time, the SLs were reported with different terms.

For consistency in this report, soil screening levels are referred to as Residential Soil Remediation Levels (R-SRLs) or Nonresidential Soil Remediation Levels (NR-SRLs). The screening levels for soil for groundwater protection of groundwater are referred to as Groundwater Protection Levels (GPLs). Screening levels for groundwater are referred to as SLs. SLs used for groundwater are the Arizona Aquifer Water Quality Standards (AWQS). If no AWQS is available, the SL is the USEPA Regional Screening Level.

3.0 NAAD 01 OLD EOD DEMOLITION AREA

3.1 Introduction

NAAD 01 is a 640-acre, largely forested area, located within the Former OB/OD Area on the southern portion of Camp Navajo. This review addresses only MEC hazards at NAAD 01. As documented in a separate DD, *Decision Document for Seven OB/OD Area CERCLA Sites, Camp Navajo, Arizona* (MKM, 2009), the selected remedy for chemical constituents at NAAD 01 was closure because no unacceptable risk to human health or the environment was present associated with site-related chemical constituents.

NAAD 01 includes the demolition operations area designated as MRWA 01-01, and a kick-out area designated as MRWA 01-02 in the DD (CH2M Hill, 2009). The layout of NAAD 01 is shown on Figure 3-1 (Appendix A).

3.2 Site Chronology

A chronology of site events for NAAD 01 is presented in Table 3-1.

Table 3-1. Chronology of Site Events at NAAD 01

Event	Date
Ordnance demolition activities begin.	1942
All operations ceased.	1970s
The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted an installation-wide preliminary assessment, including site inspections, interviews, and records reviews.	1979
Uribe and Associates conducted a RCRA Facility Assessment on the behalf of USEPA and ADEQ, consisting of site inspections, interviews, and compilation of earlier preliminary assessments and site investigations.	1993
AZARNG conducted a UXO surface sweep and disposal.	1995
Tetra Tech conducted a remedial investigation consisting of soil borings, soil and surface water sampling, and geophysical surveys.	2000
Oak Ridge National Laboratory (ORNL) conducted an airborne geophysical survey.	2002
B&C conducted a footprint reduction project to characterize the extent of MEC contamination throughout the Former OB/OD Area, including digital geophysical surveys and clearance of roadways and fence lines.	2003

Event	Date
CTE Engineers conducted anomaly excavations, and evaluated the quality and usability of the airborne geophysical data.	2004
CH2M HILL conducted a MEC characterization, corrosion study and Hazard Assessment (HA).	2006
MKM conducted a chemical constituent investigation and removal action.	2007
CH2M HILL conducted a MEC surface removal.	2007
The Decision Document for chemical constituents was completed.	2009
The Decision Document for MEC was completed.	2009
CH2M HILL replaced danger signs at MRWA 01.	2012
CH2M HILL prepared an After Action Report for MEC response actions at MRWA 01, MRWA 02, and MRWA 20.	2014

3.3 Background

Site History

NAAD 01 was actively used for ordnance demolition and disposal from 1942 until 1961. Demolition activities focused on the destruction of High Explosive (HE)-filled munitions in shell sizes up to 155 mm; however, some white phosphorus (WP)-filled projectiles and small arms munitions were also detonated. NAAD 01 was also used by the 77th EOD Detachment for demolition and training during its tenure at Camp Navajo, which began in 1970 and ended in the early to mid-1970s.

Investigations in 1979 identified an open disposal pit containing slugs, munitions boxes, small arms brass, and other debris in the central portion of NAAD 01, confirming that open burning operations were conducted in confined areas, using small arms munitions and other materials.

Twenty-seven acres of NAAD 01 correspond to MRWA 01-01, which encompasses historic operations areas. The 613 acres of MRWA 01-02 that surround MRWA 01-01 extend out to the distance associated with the munition with the greatest fragmentation distance (MGFD), assumed to receive MEC and Munitions Debris (MD) resulting from kick-outs during demolition activities. MD does not represent an explosive hazard.

Physical Characteristics

Topography and Surface Water

NAAD 01 consists primarily of a flat prairie and forest situated at elevations between 7,020 and 7,080 amsl. The former operations area consists of a grass-covered open prairie. The kick-out area

consists of forested areas on the south, east and west sides of the site, and the Limited Area boundary road to the north. There are intermittent surface water channels across the former operations area that drain under the road along the northern site boundary. The surface water eventually drains to Volunteer Wash exiting the southern portion of the installation through Volunteer Canyon (B&C, 2009).

Geology

The soil at NAAD 01 was characterized as clayey, with bedrock encountered at depths of 4.5 to 10.5 feet bls during investigation and excavation activities (MKM, 2009)

Erosion and Frost Heave

Frost penetration is conservatively estimated to extend to a maximum depth of two feet at NAAD 01. It is inferred that MEC in the upper two feet of soil could be exposed by the effects of frost heave.

Hydrogeology

Groundwater was not encountered in the soil borings or excavations at NAAD 01. Shallow aquifers have not been encountered during investigations in the Former OB/OD Area (CH2M Hill, 2009).

Natural Resources

During a vegetation survey in 2005, the dominant species identified in the area were blue grama, mountain muhly, sage, yarrow, and squirreltail. Dalmation toadflax, which is an indicator of extensive ground disturbance, was also found in the survey area. Dalmation toadflax is listed by the Arizona Department of Agriculture as a prohibited and restricted noxious weed. No plant species of concern, including threatened and endangered species, have been identified in NAAD 01 (MKM, 2006).

Cultural Resources

One NRHP-eligible cultural site, AZ I:13:328 (Arizona State Museum [ASM]), has been identified at NAAD 01. The feature is a 33- by 10-foot concrete bunker with a 0.617-acre work area (CH2M Hill, 2009).

Land and Resource Use

Currently, NAAD 01 is not used; however, it is available for non-intrusive activities such as navigation training and recreational hunting. NAAD 01 lies within the explosive safety zone for the storage facilities in the Limited Area.

History of Contamination

Environmental investigations at NAAD 01 were initiated in 1979 with an assessment by the United States Army Toxic and Hazardous Materials Agency (USATHAMA). USATHAMA determined that the site was actively used for ordnance demolition and disposal, and for training.

In 1993, a RCRA Facility Assessment (RFA) identified a potential small arms burn cage, a concrete bunker on the south side of the former operational area, and an open disposal pit on the northwest half of the former operations area. The open disposal pit was reported to contain “small arms, brass, slugs, wire, mesh, munitions boxes, one 5-gallon can, broken concrete, and large metal crate sides”. In addition, the RFA identified an earthen mound with a collapsed wooden structure, interpreted to be a munitions storage bunker, near the center of former operations area.

A remedial investigation was conducted at NAAD 01 in 1995 and included a limited ground-based geophysical survey. The results of the geophysical survey were used to identify potential buried ordnance. However, these anomalies were not confirmed through excavation as part of the remedial investigation.

A visual site inspection completed as part of the remedial investigation identified two shallow water-filled pits, a metal debris pile, a mound with a wooden frame structure, a concrete bunker, and a possible open disposal pit. The open disposal pit was noted to contain slugs, munitions boxes, small arms brass, and other debris. No MEC items were reported to have been discovered.

In October 2002, an airborne geophysical survey was conducted at NAAD 01. The airborne geophysical survey identified 926 anomalies in NAAD 01, 162 of which were considered to be cultural features or areas of significant geologic interference. The remaining 764 anomalies were distributed across the site. These anomalies were attributed to the presence of volcanic materials. The anomalies were not investigated as part of the survey.

In 2004, field validation activities and a review of both interpreted and raw geophysical data were conducted to evaluate the validity and usefulness of data collected during the 2002 Airborne Geophysical Survey. According to the data evaluation, visible site features included coils of wire, piles of scrap, metal culverts, pipes, and other ferrous items. The sources of the airborne magnetometer anomalies were confirmed to be ordnance- and range-related scrap at 91 percent of the anomaly locations.

In 2005, a Supplemental MEC Characterization Project was conducted, during which the MRWA designations were developed. A data gap analysis and preliminary site reconnaissance provided information to develop the scope for MEC characterization. The information from the first two evaluations was used to develop the baseline MEC Hazard Assessment (HA).

The data gap analysis was conducted to gather information to delineate and confirm the NAAD 01 operational site boundaries, estimate MEC densities, complete a preliminary evaluation of MEC exposure hazards, and assess short- and long-term explosives safety and environmental risk for

anticipated future land uses. Field activities identified nine suspected primary MEC sources where surface disturbance was noted, indicating areas where disposal or detonation might have occurred.

MEC characterization activities were completed in 2006. Field activities included the investigation of primary MEC source areas, characterization of the distribution and density of MEC and MD in secondary source areas, and a limited corrosion study. Seven of the nine previously identified suspected primary MEC source areas, plus one suspected source area not previously identified, were investigated during MEC characterization. All suspected primary MEC source areas were located within the MRWA 01-01 boundary.

The results indicated that MEC density zones ranged from zero, located near the MRWA 01-01 boundary, to the highest MEC concentration inside MRWA 01-01. The greatest concentration of MD was identified within MRWA 01-01 and on the north side of the Limited Area boundary road.

MEC characterization activities also included the collection and analysis of soil and munitions casing samples to assess physical and environmental conditions that would contribute to degradation of munitions casings. The analysis of the corrosivity potential in the environment indicated corrosion rate for munitions casings ranging from 0.000018 to 0.0054 inch per year. Based on the casing thicknesses of munitions recovered from the site, full penetration of the casings could occur over a period of 49 to 524 years.

The baseline MEC HA was developed for MRWA 01-01 and MRWA 01-02 in accordance with the USEPA MEC HA Guidance (USEPA, 2006). The baseline MEC HA incorporated input factors such as physical hazards, accessibility, contact hours, nature of MEC, potential receptors, and exposure pathways. It followed a numeric structure to weight, score, and combined scores to describe the MEC hazards at MRWA 01. As a result of the baseline MEC HA, a surface MEC removal project was conducted in 2007 (CH2M Hill, 2009).

Site-related chemical characterization, baseline ecological risk assessment, and removal action were conducted at NAAD 01 in 2007. Based on the results, there was no significant risk or hazard from ecological exposures to site-related chemical constituents remaining at NAAD 01. The results were summarized in the *Decision Document for Seven OB/OD Area CERCLA Sites* (MKM Engineers, 2009). In addition, it was concluded that the potential cumulative impact of future releases of MC contained in remaining MEC would be negligible and would not present unacceptable chemical exposure risks to ecological receptors.

A Final After Action Report (AAR) was submitted to the DDESB in 2015 to close out the Explosive Safety Submission project file. The report documented that the explosive safety aspects of the selected response actions had been completed. This report also summarized the intended future land use, LUCs, and LTM. The report concluded that the surface MEC removal action completed at MRWA 01 in 2007 reduced the exposure hazard sufficiently to support the reasonably anticipated future land use (CH2M Hill, 2014).

Initial Response

In May 1995, the AZARNG conducted a UXO surface sweep and disposal operation in NAAD 01 to prevent untrained personnel from coming into contact with potentially live ordnance during nonintrusive field activities. Two 90 mm WP projectiles and one 155 mm HE projectile were reportedly discovered during the surface sweep. These MEC items were removed and disposed of by Camp Navajo (CH2M Hill, 2009).

In 2003, additional removal activities were completed in NAAD 01 and surrounding areas. MEC was removed from the road to permit safe travel by Camp Navajo Security and Fire Protection services and reduced the overall footprint of ordnance-contaminated acreage. The work consisted of conducting site location surveys and mapping, processing and interpreting geophysical survey data, reacquiring and excavating target anomalies, and managing MEC (B&C, 2005b).

During the geophysical survey, reacquisition, and intrusive investigation, a total of 0.64 linear miles of primary and secondary roadways in NAAD 01 were surface cleared. Approximately 8,000 anomalies were recorded that met or exceeded the target selection threshold criteria. Of this total, 141 anomalies (2 percent of total) were selected for reacquisition and intrusive investigation. With the exception of one flare cap, the 129 items recovered were characterized as MD. No MEC items were recovered. The effort resulted in the characterization and clearing of the NAAD 01 road that leads from Gate 13A to the concrete bunker, and the Limited Area boundary road, located along the northern boundary of NAAD 01.

In 2007, a surface MEC removal project was completed at MRWA 01. A total of 43 MEC items were recovered, inventoried, and placed in the appropriate Camp Navajo explosive storage magazines. Figure 3-2 (Appendix A) shows the 2007 surface MEC removal areas within MRWA 01.

All primary areas within NAAD 01 have been investigated, and no additional disposal, detonation, or burial pits are suspected. Subsurface MEC response actions were evaluated, but not implemented at NAAD 01 because the costs were not commensurate with the MEC exposure hazard. Table 3-2 summarizes the subsurface MEC expected to remain at MRWA 01 based on the *Final After Action Report, Munitions and Explosives of Concern Response Actions, MRWA 01, MRWA 02, and MRWA 20, Camp Navajo, Arizona* (CH2M Hill, 2014).

Table 3-2. Summary of Estimated MEC Expected to Remain at NAAD 01

MRWA Subarea	Size (Acres)	Estimated Quantity to Remain	Estimated MEC Type to Remain
MRWA 01-01	27	6 subsurface	M2/M3 AP Mine
			37-mm projectile, M54 HE
MRWA 01-02	613	4 shallow subsurface (0 to 4 inches depth)	M2/M3 AP Mine
			37-mm projectile, M54 HE
			M1A1 AP Mine

Summary of Basis for Taking Action

The results of the updated MEC HA for MRWA 01-01 indicated a Hazard Level 3, which suggested that continued enforcement of access restrictions for future use was consistent with site conditions. However, according to the DD, the results also indicated that the area might not be suitable if future use activities change or modify the existing access restrictions, or change the number of human contact hours.

It was determined that current restricted-access use and reasonably anticipated future uses that include up to 99,646 annual contact hours of nonintrusive activities are compatible with conditions in MRWA 01-02. However, future uses of MRWA 01-02 would include enhanced MEC awareness training and oversight by range management personnel to ensure the types of training and other activities being performed remain consistent with site conditions and the residual explosive risk that remains for MRWA 01-02.

3.4 Remedial Actions

Remedial Action Selection

According to the DD (CH2M Hill, 2009), the primary Remedial Action Objective (RAO) for NAAD 01 is *"to ensure the protection of human health and the environment, commensurate with planned military land use. Secondary RAOs include the following:*

- *Ensure that future land use remains consistent with the military training and storage missions.*
- *Ensure that future site conditions remain consistent with the characterization data used to determine site risk.*
- *Ensure that the LUCs remain appropriate for future land use and site conditions, or are updated to remain protective if future land use and/or site conditions change within the limits of the RAOs listed above.*

The secondary RAOs will be used to evaluate the selected response actions during recurring reviews to assure the long-term protection of human health and the environment."

The Decision Document for MRWA 01 is provided in Appendix I.

The selected response action presented in the DD (CH2M Hill 2009) is LTM consisting of LUCs and inspections. The remedy also includes the requirements summarized in Army and DoD regulations for range management and safety that include existing site physical controls and access prevention measures, security patrols, and MEC awareness and safety training as described in Section 2.0 (Camp Navajo Land Use Controls). The following site-specific tasks are described in the DD:

- *Revision to the Camp Navajo Real Property Development Plan with perimeter boundaries, pertinent features and information regarding land use restrictions and controls. The Camp Navajo Integrated Natural Resource Management Plan, and the Integrated Cultural Resource Management Plan, may be updated as needed;*
- *Development of site-specific MEC awareness training materials, submittal of an After Action Response (AAR) for MEC areas to DDESB, which documents land conditions and the selection of Site-Related LUCs for NAAD 01, and installation of boundary warning signs as required by DDESB;*
- *Development of Land Use Controls Implementation Plan. This plan will include a description, a detailed map, details regarding land use restrictions, land use controls and methods for ensuring the controls and restrictions are effective, the scope and schedule for annual reporting and the 5-year reviews, information regarding the performance of MEC inspections, responsibilities and a presentation of estimated costs for the response action;*
- *Restrictions on future land use including the prohibition of inhabited buildings or structures, parks or playgrounds;*
- *Intervention by the Environmental Office if a non-mission-related land use is planned;*
- *Restrictions on intrusive land use activities due to the presence of subsurface MEC. Intrusive activities will only be permitted with UXO construction support;*
- *Restrictions on the off-site removal of MEC, MD, and soil or debris that may contain MEC or MD, unless properly inspected and certified for release;*
- *Performance of site reviews every 5 years for a period of 30 years, to determine whether the site-related LUCs response action minimizes explosive safety risks and continues to be protective of human health, safety, and the environment. If the results of consecutive 5-year reviews indicate a low risk to users, and no changed site conditions, the Site-related LUCs response action may be re-evaluated to determine whether some of the components are no longer necessary, or the frequency of reviews and site inspections can or may be reduced;*
- *The performance of MEC inspections, if determined to be necessary, following the finding of one or more MEC or a change in site conditions. MEC finds and removal for the period would be evaluated to determine whether MEC exposure risk should be re-evaluated;*
- *Development of an annual report to address and document changes to existing land use controls or site conditions. As a component of the 5-year recurring reviews, the need and/or frequency of the annual reports will be reviewed to determine whether they should be continued.*

Remedial Action Implementation

Site specific LUCs are depicted on Figure 3-3 (Appendix A). Fifty-eight new signs were installed around the boundary at NAAD 01 in 2012. The signs state “DANGER, SUBSURFACE UNEXPLODED ORDNANCE, DO NOT DIG”. The signs were installed at a maximum interval of 100 feet. They were installed at lesser intervals, as necessary, wherever visibility was reduced. Signs along the southern and western boundaries that were originally located within dense forest were moved to the forest-meadow interface for better visibility, while still bounding the former operational area where subsurface MEC may remain. The locations of the signs are shown on Figure 3-3.

Annual inspections and repairs, as necessary have been made since 2010. In 2013 and 2014, the signs were found to be in good condition. No changes in land use were observed.

The LUCs, LUC inspections and reviews, and enforcement actions associated with NAAD 01 will be described in the following documents:

- Land Use Control Implementation Plan (LUCIP). The LUCIP is expected to be completed in 2015-2016 and will include a description of NAAD sites, a detailed map, details regarding land use restrictions, land use controls and methods, the scope and schedule for annual reporting and the 5-year reviews, and information regarding the performance of MEC inspections;
- Long-Term Management/Post-Closure Care (PCC) Work Plan. The LTM/PCC WP is planned for 2015-2016 and will be a comprehensive work plan that unifies the policies and procedures for common tasks that apply to multiple sites. The work plan will summarize the modifications and updates to the LTM program since 2005. The work plan will also include a LUC inspection and review plan, and contain checklists or forms to be used for each site.
- Camp Navajo RPDP. The RPDP will be updated in 2015-2016 to include NAAD 01 boundaries, pertinent features and information regarding land use restrictions and controls (revision planned for 2015- 2016).

Systems Operations/O&M

There are no systems operating at the site. Maintenance activities include replacement of damaged fencing and signs, as necessary.

3.5 Progress Since Last Review

This is the first Five-year Review for NAAD 01.

3.6 Site-Specific Five-Year Review Process

Document Review

This Five-Year Review included a review of key documents for the site including:

- Decision Document for Seven OB/OD Area CERCLA Sites, Camp Navajo, Arizona (MKM, April 3, 2009);
- MRWA 01 and MRWA 20 MEC Decision Document, Camp Navajo (CH2M Hill 2009);
- Installation, Replacement and Repair of Signs and Barriers, MRWA 01 and MRWA 02, Camp Navajo, Arizona, Technical Memorandum (CH2M Hill, March 2013);
- 2013 Camp Navajo fence, sign, and barrier inspections and repairs, Memorandum for Record (Camp Navajo, January 2014);
- Final After Action Report, Munitions and Explosives of Concern Response Actions, MRWA 01, MRWA 02, and MRWA 20, Camp Navajo, Arizona (CH2M Hill, April 2014); and
- 2014 Camp Navajo LUCs Inspections and Review, Camp Navajo, Technical Memorandum, draft (Camp Navajo, May 2015).

Data Review

No new data has been generated since the remedy was been implemented at NAAD 01.

Site Inspection

The site inspection was conducted on 21 May 2015. Present at the site inspection were Joan Cullen and Brittany Hyde (USACE-Louisville District), Randall Wilkinson (ARNG), Kim Birdsall (AZARNG), and Karin Harker (ADEQ). Photographs of the site as observed during the site visit are provided in Appendix B. Site Inspection forms are provided in Appendix D.

The inspection of NAAD 01 on 21 May 2015 noted the following observations:

- Security measures were enforced at the access gate to Camp Navajo and to the Limited Area;
- A security fence surrounds the Limited Area and serves as the northern boundary of NAAD 01. Access to NAAD 01 required a padlock key;
- Signage was in place around the boundary of NAAD 01 and in good condition;
- "DANGER" SUBSURFACE UNEXPLODED ORDNANCE" "DO NOT DIG" signs were posted every 100 feet or less;

- No evidence of intrusive activities was observed; and
- Scattered MD was observed at NAAD 01.

Interviews

Mr. Randy Wilkinson (ARNG) was asked for information concerning the history and LUCs at NAAD 01 and indicated that suspect UXO in the surface area was believed to have been addressed by a couple of removal actions. Inert metal debris (MD) has been occasionally observed on the surface. He further indicated that he is in the area several times a year and would confirm that no digging or other potential intrusive activities are occurring at NAAD 01. Mr. Wilkinson stated that the remedy appears to be working as intended and that the Camp Navajo RPDP is expected to be updated in 2015 or 2016 to include the LTM sites depending on funding availability.

Ms. Karin Harker (ADEQ) responded in writing that monitoring for potential MEC, base-wide munition awareness educational programs, land use controls and access controls should be maintained. Annual inspections and reports should be conducted.

Mr. Wayne Miller (ADEQ), former project manager for Camp Navajo, responded in writing that the current program was acceptable. He also noted that there had been no communication in the preceding 3 years, but was not expecting activities at the site. He further responded that there had been no complaints, violations or other incidents related to NAAD 01 that required a response by ADEQ. Monitoring for potential MEC, base-wide munition awareness education programs, land use controls and access controls should be maintained.

Interview Records are included in Appendix C.

3.7 Technical Assessment

The objective of this Five-Year Review is to evaluate if the remedy at NAAD 01 remains protective of human health and the environment. The technical assessment of the protectiveness of the remedy is based on the responses to the following three questions posed in the USEPA Comprehensive Five-Year Review Guidance (EPA 540-R-01-007/OSWER No. 93557-03B-P, June 2001):

1. Question A: Is the remedy functioning as intended by the decision documents?
2. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents? YES

The review of documents, risk assumptions and the results of the inspection of NAAD 01 indicates that the remedy is functioning as intended by the RAOs presented in the DD. MEC clearance has been completed at NAAD 01 minimizing exposure to MEC.

Mission-related LUCs ensure that land use is consistent with military training and storage missions. LUCs require Camp Navajo personnel to inspect and maintain fences and signs around the installation boundary and at NAAD 01.

Intrusive activities on Camp Navajo require an excavation permit and a REC, both of which enable the potential identification of explosive hazards and environmental impacts at NAAD 01, and the need for UXO construction support. Inspections ensure that the LUCs remain appropriate for site conditions.

The LUCIP is expected to be completed in 2015-2016. The Camp Navajo RPDP is scheduled to be updated in 2015-2016 and will include NAAD 01 boundaries, pertinent features and information regarding land use restrictions and controls.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? YES

There are no changes for the exposure assumptions and remedial action objectives since the final remedy was put in place. There have been no changes in the physical conditions that would reduce the protectiveness of the remedy. The only potential exposure pathway identified in the DD was exposure to subsurface soils by intrusive activities (i.e. digging, trenching, or drilling) which are addressed by the LUCs which were observed to be in place.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? NO

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, site inspection, and interview, the remedy is functioning as intended by the DD. There have been no changes in the physical conditions at NAAD 01 that would affect the protectiveness of the remedy. There have been no changes in land use or accessibility. LUCs are in place that restrict access to NAAD 01 and inspections are conducted to monitor LUCs. There is no other information that calls into question the protectiveness of the remedy

3.8 Issues

No issues were identified during the Five-Year Review that affect current or future protectiveness.

3.9 Recommendations and Follow-up Actions

No follow-up or additional actions are necessary for the remedy at NAAD 01 to remain protective of human health and the environment.

3.10 Protectiveness Statement

The remedy at NAAD 01 is protective of human health and the environment. The remedy is LTM consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Primary MEC areas within NAAD 01 have been investigated and removal actions have been completed. No additional source areas are suspected to be present on the ground to a depth of one-foot;
- Soil and surface water were investigated, and soil removal actions were completed in 2007. No unacceptable risks due to site-related chemical constituents remain;
- The surface MEC removal action completed at NAAD 01 in 2007 reduced the exposure hazard to allow for military training;
- There are no complete exposure pathways for humans or wildlife. Subsurface exposure to MEC is limited by LTM which includes LUCs and inspections;
- LUCs include access restrictions, MEC awareness training, and non-residential land use;
- Warning signs are installed at 100-foot or less intervals around the boundary;
- Dig permits and Records of Environmental Consideration (RECs) are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office; and
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions.

3.11 Next Review

The next Five-Year Review for NAAD 01 will be conducted in October 2020.

4.0 NAAD 11B TNT WASHOUT FACILITY

4.1 Introduction

NAAD 11B is located in the central portion of the Ammunition Workshop Area, which is located within the Limited Area of Camp Navajo. It is the site of a former TNT washout facility, consisting of Building 318 and the former Building 319. Three former TNT wastewater lagoons are located south of the buildings (Figure 4-1, Appendix A).

4.2 Site Chronology

A chronology of site events for NAAD 11B is presented in Table 4-1.

Table 4-1. Chronology of Site Events at NAAD 11B

Event	Date
Operations involved washing out 2,4,6-trinitrotoluene (TNT) and other explosives from ordnance undergoing demilitarization. Explosives-contaminated wastewater from Building 318 was discharged to the former TNT wastewater lagoons.	1940s-1972
The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted an installation-wide preliminary assessment, including site inspections, interviews, and records reviews.	1979
Environmental Science and Engineering performed an environmental survey of the Navajo Army Depot. Activities included soil borings and sampling, monitoring well installation, and groundwater and surface water sampling.	1981
Arizona Department of Health Services (ADHS) and USEPA performed groundwater and surface water sampling.	1984
Malcolm Pirnie performed a RCRA closure investigation consisting of soil borings and soil sampling.	1988
USAEHA performed well installations, soil sampling and groundwater sampling.	1989-1990
Uribe and Associates conducted a RCRA Facility Assessment on the behalf of USEPA and ADEQ, consisting of site inspections, interviews, and compilation of earlier preliminary assessments and site investigations.	1993
Tetra Tech performed a remedial investigation/feasibility study. Activities included a passive soil gas survey, surface and subsurface soil sampling, groundwater sampling, and geophysical surveys.	1995-1997

Event	Date
Morrison Knudson performed an interim removal action, which included soil excavation and verification sampling.	1996
ITC performed a supplemental remedial investigation/feasibility study. Activities included surface and subsurface soil sampling, groundwater monitoring and sampling, surface water sampling, and geophysical surveys.	1998-2001
An interim removal action was performed that included Building 319 demolition, soil excavation, and verification soil sampling.	1999
Clayton Group Services, under the supervision of B&C, performed a limited excavation.	2002
B&C performed a final soil characterization, which included well installation and surface and subsurface soil sampling, as well as excavation of two areas in the former TNT wastewater lagoons.	2002
MKM conducted LTM groundwater monitoring well rehabilitation and initiated quarterly sampling.	2005
LTM groundwater sampling frequency was reduced to semiannual monitoring.	2007
MKM initiated ramp-down of LTM groundwater monitoring program.	2007
MKM performed a risk screening for RDX.	2008
First CERCLA 121(c) Five-Year Review.	2010

4.3 Background

Site History

Operations at Buildings 318 and 319 began in the 1940s and involved washing TNT and other explosives from ordnance undergoing demilitarization. After the TNT was washed out of a shell, it was heated to a molten state and passed through a flaker that converted the molten TNT into flakes of dry TNT. The dry TNT then was packaged for reuse. Explosives-contaminated wastewater from Building 318 was discharged to the former TNT wastewater lagoons via an open, unlined trench or feeder canal until January 1953, when the facility changed to a closed system.

Washout operations were discontinued at Buildings 318 and 319 in 1972 when TNT cleaning equipment was removed from NAAD 11B. Building 319 was demolished in 1999.

Physical Characteristics

Topography and Surface Water

NAAD 11B is located area, within what has been termed the "Prairie Area," where the topography has relatively low relief and slopes to the south. The base of an outcrop, with a minimum relief of approximately 40 feet above the investigation area, is located about 200 feet north of Building 318. Rail tracks and service roadways are located along the base of the hill on a northwest-southeast orientation. Building 319 was formerly situated in a topographically low area. Lower Reservoir Road is located southwest of the former Building 319, with a culvert that drains the topographically low area to open areas south of the road. The area is generally lacking in vegetative cover with only various types of short grasses, forbs, and shrubs.

There are no persistent surface water bodies at NAAD 11B. Surface runoff flows south to Volunteer Wash.

Geology

NAAD 11B is located on surficial soil consisting of alluvium that is underlain by clay and sand deposits of the Camp Navajo Clay to a depth of approximately 55 feet. The Camp Navajo Clay is exposed in the hill slope north of NAAD 11B where it is capped by volcanic rocks of the Wild Bill Hill Basalt. Basalt flows, attributed to the Hart Prairie and Volunteer Mountain vents, are exposed several thousand feet west of NAAD 11B.

Northeast-to-southwest-trending faults that displace the Camp Navajo Clay and the underlying Volunteer Mountain Basalt are located approximately 100 feet west and 600 feet east of NAAD 11B. Displacement across the fault to the west is upward on the southeast side, while displacement across the fault to the east is upward on the northwest side, which results in barriers to effective groundwater flow to the west and east (B&C, 2010).

Hydrology

Depth to shallow groundwater at NAAD 11B is encountered at depths between 9 to 40 feet bls in sand units in the Camp Navajo Clay. The sand units are very thin and yield very little water, as indicated by the low purge rates and purge volumes during annual monitoring events. The potentiometric surface map shows a moderate gradient across NAAD 11B from southeast to northwest. This gradient is likely the result of recharge by natural springs to the east and northeast. Infiltration appears to be enhanced in the vicinity of the springs creating an apparent gradient toward the northwest while water levels remain relatively steady in the central portion of NAAD 11B (PIKA, 2014).

Natural Resources

No species of concern, including threatened and endangered species, have been reported within or near NAAD 11B.

Cultural Resources

No archaeological sites have been reported at NAAD 11B.

Land and Resource Use

NAAD 11B is not currently being used. There are no plans for future land use.

History of Contamination

Investigations at Camp Navajo in 1989 and 1990 included a number of field studies across the Ammunition Workshop Area. Analysis of the soil samples from these studies indicated the presence of metals, explosives, and nitrates, at concentrations below the R-SRL. Groundwater analysis results from these studies identified volatile organic compounds (VOCs), sulfate, nitrate, metals, and explosive compounds, also at concentrations below AWQSS values. However, an evaluation of these monitoring wells determined that the majority of them were not close enough to accurately evaluate groundwater quality at NAAD 11B.

An Interim Removal Action (IRA) was conducted at NAAD 11B in October 1996 to remove soil with concentrations of TNT above NR-SRLs. Approximately 90 cubic yards of soil southwest of Building 319 was excavated to variable depths from 18 to 24 inches. TNT, 2,4-dinitrotoluene (DNT), octahydro-1,3,5,7-tetramitro-1,3,5,7-tetrazine (HMX), and Royal Demolition Explosive (RDX), were detected in the confirmation samples at concentrations sufficiently above NR-SRLs to cause suspension of further excavation until the extent of explosives was defined.

A remedial investigation was conducted at NAAD 11B between 1995 through 1997. The investigation included the sampling and analysis of surface and subsurface soils, and groundwater from eight monitoring wells installed in the vicinity of Buildings 318 and 319. The surface and subsurface soil samples were analyzed for potential COCs, which included metals, explosives, VOCs, nitrate/nitrite, and nitrogen as ammonia. The sample results identified several compounds at concentrations that exceeded their respective NR-SRLs in soil. Metals, nitrate/nitrite, RDX, and HMX were detected in groundwater. However, only RDX was present at concentrations above the SL for groundwater (B&C, 2010).

Results of the initial RI indicated that further characterization of soil and groundwater around Building 319 was necessary. A Supplemental Remedial Investigation (SRI) was initiated in June 1998 to further delineate explosives and metals in soil and groundwater. The SRI included investigation of surface soil in the former TNT wastewater lagoon, in subsurface soil around Building 319, and in areas proximal to Building 319. Of the soil samples collected from the former TNT wastewater lagoon, only one sample contained explosive compounds, with the concentrations of TNT and 1,3,5-trinitrobenzene (TNB), above their respective R-SRLs. No concentrations of explosives were above their respective R-SRLs in the subsurface soils around Building 319.

A total of ten metals were detected in subsurface SRI samples from the vicinity of Building 319. The majority of detected metals were below their respective R-SRLs. However, multiple samples from seven boreholes contained concentrations of arsenic and beryllium above their respective SRLs.

In 1999-2000, a second IRA was conducted in the vicinity of Building 319 to remediate concentrations of explosives above NR-SRLs. Prior to initiation of the IRA, Building 319 was demolished. Confirmation samples following the IRA indicated that concentrations of explosive compounds remaining in soils were below their respective R-SRLs.

Between 1998 and 2002, RDX and TNT continued to be detected in groundwater samples at NAAD 11B wells. Explosive constituents were consistently detected in three wells, and either isolated or sporadically in four other wells (B&C, 2010).

In 2002, additional subsurface soil sampling was conducted at NAAD 11B in conjunction with the drilling of a soil boring for the installation of monitoring well MW02-01. Soil samples were collected at depths of 10, 20, 30, and 40 feet bgs. The subsurface soil samples were analyzed for metals, explosive compounds, nitrate and nitrite. With the exception of beryllium in the 10 feet bgs sample, the concentrations of other detected analytes were less than their respective R-SRLs.

Following a limited IRA performed in 2002 from two limited areas in the former TNT wastewater lagoon, confirmation soil samples were collected and analyzed for explosives and metals. Analytical results for the soil samples from both excavations indicated no detections for explosives. Except for beryllium, concentrations of metals were either non-detect or present at concentrations less than the R-SRL.

Camp Navajo collected two years (eight quarters) of groundwater monitoring data from the regional aquifer wells located north and east of NAAD 11B. Quarterly sampling began in August 2004 and was completed in June 2006. All detected concentrations of COCs for NAAD 11B were below their respective AWQSSs.

Results of the Tier 1 human health risk assessment (HRA) indicated that detected chemicals in soil at NAAD 11B passed the NR-SRL for soil. A limited number of constituents were carried into a Tier 2 HRA because the reporting limits exceeded the R-SRL. Results of a Tier 1 and Tier 2 HRA indicated that there was no unacceptable risk from human exposures attributable to chemical constituents in soil at NAAD 11B (B&C, 2010).

None of the metals detected during the characterization or IRA confirmation sampling were determined to pose a risk to groundwater quality. A leaching to groundwater evaluation was not conducted for explosives because SLs were not established at the time. However, monitoring data appear to confirm that the removal actions in 1996, 2000, and 2002 minimized migration of contaminants to groundwater.

Initial Response

An IRA to remove soil with concentrations of TNT above the NR-RSL was completed at NAAD 11B in 1996. The excavation involved the removal of soil (to depths of 18 to 24 inches) southwest of Building 319. Confirmation samples detected TNT; DNT; HMX; and RDX, at concentrations above their respective NR-SRLs.

A second IRA, was conducted between 1998 and 2000, and included the demolition of Building 319 and foundation removal. At the conclusion of Building 319 foundation removal, approximately 800 cubic yards of soil were excavated to a level estimated to be one foot below the former foundation. An additional 198 cubic yards were excavated to a depth approximately four feet below the overall base of the excavation at specific locations.

Final verification sampling indicated that TNT and RDX were detected at concentrations below their respective R-SRLs. Concentrations of TNB remained above the R-SRL in the central and southern portion of the excavation. However, further soil removal was constrained by the proximity of Lower Reservoir Road.

During the Final Characterization at NAAD 11B in 2002, two additional areas in the former wastewater lagoons were excavated to a depth of two feet bls. Confirmation soil samples from the bottom of the excavations confirmed that concentrations of detected analytes were below their respective R-SRLs, with the exception of beryllium with a concentration of 2 mg/kg in the 10 feet bls sample. In 2007, the R-SRL for beryllium was increased to 150 mg/kg.

Summary of Basis for Taking Action

As described in the DD, the basis for taking action at NAAD 11B was, *"Since no unacceptable risk is associated with chemical constituents in the soil at NAAD 11B, no further remedial action is planned and the site IRP status is considered remedy in place for chemical constituents present within the soil. Because final data and risk assessment results confirmed that no further remedial action is required to satisfy CERCLA/NCP risk-based cleanup requirements for contaminants in soil, further evaluation of remedial alternatives was not performed. No action, including use restrictions, is necessary to protect human health and the environment from site-related chemical constituents present within soils at NAAD 11B.*

However, explosive compounds continue to be detected in some of the wells at NAAD 11B. Furthermore, while RAOs for previous soil removal actions included protection of groundwater, action levels (GPLs) for explosives were not quantified and residual explosives concentrations in soil above GPLs may remain. Therefore, groundwater monitoring and LUCs are appropriate to verify the effectiveness of the completed removal action."

4.4 Remedial Actions

Remedial Action Selection

The remedy selected for NAAD 11B is LTM consisting of LUCs, groundwater monitoring, and inspections. The RAOs for NAAD 11B described in the DD are:

- *"Monitor groundwater quality to ensure the protectiveness of the removal action and to support recommendations for ramp-down or closure;*
- *Evaluate the reproducibility and accuracy of the analytical data collected from groundwater monitoring locations;*
- *Verify the protection of groundwater quality by comparing analytical results to screening levels and evaluating the data for trends;*
- *Maintain the integrity of the monitoring well surface completions; and*
- *Restrict the use of shallow groundwater within NAAD 11B until contaminant concentrations are determined to be acceptable".*

The duration of groundwater monitoring is based on the ramp-down strategy (Figures 2-2, 2-3, and 2-4, Appendix A). According to the LTM WP, wells that have been sampled for six monitoring events, without exceedences of screening criteria for COCs may be removed from LTM with ADEQ concurrence. If only minor exceedences (below 15% based on Laboratory Control Sample criteria in Master Quality Assurance Project Plan) are observed in onsite or adjacent monitoring wells, and COCs are not detected at concentrations above the screening criteria in downgradient well(s), the site may be removed from LTM with ADEQ concurrence.

Remedial Action Implementation

The LTM groundwater sampling program has been conducted over a nine-year period and has included four rounds of quarterly sampling (4Q05, 1Q06, 2Q06, 3Q06), eight rounds of semiannual sampling (Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009, Fall 2009, Spring 2010, and Fall 2010), and three rounds of annual sampling (2012, 2013, and 2014). The data collected in 2014 at NAAD 11B were assessed according to the ramp-down strategies (PIKA, 2014).

The integrity of the monitoring well surface completions, wells, and locks at NAAD 11B have been inspected on a regular basis as part of the monitoring program. The most recent inspection was conducted in May 2014. The well completions, caps, and locks were reported to be in good condition.

LUCs are in place that restrict the use of shallow groundwater at NAAD 11B.

The LUCs, LUC inspections and reviews, and enforcement actions associated with NAAD 11B will be described in the following documents:

- LUCIP. The LUCIP is expected to be completed in 2015-2016 and will include a description of NAAD sites, a detailed map, details regarding land use restrictions, land use controls and methods, the scope and schedule for annual reporting and the 5-year reviews, and information regarding the performance of MEC inspections;
- LTM/PCC WP. The LTM/PCC WP is planned for 2015-2016 and will be a comprehensive work plan that unifies the policies and procedures for common tasks that apply to multiple sites. The work plan will summarize the modifications and updates to the LTM program since 2005. The work plan will also include a LUC inspection and review plan, and contain checklists or forms to be used for each site.
- Camp Navajo RPDP. The RPDP will be updated in 2015-2016 to include NAAD 11B boundaries, pertinent features and information regarding land use restrictions and controls (revision planned for 2015- 2016).

Systems Operations/O&M

There are no systems operating at NAAD 11B. Maintenance activities include repairs to well surface completions, as necessary.

4.5 Progress Since Last Review

The previous Five-Year Review (MKM, 2010) concluded that *"The remedy appears to be protective of human health and the environment. All threats at the site have been addressed through the removal actions at NAAD Sites 11B, 14D, 14G, and 43, through the stabilization and capping of the landfill at NAAD 40, and through the implementation of LUCs at all sites.*

Long-term protectiveness of the removal actions will continue to be monitored by groundwater sampling during year five of the LTM program. Current data indicate that the remedies are functioning as intended at all sites."

Table 4-2 summarizes the issues and recommendations from the previous Five-Year Review, as well as follow-up actions since 2010. Annual groundwater monitoring was conducted at NAAD 11B in August 2012, May 2013, and May 2014. The annual LTM reports summarize data collected during the sampling event and evaluate data collected since 2005 to monitor the effectiveness of the implemented remedial actions (time-series plots and Mann-Kendall Statistical Tests). The LTM reports also made recommendations for optimizing the sampling program, and to ramp down monitoring activities to achieve site closure.

The evaluation of data since the previous Five-Year Review indicated that RDX continues to be detected above the SL of 0.61 µg/l consistently in three wells, and sporadically in four wells. In 2014, RDX concentration exceeded the SL in six wells. There were no exceedences of other

analytes. No changes were recommended for the monitoring program for NAAD 11B in the 2014 LTM report.

The feasibility of biological treatment of RDX in groundwater at NAAD 11B was evaluated in 2013. The evaluation concluded that the subsurface conditions at NAAD 11B are not optimal for the use of in-situ treatment technologies. JD2 concluded that the currently available in-situ groundwater treatment technologies were unlikely to be successful in remediating the RDX contaminated groundwater below the residential SL (JD2, 2013).

Table 4-2. Issues, Recommendations, and Actions Taken since the Last Five-Year Review

Issue	Recommendation	Follow-Up	Status
The presence of dry wells or the intermittent nature of water in some wells makes the interpretation of groundwater gradients difficult.	Conduct sampling in the spring to increase the chances of water being present in site wells.	The recommendation was adopted in the 2012 LTM WP Addendum. Sampling was conducted in the spring of 2013, 2014, and 2015.	Complete
The LUCs for NAAD 11B have not been formally documented in the Camp Navajo RPDP.	Update the Camp Navajo RPDP	The plan is scheduled to be updated in 2015-2016.	To be completed 2015-2016
	Reduce the sampling frequency at NAAD 11B to annual frequency and implementing further ramp-down procedures as appropriate	Sampling was reduced to annual frequency in 2012. A letter LTM WP Addendum summarized the changes for the 2012 LTM groundwater monitoring and reporting tasks.	Complete
	Adopt the revised Ramp-down figures	A letter WP Addendum summarized the changes for the 2012 LTM groundwater monitoring and reporting tasks.	Complete
	Adopt updated SLs for remedy evaluation and ramp-down criteria for the annual sampling;	The updated SLs were adopted in the 2012 LTM WP Addendum	Complete
	Report non-detects to the MRLs* instead of MDLs.**	Non-detects have been reported to the MRL since 2012. A letter WP Addendum summarized the changes for the 2012 LTM groundwater monitoring and reporting tasks.	Complete

*MRL - Method Reporting Limit

**MDL - Method Detection Limit

4.6 Site-Specific Five-Year Review Process

Document Review

This Five-Year Review consisted of a review of relevant documents including:

- Arizona Administrative Code (AAC). *Water Quality Standards for Surface Water, Title 18, Chapter 11, Article 1. Appendix A. Numeric Water Quality Criteria. Table 2. Aquatic & Wildlife Designated Uses: Ephemeral Standards for Aquatic and Wildlife (Acute)*;
- Arizona Administrative Code (AAC). *Aquifer Water Quality Standards (AWQS), Title 18, Chapter 11, Article 4*;
- Long Term Management Work Plan for NAAD Sites 11B, 14D, 14 G, 40 and 43, Camp Navajo, Arizona, MKM, 2005;
- Decision Document for Five Long-Term Management Sites NAAD 11B, 14D, 14G, 40, and 43, Brown & Caldwell, December 2010;
- Five-Year Review Report for Five IRP Sites (NAAD 11B, 14D, 14G, 40, and 43) at Camp Navajo, Bellemont, Arizona, MKM, October 2010;
- 2012 Long-Term Management Groundwater Monitoring Report for NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, May, 2013;
- 2013 Long-Term Management Groundwater Monitoring Report for NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, January 2014;
- Review of Potential Approaches for Biological Treatment of RDX Contaminated Groundwater at NAAD 11B, Building 318, Camp Navajo, Arizona, JD2 Consulting, December 2013; and
- 2014 Long-Term Management Groundwater Monitoring Report for NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, October 2014.

Data Review

Based on the documents reviewed, there are no current exposure pathways that could adversely impact human health and the environment. The Tier 1 HRA indicated that all detected constituents in soil at NAAD 11B passed the NR-SRL. Several constituents that exceeded the R-SRL were carried into a Tier 2 HRA. The results of the Tier 2 HRA indicated that concentrations of constituents posed no unacceptable risk for non-residential use.

Shallow groundwater at NAAD 11B is encountered at depths between 9 to 40 feet bls in sand units in the Camp Navajo Clay. The sand units are very thin and yield very little water, with low purge rates and purge volumes. Wells are screened in multiple Camp Navajo Clay sandy units resulting in a wide range of measured elevations.

The potentiometric surface for the 2014 groundwater monitoring event is provided on Figure 4-2 (Appendix A). According to the 2014 LTM report, the potentiometric surface map for NAAD 11B shows a moderate gradient across the site from southeast to northwest. The gradient slopes from monitoring wells 98-01 and 97-10 in the east and southeast toward a potentiometric low to the west of wells 99-03, 00-01 and 02-02. The report attributes the gradient to recharge by natural springs to the east and northeast of well 98-01. Well 02-01 was not included in the potentiometric assessment because the well is screened in Tertiary Gravel Deposits (Tg1) and not in the Camp Navajo Clay sand layers. The wells in the northwestern portion of the site have been historically dry. Well 97-07 was dry during the 2014 monitoring event and could not provide data to establish the direction of the groundwater gradient. Although a water level was not collected from well 99-01 during this assessment, historically wells 02-04 and 99-01 have indicated a groundwater gradient in a southerly direction.

The potentiometric surface from the 2012 and 2013 monitoring events are shown on Figure 4-3 and 4-4, respectively (Appendix A). These figures show a similar gradient to Figure 4-2.

According to the 2014 LTM report, 11 groundwater samples and two duplicate samples were collected from NAAD 11B. Explosives were detected at concentrations above their respective Method Reporting Limits (MRLs) in six of the 11 monitoring wells sampled. The detected analytes include the following:

- RDX – monitoring wells 97-04, 97-05, 97-06, 97-08, 00-01, and 00-02;
- 4-A-2,6- DNT – monitoring wells 97-05, 97-08, 00-01, 00-02, and 02-02; and
- 2-A-4,6-DNT – monitoring wells 97-05, 00-01, 00-02, and 02-02.

RDX was the only analyte detected at concentrations above the SL in monitoring wells 97-04, 97-05, 97-06, 97-08, 00-01, and 00-02 (Figure 4-5). Detected concentrations of 4-A-2,6-2-DNT, 2-A-4,6-DNT, and TNT were below their respective SLs. Arsenic was detected at a concentration below the SL in a sample collected from well 98-03.

Table 4-3 summarizes the detected results in 2014 and exceedances (highlighted) when compared to the respective SLs. The SL for 2-A-4,6-DNT and 4-A-2,6-DNT was updated to 30 µg/L from 73 µg/L in accordance with the Letter WP Addendum (PIKA, 2012). The locations of the RDX SL exceedances at NAAD 11B are shown on Figure 4-6.

As part of the 2014 LTM evaluation, historical trends based on time-series plots and Mann-Kendall trend analysis were evaluated. Results are provided in Appendix G. The 2014 LTM report concluded that based on the groundwater potentiometric surface gradient and eight years of groundwater analytical results, the plume appears to be stable and does not appear to be migrating from the source area (PIKA, 2014). Changes in the plume appear to be influenced by the seasonal presence or absence of groundwater.

A review of the data and analysis during this Five-Year Review indicated that the plume appears stable and is not increasing in size, which is consistent with the conclusions of the 2014 LTM report.

Table 4-3. Summary of the 2014 NAAD 11B Detected Results.

MW ID	Sample Number	Sample Date	Method	Analyte	Result	Units	SL
97-04	ND11B-WTR97-04-2014-A	5/13/14	8330A	RDX	0.96 J	µg/L	0.61
97-04	ND11B-WTR97-04-2014-B	5/13/14	8330A	RDX	1.1 J	µg/L	0.61
97-05	ND11B-WTR97-05-2014-A	5/13/14	8330A	2-A-4,6-DNT	1.9 J	µg/L	30
97-05	ND11B-WTR97-05-2014-A	5/13/14	8330A	4-A-2,6-DNT	16 J	µg/L	30
97-05	ND11B-WTR97-05-2014-A	5/13/14	8330A	RDX	140	µg/L	0.61
97-06	ND11B-WTR97-06-2014-A	5/13/14	8330A	RDX	0.85	µg/L	0.61
97-06	ND11B-WTR97-06-2014-B	5/13/14	8330A	RDX	0.86	µg/L	0.61
97-08	ND11B-WTR97-08-2014-A	5/14/14	8330A	4-A-2,6-DNT	0.66	µg/L	30
97-08	ND11B-WTR97-08-2014-A	5/14/14	8330A	RDX	18	µg/L	0.61
98-03	ND11B-WTR98-03-2014-A	5/14/14	6020	Arsenic	3.9 J	µg/L	10
00-01	ND11B-WTR00-01-2014-A	5/14/14	8330A	2-A-4,6-DNT	2.4	µg/L	30
00-01	ND11B-WTR00-01-2014-A	5/14/14	8330A	4-A-2,6-DNT	8.1	µg/L	30
00-01	ND11B-WTR00-01-2014-A	5/14/14	8330A	2,4,6-TNT	0.41	µg/L	2.2
00-01	ND11B-WTR00-01-2014-A	5/14/14	8330A	RDX	33	µg/L	0.61
00-02	ND11B-WTR00-02-2014-A	5/14/14	8330A	2-A-4,6-DNT	2.1 J	µg/L	30
00-02	ND11B-WTR00-02-2014-A	5/14/14	8330A	4-A-2,6-DNT	11	µg/L	30
00-02	ND11B-WTR00-02-2014-A	5/14/14	8330A	RDX	79	µg/L	0.61
02-02	ND11B-WTR-02-02-2014-A	5/12/14	8330A	2-A-4,6-DNT	2.7 J	µg/L	30
02-02	ND11B-WTR-02-02-2014-A	5/12/14	8330A	4-A-2,6-DNT	4.8 J	µg/L	30

Highlighted results are greater than the SL

2-A-4,6-DNT – 2-amino-4,6-dinitrotoluene

4-A-2,6-DNT – 4-amino-2,6-dinitrotoluene

RDX – hexahydro-1,3,5-trinitro-1,3,5-triazine

2,4,6-TNT – 2,4,6-Trinitrotoluene

SL – screening level

J – estimated value

UJ – Reporting limit is estimated

µg/L – micrograms per liter

Site Inspection

The site inspection was conducted on 21 May 2015. Present at the site inspection were Joan Cullen and Brittany Hyde (USACE-Louisville District), Randall Wilkinson (ARNG), Kim Birdsall

(AZARNG), and Karin Harker (ADEQ). Photographs of the site as observed during the site visit are provided in Appendix B. Site Inspection forms are provided in Appendix D.

The inspection on 21 May 2015 noted the following observations:

- Security measures were enforced at the access gate to Camp Navajo and to the Limited Area;
- Monitoring wells were identified, locked, and pads were in good condition;
- No evidence of intrusive activities were observed at NAAD 11B; and
- No unusual soil staining was observed at NAAD 11B.

Interviews

Mr. Randy Wilkinson (ARNG) was asked for information concerning the history and LUCs at NAAD 11B and indicated that surface soils met standards for residential use. He further indicated that he is in the area several times a year to observe NAAD 11B and that the remedy appears to be protective. Mr. Wilkinson indicated that there were no water supply wells nearby that could be impacted based on distance and depth to the regional aquifer. A contract to continue LTM monitoring at NAAD 11B is expected to be awarded in 2015-2016. The Camp Navajo Real Property Development Plan is expected to be updated in 2015-2016 depending on funding availability.

Ms. Karin Harker (ADEQ) responded in writing that ADEQ receives regular monitoring reports for NAAD 11B from Camp Navajo Contractors. Randy Wilkinson (ARNG) has made information and the site accessible. Continual communication regarding scheduled field activities, annual inspections, sampling events, and expected reporting activities would be helpful and appreciated. Ms. Harker further reported that ongoing monitoring at NAAD 11B is acceptable. The long-term monitoring agreement is an agency-accepted document, and the groundwater monitoring and contaminant analytics are acceptable. However, she noted that the hydrogeologic regime, contaminant delineation, contaminant fate, and contaminant transport may be differently interpreted by different individuals.

Mr. Wayne Miller (ADEQ), former project manager for Camp Navajo, responded in writing that for NAAD 11B, the current program was acceptable. ADEQ receives regular monitoring reports from Camp Navajo contractors. Over the last 5 five years, ADEQ personnel visited Camp Navajo on average once a year. He further responded that there had been no complaints, violations or other incidents related to NAAD 11B that required a response by ADEQ.

Interview forms are included in Appendix C.

4.7 Technical Assessment

The objective of this Five-Year Review is to evaluate if the remedy at NAAD 11B remains protective of human health and the environment. The technical assessment of the protectiveness of the remedy is based on the responses to the following three questions posed in the USEPA Comprehensive Five-Year Review Guidance (EPA 540-R-01-007/OSWER No. 93557-03B-P, June 2001):

1. Question A: Is the remedy functioning as intended by the decision documents?
2. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents? YES

The review of the DD, monitoring reports, site inspection, and analytical data collected since the previous Five-Year Review indicates that the remedy is functioning as intended by the DD.

The removal actions in 1996, 2000, and 2002 achieved the remedial objectives to minimize migration of contaminants to groundwater, and prevent direct contact with, or ingestion of COCs identified at the site.

RDX remains in the groundwater at concentrations above the SL of 0.61 ug/l. However, monitoring data confirms that impacted groundwater has been delineated and confined below the source area in shallow intermittent lenses that do not appear to be connected to the regional groundwater. The data also demonstrate stable or slightly decreasing contaminant levels indicating that historic soil removal actions were effective.

The LTM program is effective in monitoring conditions at NAAD 11B to identify changes that might impact the protectiveness of the remedy.

The LTM data indicated that the RDX plume at NAAD 11B is stable. The implementation of LUCs has maintained the integrity of the monitoring well surface completions and no evidence of adverse land or resources use was observed during the site inspection.

Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid? YES

The previous assumptions about the installation missions of military training and storage have not changed, and therefore, the exposure assumptions remain valid.

The changes in regulatory standards since 2004 are identified in Appendix F. The changes do not affect the exposure assumptions that were used at the time the remedy was selected.

Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy? *NO*

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

Based on the reports reviewed and evaluated, interviews, and site inspection, the remedy is functioning as intended by the DD. There have been no changes in the assumptions, toxicity values or cleanup standards that would affect the protectiveness of the remedy.

There are no complete exposure pathways for soil or groundwater at NAAD 11B. Access to the Limited Area is restricted. Current land use is non-residential and will remain non-residential in the foreseeable future. The remedy, LTM consisting of LUCs, groundwater monitoring, and inspections, ensures that human health and the environment remain protected.

4.8 Issues

No issues were identified during the Five-Year Review that affect current or future protectiveness.

4.9 Recommendations and Follow-up Actions

No follow-up actions are recommended for NAAD 11B.

4.10 Protectiveness Statement

The remedy at NAAD 11B is protective of human health and the environment. The remedy is LTM consisting of LUCs, groundwater monitoring and inspections. The remedy is protective for the following reasons:

- Soil and groundwater were investigated, and soil removal actions completed in 2002 have mitigated potential risks associated with soils;
- There are no complete exposure pathways for humans or wildlife;
- Exposure to shallow groundwater is limited by LUCs and inspections;
- LUCs include access restrictions and non-residential land use;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office;

- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions; and
- Groundwater monitoring is conducted annually to confirm the protectiveness of the remedy.

4.11 Next Review

The next Five-Year Review NAAD 11B will be in October 2020.

5.0 NAAD 20 PYROTECHNIC RANGE

5.1 Introduction

The former Pyrotechnic Range is approximately 3,000 feet long and 600 feet wide, located in the southeast portion of the installation, within the Former OB/OD Area. The location of NAAD 20 is shown in Figure 5-1. The site is identified as NAAD 20 in the Camp Navajo Installation Action Plan (IAP). For the purposes of munitions investigation and response actions, the area was designated as MRWA 20. This report refers to the site as NAAD 20 for consistency with the IAP. However, the DD and other reports and documents refer to NAAD 20 as MRWA 20.

This review addresses only MEC at NAAD 20. As documented in the Decision Document, *Decision Document for 28 Installation Restoration Program Buyout Sites, Camp Navajo, Bellemont, Arizona (URS, 2014)*, the selected remedy for chemical constituents at NAAD 20 was closure because no unacceptable risk to human health or the environment was present associated with site-related chemical constituents.

5.2 Site Chronology

A summary of site events for NAAD 20 is presented in Table 5-1.

Table 5-1. Chronology of Site Events at NAAD 20

Event	Date
Surveillance Testing of conventional munitions ceased.	1979
The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted an installation-wide preliminary assessment, including site inspections, interviews, and records reviews.	1979
Uribe and Associates conducted a RCRA Facility Assessment on behalf of USEPA and ADEQ, consisting of site inspections, interviews, and compilation of earlier preliminary assessments and site investigations.	1993
AZARNG conducted an UXO surface sweep and disposal.	1995
Tetra Tech conducted a remedial investigation consisting of soil borings, soil and surface water sampling, and geophysical surveys.	2000
ORNL conducted an Airborne Geophysical Survey.	2002
B&C conducted a chemical constituent soil investigation.	2002
B&C conducted a footprint reduction project to characterize the extent of MEC contamination throughout the former OB/OD Area, including digital geophysical surveys and clearance of roadways and fence lines.	2003

Event	Date
CTE Engineers conducted anomaly excavations, and evaluated the quality and usability of the airborne geophysical data.	2004
CH2M Hill conducted MEC characterization, corrosion study, and Hazard Assessment.	2006
The Decision Document for MEC was completed.	2009
CH2M Hill prepared an After Action Report for MEC responses at MRWA 20.	2014
The Decision Document for chemical constituents was completed.	2014

5.3 Background

Site History

The 40-acre, former Pyrotechnic Range was used for munitions surveillance testing beginning at an unknown date and ending no later than 1979. The boundary coincides with the former operational footprint. An additional 1-acre, arc-shaped parcel that includes the 300-foot distance is associated with the kick-out area where a 3.5-inch M404A1 rocket fuze was found.

NAAD 20 was used for the surveillance testing of controlled quantities of grenades, rocket motors, flares, and small arms ammunition. No high explosives were reportedly used. Interviews with personnel having knowledge of previous operations indicated there was no UXO or explosives contamination in this area due to the nature of operations. Items that malfunctioned were either recovered, examined, and sent to the OB/OD Area for destruction, or destroyed in place if too hazardous to move (CH2M Hill, 2014).

Physical Characteristics

Topography and Surface Water

NAAD 20 is primarily an elongated open prairie surrounded by forested land and elevated hillsides. It extends approximately 3,000 feet in a northwest-southeast axis and is approximately 600 feet at its widest part. Access is provided by an unpaved cinder road along the northern side of the range and a dirt road along the southern boundary. A wooden shed and several concrete pads are located within the range. A drainage channel runs the length of NAAD 20, but is better defined at the northwestern end where a stock pond is located. The stock pond was created in the 1980s when the range was no longer used. The northwestern end drains northwest towards NAAD 01 and Volunteer Canyon. At the eastern end, surface water drainage is poorly defined but runoff from the eastern portion may be directed towards Rogers Lake. The area can remain wet and boggy for several months following a winter with heavy snow, or a summer monsoon with heavy rainfall.

Geology

NAAD 20 is located in a valley that contains approximately 55 feet of alluvium underlain by basalt units that have been faulted in association with the Dunham Fault Zone to the northwest. The faults are oriented in a northwest-southeast pattern coincident with the range valley itself. Basalt units from multiple volcanic vents are exposed in the hills northeast and southwest of the range. The inferred thickness of the basalt unit below the range varies from 70 to 170 feet, based on amounts of displacement across faults west of NAAD 20. The Kaibab Formation underlies the basalt units beneath and adjacent to NAAD 20.

Soils at NAAD 20 are derived from the basalt bedrock, and are generally described as clays or loams with variable amounts of coarser material, such as sand and gravel. The thickness of soil varies from a thin veneer over the hillside bedrock exposures to thicker accumulation in the flat prairie. (B&C, 2010).

Hydrogeology

A boring drilled by the AZARNG in the early 1990s encountered refusal in basalt at 70 feet. No water-bearing zones were encountered.

Natural Resources

Most of NAAD 20 consists of grass-covered open prairie. During a vegetation survey conducted in 2006, the dominant species found were blue grama, mountain muhly, sage, yarrow, and squirreltail. Dalmation toadflax, which is an indicator of extensive ground disturbance, was also found in the survey area. Dalmation toadflax is listed by the Arizona Department of Agriculture as a prohibited and restricted noxious weed. No plant species of concern, including threatened and endangered species, were reported in NAAD 20 (CH2M HILL, 2009).

Cultural Resources

NAAD 20 was included in cultural resources surveys conducted at Camp Navajo in December 2002. Three sites in or near MRWA 20 are eligible for the NRHP (CH2M Hill, 2009).

Land and Resource Use

NAAD 20 was actively used for military training until 2002, when administrative restrictions were implemented by the Garrison Commander pending a MEC safety evaluation. Following MEC investigations and removal actions, NAAD 20 is now available for military training activities.

Current and reasonably anticipated future land use activities within NAAD 20 identified in the DD include the following:

- Unit-level land navigation and maneuver training;

- Other authorized training activities determined to be consistent with site conditions;
- Mission support and maintenance;
- Security and fire protection;
- Environmental LTM;
- Natural and cultural resources management; and
- Recreational activities when they do not interfere with military training.

History of Contamination

A remedial investigation of chemical constituents was completed in 1999 at NAAD 20. The investigation included an electromagnetic survey; however, the survey was unable to identify subsurface metallic objects due to the presence of iron-rich volcanic rock. No MEC finds were reported during the remedial investigation of chemical constituents (CH2M Hill, 2009).

In October 2002, an airborne geophysical survey was conducted at NAAD 20. The purpose of the survey was to detect ferrous UXO and other ferrous debris that might contribute to local environmental contamination (CH2M Hill, 2009).

Additional activities included field validation activities and a review of both interpreted and raw geophysical data to evaluate the validity and usefulness of the airborne geophysical survey data. Field validation of 37 of the ORNL-identified anomaly locations was completed. The report concluded that the remaining 2,419 anomalies were most likely the result of underlying basalt along the northern and southwest portions of NAAD 20, or ferro-magnetic rocks distributed throughout the central and eastern portions of NAAD 20.

In 2005, a Supplemental MEC Characterization Project was initiated, consisting of a data gap analysis, MEC field investigation activities, and a baseline MEC HA. The data gap analysis consisted of the collection, standardization, and evaluation of available MEC data and the assessment of the usability of the data in MEC characterization. Only MD, consisting of pieces of grenade spoons and debris from 3.5-inch rockets, was discovered (CH2M HILL, 2009).

MEC field activities included investigating the cinder pads, and characterizing the distribution and density of MEC and MD resulting from testing and surveillance activities. These activities revealed no MEC to approximately 12 inches bls at either location, but recovered approximately 1,000 pounds of debris. The majority of this debris was munitions packaging materials and small grenade components (CH2M Hill, 2009).

One M404A1 fuze was discovered in the north-central part of NAAD 20. Considering the location of the fuze, the distance associated with the kick-out area was expanded approximately 300 feet around this location. In addition, one discernible MD fragment (a 40-mm expended smoke

projectile) containing smoke residue was found. According to the operational history, this item is consistent with the types of military munitions tested at NAAD 20.

The results of a baseline MEC HA indicated a low potential for an explosive event under current use conditions. However, the results also indicated that the area might not be suitable for future use if there are changes in the existing access restrictions or changes in the number of human contact hours associated with future military use.

To evaluate the response action alternatives, the baseline NAAD 20 MEC HA was updated to assess MEC exposure risk related to future land use scenarios. The updated MEC HA incorporated the following information:

- The nature and extent of removal action activities undertaken to date;
- The locations of possible future removal actions;
- The military land use activities (for example, construction, bivouacking, and land navigation) that could bring receptors into contact with MEC;
- Anticipated subsurface activities (for example, driving tent pegs into the ground, digging fire pits, and constructing concrete foundations) in support of military activities;
- The number of people engaging in each military activity per year; and
- The duration of each military activity.

The baseline MEC HA assumed that the 1995 surface MEC clearance and removal by EOD personnel, and the 2005-2006 MEC removal covering 46 percent of NAAD 20, satisfied the requirements for surface and subsurface clearance action throughout NAAD 20. MEC HA scoring reductions were applied after surface (or subsurface) clearance actions had been completed. Also, because of the nature of surveillance testing that occurred during historic site operations, MEC was only suspected to exist on the surface; therefore, surface clearance was also assumed to satisfy the requirements of subsurface clearance.

During MEC characterization, approximately 46 percent of the acreage within and adjacent to the NAAD 20 boundary were assessed for secondary source area MEC. On the basis of this information, the distribution of MEC was determined to be limited to the area within the NAAD 20 boundary (CH2M HILL, 2009).

Observations during the MEC characterization field program, coupled with review of previous reports and literature, suggested that the single MEC item found was mishandled or misplaced rather than intentionally disposed. Records suggest that the single M404A1 series fuze contained 0.2 grams of black powder. Assuming the type and quantity of potential MEC remaining are consistent with what was recovered, another 0.2 grams of black powder would remain in the single, potentially undiscovered M404A1 fuze that could possibly remain within NAAD 20. The amount of MC remaining at NAAD 20 would not represent a significant contribution of

contaminants to surface or groundwater and would not represent a source for a potential migration pathway.

The updated MEC HA determined that restricted-access use and reasonably anticipated future uses are compatible with conditions in NAAD-20 (CH2M HILL, 2009).

Initial Response

During May 1995, AZARNG conducted a UXO surface sweep and disposal operation to prevent untrained personnel from coming into contact with potentially live ordnance during nonintrusive field activities (B&C, 2005). The sweep covered a large portion of the Former OB/OD Area and Buffer Areas, including NAAD 20. However, the results of the NAAD 20 sweep were not specifically reported.

In 2003, a MEC survey was conducted to characterize and clear the primary and secondary roadways and designated fence lines. The work included removal of MEC to permit safe travel by security and fire protection services, provide supporting data for MEC characterization, and reduce the overall footprint of ordnance-contaminated acreage. The work included mapping and geophysical surveys, and the identification and management of MEC.

No MEC was identified. The results of the anomaly source investigation at NAAD 20 yielded a considerable amount of MD that could not be directly associated with a particular munition. The remaining anomalies consisted of scrap metal and iron-rich volcanic rock. This effort resulted in the characterization and clearing of roads to allow for safe passage in NAAD 20.

Summary of Basis for Taking Action

The baseline MEC HA concluded that restricted-access use and reasonably anticipated future uses that include up to 99,646 annual contact hours of nonintrusive activities were compatible with conditions in MRWA 20. Future uses of MRWA 20 would include site-specific MEC awareness training and oversight by range management personnel to ensure the types of training and other activities being performed remain consistent with site conditions. The DD for NAAD 20 is included in Appendix I.

5.4 Remedial Actions

Remedial Action Selection

According to the DD (CH2M Hill, 2009), the primary RAO for NAAD 20 is *"to ensure the protection of human health and the environment, commensurate with planned military land use. Secondary RAOs include the following:*

- *Ensure that future land use remains consistent with the military training and storage missions.*

- *Ensure that future site conditions remain consistent with the characterization data used to determine site risk.*
- *Ensure that the LUCs remain appropriate for future land use and site conditions, or are updated to remain protective if future land use and/or site conditions change within the limits of the RAOs listed above.*

The secondary RAOs will be used to evaluate the selected response actions during recurring reviews to assure the long-term protection of human health and the environment."

The selected remedial action for NAAD 20 presented in the Decision Document (CH2M Hill, 2009) included the following:

- *Update Camp Navajo Real Property Development Plan with NAAD 20 perimeter boundaries, pertinent features and information regarding land use restrictions and controls. The Camp Navajo Integrated Natural Resource Management Plan, and the Integrated Cultural Resource Management Plan, may also be updated as needed;*
- *Development of NAAD 20 site-specific MEC awareness training materials;*
- *Submittal of Explosives Safety Submission to DDESB, which documents land conditions and the selection of Mission-related LUCs for NAAD 20;*
- *Installation of boundary warning signs as required by DDESB;*
- *Five-Year Reviews;*
- *The performance of MEC inspections, if determined to be necessary, following the finding of one or more MEC or a change in site conditions. MEC finds and removal for the period would be evaluated to determine whether MEC exposure risk should be re-evaluated;*
- *The implementation and execution of mission-related LUCs will occur for as long as AZARNG continues the missions. However, if the results of consecutive 5-year reviews indicate a low risk to users, and no changed site conditions, the response action may be re-evaluated to determine whether the frequency of reviews and site inspections can be reduced.*

Remedial Action Implementation

The remedy selected for NAAD 20 is LTM consisting of mission-related LUCs and inspections. There are no site-specific physical LUCs required at NAAD 20. DDESB determined that that mission-related LUCs were sufficiently protective for NAAD 20. Mission-related physical LUCs include the installation fence and signs which were inspected in 2013 and 2014. Sections of fences

were repaired as needed. Mission-related administrative LUCs include compliance with Army Regulations. MEC training materials identifying NAAD 20 have been developed.

The LUCs, LUC inspections and reviews, and enforcement actions associated with NAAD 20 will be described in the following documents:

- LUCIP. The LUCIP is expected to be completed in 2015-2016 and will include a description of NAAD sites, a detailed map, details regarding land use restrictions, land use controls and methods, the scope and schedule for annual reporting and the 5-year reviews, and information regarding the performance of MEC inspections;
- LTM/PCC WP. The LTM/PCC WP is planned for 2015-2016 and will be a comprehensive work plan that unifies the policies and procedures for common tasks that apply to multiple sites. The work plan will summarize the modifications and updates to the LTM program since 2005. The work plan will also include a LUC inspection and review plan, and contain checklists or forms to be used for each site.
- Camp Navajo RPDP. The RPDP will be updated in 2015-2016 to include NAAD 20 boundaries, pertinent features and information regarding land use restrictions and controls (revision planned for 2015- 2016).

Systems Operations/O&M

There are no systems operating at NAAD 20. Maintenance activities include replacement of damaged installation fencing and signs, as necessary.

5.5 Progress Since Last Review

This is the first Five-Year Review for NAAD 20.

5.6 Site-Specific Five-Year Review Process

Document Review

For NAAD 20, the following documents were reviewed:

- MRWA 01 and MRWA 20 MEC Decision Document, Camp Navajo, CH2M Hill December 2009;
- Final After Action Report Munitions and Explosives of Concern Response Actions, MRWA 01, MRWA 02, and MRWA 20, Camp Navajo, Arizona, CH2M Hill, April 2014;
- 2013 Camp Navajo fence, sign, and barrier inspections and repairs;
- Decision Document for Twenty-Eight Installation Restoration Program Buyout Sites, Camp Navajo, URS, July 2014; and

- 2014 Annual Environmental Land Use Controls Review, Camp Navajo, draft Technical Memorandum (Camp Navajo, May 2015).

Data Review

No additional data has been generated since the Decision Document was finalized in 2009.

Site Inspection

The site inspection was conducted on 21 May 2015. Present at the site inspection were Joan Cullen and Brittany Hyde (USACE-Louisville District), Randall Wilkinson (ARNG), Kim Birdsall (AZARNG), and Karin Harker (ADEQ). Photographs of the site as observed during the site visit are provided in Appendix B. Site Inspection forms are provided in Appendix D.

An inspection of NAAD 20 noted the following observations:

- Security measures were enforced at the access gate to Camp Navajo and to the Limited Area;
- NAAD 20 consists of a large open prairie;
- There are no signs identifying the NAAD 20 boundary. However, signs identifying the installation boundary were observed on the fence along the southeast side of NAAD 20; and
- No evidence of intrusive activities were observed.

Interviews

Mr. Randy Wilkinson (ARNG) indicated that no MEC has been identified at NAAD 20. Only inert metal debris was recovered during investigation and clearance activities. Mr. Wilkinson stated that the remedy appears to be working as intended and that the Camp Navajo RPDP is expected to be updated with LTM sites in 2015-2016 depending on funding availability.

Ms. Karin Harker (ADEQ) responded in writing that for NAAD 20, monitoring for potential munitions and explosives of concern, base-wide munition awareness educational programs, land use controls and access controls should be maintained. Annual inspections and reports should be conducted.

Mr. Wayne Miller (ADEQ), former project manager for Camp Navajo, responded in writing that for NAAD 20, the current program was acceptable. He also noted that there had been no communication in the preceding 3 years, but was not expecting activities at NAAD 20. He further responded that there had been no complaints, violations or other incidents related to the site that required a response by ADEQ. Monitoring for potential munitions and explosives of concern, base-wide munition awareness education programs, land use controls and access controls should be maintained.

Interview forms are included in Appendix C.

5.7 Technical Assessment

The objective of this Five-Year Review is to evaluate if the remedy at the NAAD 20 remains protective of human health and the environment. The technical assessment of the protectiveness of the remedy is based on the responses to the following three questions posed in the USEPA Comprehensive Five-Year Review Guidance (EPA 540-R-01-007/OSWER No. 93557-03B-P, June 2001):

1. Question A: Is the remedy functioning as intended by the decision documents?
2. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents? YES

The review of inspection reports, site inspection and interviews indicated that the remedy is functioning as intended by the Decision Document. The final remedy for NAAD 20 is LTM consisting of mission-related LUCs and inspections. Mission-related LUCs restrict access to the area and residential development. LTM includes on-going inspections ensure compliance with LUCs.

Characterization activities and risk assessments were completed for site-related chemical constituents at NAAD 20. The nature and extent of residual site-related chemical constituents in surface and subsurface soil and surface water were defined and the associated risks to ecological and human receptors were assessed. Based on the HRA and ERA, there are no unaccepted risks associated with site related chemicals.

Information obtained during MEC characterization activities indicate that additional MEC could remain at MRWA 20. However, NAAD 20 has been investigated and the data indicate that the type and quantity of remaining MEC would be consistent with what has been recovered to date. Therefore, the potential cumulative impact of future releases of MC contained in remaining MEC would be negligible and would not present unacceptable chemical exposure risks to human receptors.

The pathways evaluation considered that physical access to the site (and access to the potential MEC) is controlled. Receptors must receive MEC awareness training. The site constraints of restricted access, controlled activity type, and mandatory MEC awareness training indicate an incomplete source/receptor pathway.

Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid? YES

Inspection reports indicated that there have been no changes to physical conditions at NAAD 20. There are no changes to the exposure assumptions and remedial action objectives since the final MEC remedy was put in place.

Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy? NO

There is no other information that would call into question the protectiveness of the remedy.

Technical Assessment Summary

A review of NAAD 20 documents, interviews, and site inspection indicated that the remedy is functioning as intended and is protective of human health and the environment as intended by the DD. Mission-related LUCs are in place and include existing physical controls and access prevention measures, on-call UXO construction support for intrusive activities, security patrols, and MEC awareness safety training. The administrative LUCs include notation of NAAD 20 on the Camp Navajo RPDP which is scheduled to be completed in 2015-2016;

There have been no changes to the physical conditions or land use that would reduce the protectiveness of the remedy.

5.8 Issues

No issues were identified during the Five-Year Review that affect current or future protectiveness.

5.9 Recommendations and Follow-Up Actions

There are no follow-up actions recommended for NAAD 20.

5.10 Protectiveness Statement

The remedy at NAAD 20 is protective of human health and the environment. The remedy is LTM consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Soil and surface water were investigated. No unacceptable risk due to site-related chemical constituents remain;
- The MEC investigation covered 46% of NAAD 20 to a depth of two feet. Based on the lack of MEC, no further investigation or removal was warranted for NAAD 20 to be used for military training.
- There are no complete exposure pathways for humans or wildlife. Subsurface exposure to MEC is limited by LUCs and inspections.

- LUCs include access restrictions, MEC awareness training, and non-residential land use;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office.
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions.

5.11 Next Review

The next Five-Year Review for NAAD 20 will be conducted in October 2020.

6.0 NAAD 40 FORMER SANITARY LANDFILL

6.1 Introduction

NAAD-40 is a former sanitary landfill (FSL) covering approximately six acres on the northeastern portion of the Limited Area of Camp Navajo. The layout of NAAD 40 is shown in **Figure 6-1**.

6.2 Site Chronology

A chronology of major events for NAAD 40 is presented in **Table 6-1**.

Table 6-1. Chronology of Site Events at NAAD 40

Event	Date
Sanitary landfill operations.	1966-1981
The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted an installation-wide preliminary assessment, which included site inspections, interviews, and records reviews.	1979
Environmental Science and Engineering performed an environmental survey of the Navajo Army Depot. Activities included soil borings and sampling, monitoring well installation, and groundwater and surface water sampling.	1981
ADHS and USEPA performed groundwater and surface water sampling.	1984
AZARNG installed two wells (this activity was a training exercise, not part of an investigation, and no report was generated).	1991
Uribe and Associates conducted a RCRA Facility Assessment on behalf of USEPA and ADEQ consisting of site inspections, interviews, and compilation of earlier preliminary assessments and site investigations.	1993
Tetra Tech performed a remedial investigation/feasibility study which included a passive soil gas survey, excavation of test pits, waste sampling, surface and subsurface soil sampling, and groundwater sampling.	1994-1997
ITC performed a supplemental remedial investigation to delineate the extent of the landfill and to complete characterization for the EE/CA. Activities included the excavation of test pits, soil sampling, and groundwater sampling.	1998-1999

Event	Date
ITC performed an EE/CA.	2001
ITC constructed a cover system over the landfill.	2001
MKM performed LTM groundwater monitoring well rehabilitation and landfill cover system repair, and initiated quarterly groundwater sampling.	2005
MKM initiated ramp-down of LTM groundwater monitoring program.	2007
NAAD 40 sampling frequency was reduced to annual monitoring.	2007
MKM performed maintenance of the landfill cover system.	2008
CERCLA 121(c) Five-Year Review.	2010
Decision Document for NAAD 40 finalized.	2010
2013 Camp Navajo fence, sign, and barrier inspections and repairs.	2013
2014 Camp Navajo conducts LUCs inspection and review.	2014

6.3 Background

Site History

NAAD 40 reportedly received trash and garbage from Navajo Army Depot activities from the 1940s to 1966. Since then, solid waste has been hauled from Camp Navajo to the City of Flagstaff municipal landfill. Dried sewage sludge from the wastewater treatment plant was also disposed at the NAAD 40 from 1966 until 1981. Other wastes that may have been disposed include motor oil, paint cans, and medical waste (Tetra Tech, 1998b). Geophysical surveys and waste delineation estimated approximately 60,000 cubic yards of waste in place.

Physical Setting

Topography and Surface Water

Prior to capping, the only man-made structures at NAAD 40 were a road, fencing around the waste materials, and several monitoring wells. An unpaved road that bisected the landfill from north to south was used while the FSL was in operation. In October 2001, a soil cap was installed over the waste to protect personnel and wildlife from the physical hazards presented by exposed surface debris, reduce percolation of rain and snowmelt into the landfill, and reduce the potential for future contamination of groundwater. The site was graded to blend into the surrounding natural valley.

There are no perennial streams or persistent surface water bodies at NAAD 40. The landfill cap was contoured to shed runoff to ditches that drain to the intermittent stream channel running along the southern boundary of the landfill. The intermittent stream channel, which drains westerly to Volunteer Wash, contains water only following significant rain storms or snow melt events.

Geology

Surficial deposits at NAAD 40 consist of Quaternary alluvium and colluvium composed of silt and sand containing basalt rock fragments. Alluvium covers the relatively flat valley floor while colluvium covers the steeper slopes at the valley margins. The surficial alluvium is underlain by sandy silt and gravelly silt up to about 15 feet thick. Deeper unconsolidated materials encountered during drilling of soil borings and monitoring wells consist of gravel and/or breccia intervals that grade upward to dense, hard silt. The unconsolidated materials, which range from about 48 to 90 feet thick, are underlain by Tertiary basalts and the Permian Kaibab Formation. Similarly, the hills bounding the valley where the FSL is located consist of Kaibab Formation sedimentary rocks covered by basalt flows.

The northwest trending valley containing NAAD 40 is a graben, a structural feature formed where a bedrock block bounded by two normal faults was displaced downward as a result of vertical movement along the faults. Information compiled during the RI indicates that differential displacement occurred on the two faults. On the northeast side of the graben, displacement may be below 10 feet while the southwest side of the graben may have been displaced as much as 100 feet. Other faults delineated in the immediate vicinity include a second northwest trending fault located approximately 100 feet northeast of the graben and a northeast trending fault that cuts across the graben approximately 100 feet northwest of NAAD 40. This last fault is coincident with a small side drainage that empties into the intermittent stream channel that runs along the valley floor.

Hydrology

Shallow perched groundwater is present at depths ranging from approximately 7.6 to 24 feet below the landfill. The base of the perched interval is relatively consistent at the most shallow transition from silt, sand, and gravel sequences to dense silt. The underlying subsurface deposits vary from dry to wet, but an interval yielding water sufficient for a water supply has not been identified to a depth of 50 feet at the FSL. Groundwater is present in the Harrisburg Member on the northeastern side of the Elsey Springs graben, but an accurate determination of the saturated thickness or true depth to water is difficult due to the lack of well drilling/construction information for well FSL-5. Overall, groundwater elevations measured in the monitoring wells appear to be influenced by seasonal precipitation. The shallow wells yield very little water, as indicated by the low purge rates and purge volumes.

The NAAD 40 potentiometric surface map (Figure 6-2) shows a higher groundwater elevation in the southwest portion of the landfill than the groundwater elevations in the surrounding areas. The highest groundwater elevations were measured at PMW-5 and PMW-3 (7059.90 and 7059.44 feet

amsl, respectively) in the southwestern corner of the landfill. The gradient slopes from the southwest corner to the southeast towards PMW-1 over a 14 foot drop in groundwater elevation, and northeast towards PMW-2.

The groundwater elevation in FSL-5 was 7029.99 feet amsl during the 2014 sampling event at NAAD 40. In 2014, the depth to water in PMW-1 had risen four feet after steadily decreasing since landfill maintenance activities were conducted in 2005. No standing water or poor drainage areas were observed during the NAAD 40 biennial landfill inspection that could contribute to the rise in water level elevation. The water level in PMW-1 remains within levels recorded since landfill maintenance activities were conducted. Insufficient water was present in PMW-4 to achieve an accurate water level measurement or for sample collection.

Natural Resources

No species of concern, including threatened and endangered species, have been reported within or near NAAD 40.

Cultural Resources

No archaeological sites have been reported at NAAD 40.

Land and resource Use

Past use of NAAD 40 included cattle grazing. However, cattle grazing was terminated due to expansion of the training mission.

At present, NAAD 40 is an inactive capped, landfill. No active waste disposal has occurred since 1981. NAAD 40 is not an active route for personnel or vehicular traffic. The current foreseeable future land use at NAAD 40 is non-residential.

History of Contamination

In 1981, an environmental survey conducted at NAAD 40 included soil borings and sampling, monitoring well installation, and groundwater and surface water sampling. The analysis indicated the presence of two explosive compounds (TNB and TNT), several SVOCs (bis[2-ethylhexyl phthalate], fluoranthene, naphthalene, phenanthrene, and pyrene), nitrate, phosphate, and sulfate. The concentrations of all detected analytes were below the respective R-SRLs (B&C, 2010).

In 1995-1996, a RI was conducted at NAAD 40 that included a geophysical survey, a soil gas survey, surface and subsurface soil sampling, and excavation and sampling of test pits. . For surface soils, one petroleum hydrocarbon compound (undecane) was detected in four surface soil samples and one SVOC (naphthalene) was detected in a single sample. No VOC concentrations above 1 ug/kg were detected in surface soil samples. Only arsenic in one sample and beryllium in 24 samples were detected at concentrations above their respective R-SRLs. TRPH was detected in 56 samples, but only one concentration was above the C10 to C32 range hydrocarbons R-SRL. All nine pesticide

and PCB concentrations were below the R-SRLs. Benzo(a)pyrene concentrations in six samples exceeded the NR-SRL (B&C, 2010).

Subsurface soil samples were collected from depths between two feet and 30 feet. Arsenic in five samples, beryllium in 23 samples, cadmium in one sample, and lead in one sample, were detected at concentrations above their respective NR-SRLs. Benzo(a)pyrene in one sample and dibenzo(a,h)anthracene in one sample were also detected at concentrations above their respective NR-SRLs. Concentrations of TPH, TRPH, pesticides, VOCs were below NR-SRLs.

Groundwater samples collected during the RI were evaluated as part of the risk screening process. The groundwater data were evaluated against SLs for drinking water sources and AWQSSs. Although, several metals were detected at concentrations exceeding SLs and AWQSSs, concentrations of detected compounds in the shallow perched groundwater did not pose a risk to human health under a non-residential exposure scenario.

Three test pits were also excavated within the known extent of the landfill materials. The excavations extended to bedrock (basalt) at varying depths between 1 and 15 feet bls. Four soil samples were collected from one test pit and two soil samples were collected from each of the remaining test pits. The samples were collected from soil directly beneath the base of the waste. All 10 analyzed metals were detected in two or more of the test pit soil samples, but only arsenic in two samples, beryllium in four samples, and lead in one sample exceeded their respective R-SRLs. TPH was detected in two test pit soil samples, TRPH was detected in four samples, four pesticides were detected in two samples, nine SVOCs were detected in one sample, and four VOCs were detected in four samples. All detections were below R-SRLs (B&C, 2010).

A supplemental RI was completed in 1998 and 1999 to provide additional information necessary for preparation of the EE/CA. It included additional sampling of waste, groundwater, and surface water. It also included an evaluation of leaching potential, HRA, and ERA.

Analytes detected in the waste samples included total and TCLP metals, TPH, and pesticides. The total metals samples contained detected concentrations of barium, beryllium, chromium, lead, and mercury, but only beryllium in one sample was detected at a concentration exceeding the R-SRL.

Five shallow monitoring wells (PMW-1 through PMW-5) were installed to monitor the shallow perched groundwater interval. Analytes detected in the groundwater samples included metals, hydrocarbons, and nitrate. Metals detected included arsenic, barium, chromium, lead, selenium, and silver. All of the metals and nitrate were detected at concentrations below their respective AWQSSs. The most frequently detected analytes were barium and nitrate.

Two surface water samples were collected in the drainage channel at NAAD 40. Barium was detected in both samples and chromium was detected in one sample. However, detected concentrations were below the surface water SLs. No other analytes were detected in the surface water samples.

Soil analytical results were compared against NR-SRLs assuming a non-residential land use scenario for NAAD 40. The HRA concluded that there was no risk or hazard from human exposures attributable to site-related chemical constituents in soil (B&C, 2010).

An evaluation of potential leaching of detected chemicals to groundwater was not performed. However, groundwater data collected through 2001 did not indicate that analytes in the soil or landfill wastes had adversely impacted groundwater quality.

A screening-level ERA was conducted for COPECs in soil at NAAD 40 in 1998. The receptors of concern associated with NAAD 40 consisted of cattle, elk, pronghorn antelope, Mexican vole, northern goshawk, herbaceous plants, herbivorous mammals, and predatory birds. The COPECs in surface soil (0 to 1 foot bgs) consisted of metals (arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, and silver). With the exception of TPH, detected organic compounds were also designated as COPECs in surface soils. Complete exposure pathways were assumed to occur through incidental ingestion of COPECs in surface soils, uptake of COPECs via plant roots, and ingestion of COPECs in food (plant or animal tissue) for the applicable terrestrial receptors of concern. This assessment concluded that the organic COPECs present in surface soils posed negligible risk of adverse impacts to terrestrial receptors of concern.

Surface water did not appear to have been adversely impacted by waste and it was determined that it was unlikely to pose an unacceptable risk to human health or ecological receptors.

Results of the EE/CA indicated that construction of a low-permeability final cover would be the best remedial alternative for mitigating risks to human health and the environment and reducing potential impacts to groundwater. Source material for the low-permeability cover came from a borrow area approximately 2 miles northwest of NAAD 40. Once construction was completed, post-remedial action activities were to include inspections and maintenance, and groundwater monitoring, over a period of 30 years, and groundwater monitoring (B&C, 2010).

Analytical results for NAAD 40 are provided in Appendix H.

Initial Response

The recommended remedial alternative identified in the EE/CA was implemented at NAAD 40 in 2001. After clearing and grubbing of the landfill surface, the low-permeability final cover was constructed. It consisted of a compacted soil cap made using clay soils and rock obtained from the borrow area. Once cap construction was complete, the borrow area was graded and re-covered with stockpiled top soil. The landfill cap and the borrow area were hydroseeded with a natural seed mix. Construction also included placement of rock riprap along the drainage channel that traverses the south side, landfill cap drainage ditch on the north side, and storm water runoff outlets. Storm water diversion berms and ditches were also lined with biodegradable erosion control blankets. Four landfill gas monitoring probes were installed around the perimeter of landfill (B&C, 2010).

Maintenance and repair were made to the landfill cap in 2005 and 2006. The work included vegetation removal, installation of temporary erosion control barriers (silt fencing and straw bales),

repair of the topsoil or vegetative layer, and repair of the drainage channels around the boundary of NAAD 40 (MKM, April 2006).

Summary of Basis for Taking Action

According to the DD, "Since no unacceptable risk associated with site-related chemical constituents is present in surface soil, groundwater, and surface water at NAAD 40, no further remedial action is planned and the site IRP status is considered remedy in place. Because remedial action has already been implemented through construction of a landfill cap to prevent contact with the waste that will remain at the site, further evaluation of remedial alternatives was not performed. However, the presence of hazardous substances that remain on site in waste necessitate periodic inspections, maintenance as necessary, and LUCs to protect the integrity of the landfill cap.

The engineered landfill cap was designed to minimize the potential for infiltration and migration of contaminants that could impact groundwater quality. However, to satisfy CERCLA/NCP risk based cleanup requirements, groundwater monitoring and LUCs are appropriate to verify the effectiveness of the remedy. "

6.4 Remedial Actions

Remedial Action Selection

Inspection, maintenance, groundwater monitoring, and LUC objectives for NAAD 40 presented in the DD are as follows:

- *Periodically inspect the physical integrity of the landfill cap and drainage system, and maintain as necessary;*
- *Monitor groundwater quality to ensure the protectiveness of the landfill cap;*
- *Verify the protection of groundwater quality by comparing analytical results to screening levels and evaluating the data for trends;*
- *Maintain the integrity of the monitoring well surface completions;*
- *Restrict the use of shallow groundwater within NAAD 40 until contaminant concentrations are determined to be acceptable; and*
- *Restrict activities that could impact the integrity of the landfill cap or monitoring well surface completions.*

Remedial Action Implementation

Periodic inspections are performed to verify the integrity of the landfill cap, berms, drainage ditches, fencing, signage, and monitoring wells. Groundwater monitoring is conducted to verify that the landfill cap is effective in preventing migration of COCs to shallow groundwater. Additionally, LUCs

have been implemented. The LUCs include restrictions on activities that could impact the integrity of the landfill soil cap or monitoring well surface completions. There is a restriction on the use of shallow groundwater and prevention of residential use, transfer, or lease of the property without an environmental review. The physical LUCs consist of the soil landfill cap, warning signs around the NAAD 40 boundary and locked metal gates across the access roads.

Maintenance of the landfill cap was conducted on October 20 and October 21, 2008. Silt fences were repaired, water diversion structures were replaced; eroded areas were filled in with soil and covered with geo-net or riprap; and the disturbed areas were reseeded. The annual inspection was moved to Spring 2009 to assess the condition of the landfill repairs.

The results of the Spring 2009 inspection indicated that the repaired landfill cap was providing adequate protection to the landfill contents based on visual inspection. Additional inspections of the landfill cap were conducted in 2010, 2012, 2013, and 2014. The most recent inspection in 2014 noted that the vegetation at the landfill appeared to be well established, groundwater monitoring wells and landfill gas monitoring probes were functional and in good condition.

Groundwater monitoring has been conducted on a semiannual basis until 2007 and on an annual basis between 2008 and 2014.

The LUCs, LUC inspections and reviews, and enforcement actions associated with NAAD 40 will be described in the following documents:

- LUCIP. The LUCIP is expected to be completed in 2015-2016 and will include a description of NAAD sites, a detailed map, details regarding land use restrictions, land use controls and methods, the scope and schedule for annual reporting and the 5-year reviews, and information regarding the performance of MEC inspections;
- LTM/PCC WP. The LTM/PCC WP is planned for 2015-2016 and will be a comprehensive work plan that unifies the policies and procedures for common tasks that apply to multiple sites. The work plan will summarize the modifications and updates to the LTM program since 2005. The work plan will also include a LUC inspection and review plan, and contain checklists or forms to be used for each site.
- Camp Navajo RPDP. The RPDP will be updated in 2015-2016 to include NAAD 40 boundaries, pertinent features and information regarding land use restrictions and controls (revision planned for 2015- 2016).

Systems Operations/O&M

There are no systems in operation at NAAD 40. Maintenance activities include repairs, as necessary to signs, wells, and drainage controls.

6.5 Progress Since Last Review

The previous Five-Year Review (MKM, 2010) concluded that *"The remedy appears to be protective of human health and the environment. All threats at the site have been addressed through the removal actions at NAAD Sites 11B, 14D, 14G, and 43, through the stabilization and capping of the landfill at NAAD 40, and through the implementation of LUCs at all sites.*

Long-term protectiveness of the removal actions will continue to be monitored by groundwater sampling during year five of the LTM program. Current data indicate that the remedies are functioning as intended at all sites."

As part of the 2014 LTM event, the data collected were assessed according to the ramp-down strategies presented in Figure 4-1 (Performance Monitoring Ramp-Down Each Analytical Suite [By Well]), as specified in the Letter WP Addendum (PIKA, 2012). In addition, professional judgment was used to interpret the ramp-down decision logic and make recommendations for each site. Groundwater monitoring at NAAD 40 will continue on an annual basis. No changes to the laboratory analyses were recommended.

Table 6-2 summarizes the issues and recommendations, and follow-up actions, since the previous Five-Year Review.

Table 6-2. Issues, Recommendations, and Actions Taken since the Last Five-Year Review

Issue	Recommendation	Follow-Up	Status
The LUCs for NAAD 40 have not been formally documented in the Camp Navajo RPDP.	Update the Camp Navajo RPDP.	The plan is scheduled to be updated in 2015-2016.	To be completed in 2015-2016
	Reduce the frequency of visual inspections from semiannual to annual at NAAD 40.	Visual inspections were reduced to annual frequency in 2012.	Complete
	Reduce the frequency of inspections by a registered engineer.	Inspections were conducted biennially by an Arizona registered engineer in 2012, 2014, and is scheduled again in 2016.	Complete
	Adopt updated SLs for remedy evaluation and ramp-down criteria for the annual sampling.	Updated SLs have been used for remedy evaluation and ramp-down criteria since 2012.	Complete
	Report non-detects to the MRLs instead of MDLs.	Non-detects have been reported to the MRL since 2012.	Complete
	Remove the fencing around NAAD 40 and the plastic netting used for erosion control.	Fencing around NAAD 40 was removed and plastic netting used for erosion control in 2012.	Complete

6.6 Site-Specific Five-Year Review Process

Document Review

This Five-Year Review consisted of a review of relevant documents including annual monitoring reports, DDs, and historical technical reports. The following documents were reviewed:

- Engineering Evaluation And Cost Analysis Final Closure Camp Navajo Former Sanitary Landfill Bellemont, Arizona, IT, May 2001;
- Technical Memorandum (After-Action Report), MKM, April 2006;

- Five-Year Review Report For Five IRP Sites (NAAD 11B, 14D, 14G, 40, and 43) at Camp Navajo, Bellemont, Arizona, MKM, October 2010;
- Decision Document Five Long Term Management Sites NAAD 11B, 14D, 14G, 40, and 43 Camp Navajo, Bellemont, Arizona, B&C, October 2010;
- Letter, Long-Term Management Work Plan Addendum for Groundwater Sampling and Landfill Maintenance for Fiscal Year 2012, Camp Navajo, Coconino County, Arizona, PIKA July 2012;
- Long-Term Management Groundwater Monitoring Report For NAAD Sites 11B, 40, and 43 Camp Navajo, Arizona, PIKA, May 2013; and
- 2014 Long-Term Management Groundwater Monitoring Report For NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, October 2014.

Data Review

The reports reviewed indicated that capping of the landfill and the implementation of LUCs have minimized the migration of contaminants to groundwater and surface water and prevented direct contact with the wastes. The LUCs maintain the integrity of the monitoring well surface completions and landfill cap, with no evidence of adverse land or resources use. The LUCs include engineering controls such as warning signs and gates, and site-specific administrative controls (requirement for Garrison Commander authorization prior to entry). The warning signs and gates caution personnel of subsurface hazardous conditions.

During the 2012 inspection, the NAAD 40 boundary fence was removed, the signage was reinstalled at 100 foot intervals, and the two gates were retained at the vehicular access points. In addition, jute erosion matting was installed on the eastern edge of the landfill where rivulets had developed next to the rip-rap and plastic erosion matting was removed where it was loose or bunched up.

Groundwater sampling has been conducted at NAAD 40 since October 2005. The potentiometric surface maps prepared for groundwater monitoring events in 2012, 2013 and 2014 are provided in Appendix A (Figures 6-2, 6-3 and 6-4). The potentiometric surface maps show gradient slopes from the southwest corner to the southeast towards PMW-1 or northeast toward FSL-5.

In 2014, the highest groundwater elevations were measured at PMW-5 and PMW-3 (7059.90 and 7059.44 feet amsl, respectively) in the southwestern corner of the landfill with over a 14 foot drop to the southeast towards PMW-1.

Target analytes were detected in groundwater samples at concentrations above the MRL in the four monitoring wells sampled in 2014. The concentrations of detected analytes were below their respective SLs. The analytical results for 2014 groundwater samples are presented in Table 6-3. The historical data are included in Appendix H.

Table 6-3. Analytical Results for 2014 Groundwater Sampling

MW ID	Sample Number	Sample Date	Method	Analyte	Result	Units	SL
PMW-1	ND40-WTRPMW-1-2014-A	5/13/14	353.2	Nitrate Nitrite as N	0.69	mg/L	10
PMW-1	ND40-WTRPMW-1-2014-A	5/13/14	6020	Chromium	1.2 J	µg/L	100
PMW-1	ND40-WTRPMW-1-2014-A	5/13/14	6020	Barium	49	µg/L	2,000
PMW-1	ND40-WTRPMW-1-2014-A	5/13/14	6020	Arsenic	0.5 J	µg/L	10
PMW-2	ND40-WTRPMW-2-2014-A	5/13/14	8270C	4-Methylphenol	3.0 J	µg/L	NE
PMW-2	ND40-WTRPMW-2-2014-A	5/13/14	6020	Arsenic	1.2 J	µg/L	10
PMW-2	ND40-WTRPMW-2-2014-A	5/13/14	6020	Barium	170	µg/L	2,000
PMW-2	ND40-WTRPMW-2-2014-B	5/13/14	8270C	4-Methylphenol	5.4 J	µg/L	NE
PMW-2	ND40-WTRPMW-2-2014-B	5/13/14	6020	Arsenic	1.2 J	µg/L	10
PMW-2	ND40-WTRPMW-2-2014-B	5/13/14	6020	Barium	160	µg/L	2,000
PMW-3	ND40-WTRPMW-3-2014-A	5/13/14	6020	Chromium	0.72 J	µg/L	100
PMW-3	ND40-WTRPMW-3-2014-A	5/13/14	6020	Barium	67	µg/L	2,000
PMW-3	ND40-WTRPMW-3-2014-A	5/13/14	6020	Arsenic	0.33 J	µg/L	10
PMW-5	ND40-WTRPMW-5-2014-E	5/13/14	353.2	Nitrate Nitrite as N	0.06 J	mg/L	10
PMW-5	ND40-WTRPMW-5-2014-A	5/13/14	353.2	Nitrate Nitrite as N	3.3	µg/L	10
PMW-5	ND40-WTRPMW-5-2014-A	5/13/14	6020	Barium	77	µg/L	2,000
PMW-5	ND40-WTRPMW-5-2014-A	5/13/14	6020	Chromium	0.5 J	µg/L	100

J – estimated value

UJ – Sample detection limit is an estimated value

NE – Not established

SL – Screening Level

µg/L – micrograms per Liter

mg/L – milligrams per Liter

A review of the LTM reports indicated that that the landfill cap is preventing migration of COCs. Minor erosion and damage to the cap was reported, but at a rate that can be managed by annual maintenance and repairs, if required.

Annual landfill gas monitoring was conducted at the four gas vent monitoring probes (V-1 through V-4) and the six groundwater monitoring wells on May 13, 2014. Very low levels of carbon dioxide (0.1 to 0.3%) were detected in monitoring probes and groundwater wells. No carbon monoxide, organic vapors, or explosive gases were detected.

Site Inspection

The site inspection was conducted on 21 May 2015. Present at the site inspection were Joan Cullen and Brittany Hyde (USACE-Louisville District), Randall Wilkinson (ARNG), Kim Birdsall (AZARNG), and Karin Harker (ADEQ). Photographs of the site as observed during the site visit are provided at the end of Section 6. Site Inspection forms are provided in Appendix D.

The inspection of NAAD 40 on 21 May 2015 noted the following observations:

- Security measures were enforced at the access gate to Camp Navajo and to the Limited Area;
- Signs were in place around the boundary of NAAD 40 and in good condition;
- No fence was noted around NAAD 40;
- No evidence of intrusive activities were observed at the site;
- The cap appeared to be well vegetated with grasses;
- No evidence of erosion capable of impacting the integrity of the landfill cap was observed during the site inspection; and
- Monitoring well surface completions appeared to be in good condition.

Interviews

Mr. Randy Wilkinson (ARNG) was asked for information for concerning the history and LUCs at NAAD 40 and he indicated that the remedy appears to be functioning as intended. He indicated that erosion of the cap had been recently addressed by placing rock along the drainage ditch bordering the upgradient side of the landfill and diverting surface water away from the landfill. Mr. Wilkinson further stated that the Camp Navajo Real Property Plan is expected to be updated with LTM sites in 2015-2016 depending on funding availability.

Ms. Karin Harker (ADEQ) responded in writing that since taking over the project 7 months ago, ADEQ has visited NAAD 40 twice, and that ADEQ receives regular monitoring reports from Camp Navajo. She also indicated that she is unaware of complaints, violations or other incidents requiring a response by ADEQ. She further indicated that ongoing monitoring and maintenance is acceptable and that the protectiveness of the landfill cap should continue to be surveyed due to creep potential.

Mr. Wayne Miller (ADEQ), former project manager for Camp Navajo, responded in writing that over the last 5 years, ADEQ personnel visited the site on average once a year. He further indicated that ongoing monitoring and maintenance at NAAD 40 is acceptable.

Interview forms are included in Appendix C.

6.7 Technical Assessment

The objective of this Five-Year Review is to evaluate if the remedy at the NAAD 40 remains protective of human health and the environment. The technical assessment of the protectiveness of the remedy is based on the responses to the following three questions posed in the USEPA Comprehensive Five-Year Review Guidance (EPA 540-R-01-007/OSWER No. 93557-03B-P, June 2001):

1. Question A: Is the remedy functioning as intended by the decision documents?

2. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents? YES

The remedy appears to be functioning as intended by the DD. Previous investigations indicate that there are no unacceptable risks associated with surface soils following installation of the landfill cap. The landfill cap protects groundwater quality and is inspected annually and repaired as necessary. The cap was rehabilitated in 2006 and again in 2008. Annual inspections were conducted in 2012, 2013, and 2014. The fence was removed in 2012 to minimize hazards to wildlife. Signage is located at 100 foot intervals with the signs being legible and in good condition. LUCs are in place and are enforced.

The implementation of LUCs has maintained the integrity of the monitoring well surface completions and landfill cap. No evidence of adverse land or resources use was observed during the site inspection. The LUCs include warning signs and access gates. Administrative controls include the requirement for Garrison Commander authorization prior to entry.

On-going inspections ensure that LUCs remain in place and remain appropriate for current and future land use and site conditions.

Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid? YES

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid. Land use has not changed. There have been no changes in the toxicity values for COCs at NAAD 40.

COCs for NAAD 40 are presented in the DD and in Appendix F. Also included in Appendix F are the historical and current SLs for groundwater, and the historical and current Arizona R-SRLS and NR-SRLs.

Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy? NO

There is no new information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

Based on the review of documents, interviews, and site inspections indicate that the remedy is protective of human health and the environment as intended by the DD. The stabilization and capping of the landfill and the implementation of LUCs have minimized the migration of

contaminants to groundwater and surface water and prevent direct contact with COCs. There are no changes to the exposure assumptions or toxicity values used at the time of remedy selection that would reduce the protectiveness of the remedy. There is no new information that calls into question the protectiveness of the remedy.

6.8 Issues

No issues were identified during the Five-Year Review that affect current or future protectiveness.

6.9 Recommendations and Follow-up Actions

There are no follow-up actions recommended for NAAD 40.

6.10 Protectiveness statement

The remedy at NAAD 40 is protective of human health and the environment. The remedy, is LTM consisting of LUCs, groundwater monitoring and inspections. The remedy is protective for the following reasons:

- There are no complete exposure pathways for humans and wildlife. The landfill cap prevents direct exposure to waste and protects groundwater quality;
- No COCs exceed screening levels in groundwater and surface water. Very low levels of carbon dioxide (0.1 to 0.3%) were detected in gas monitoring probes and groundwater wells. No carbon monoxide, organic vapors, or explosive gases have been detected;
- LTM includes landfill cap inspections and maintenance, landfill gas and groundwater monitoring is conducted annually to identify changes in site conditions;
- LUCs include non-residential use and access restrictions;
- "No Unauthorized Admittance" signs are installed at 100-foot intervals around the boundary. These signs were observed to be in good condition during the site inspection;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are reviewed by the Environmental Office;
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions; and
- Groundwater monitoring is conducted annually to confirm the protectiveness of the remedy.

6.11 Next Review

The next Five-Year Review for NAAD 40 will be conducted in October 2020.

7.0 NAAD 43 FORMER CONSTRUCTION DEBRIS LANDFILL #5

7.1 Introduction

NAAD 43 is the designation applied to five separate Former Construction Debris Landfills (FCDLs) located in the northwest part of Camp Navajo. The five landfills comprise a total of approximately 38.3 acres, with FCDLs #1-4 grouped in the northern portion of the Camp Navajo Area, and FCDL #5 situated in the northwest Buffer Area (Figure 2-1, Appendix A).

Landfills #1-4 at NAAD 43 are suitable for unrestricted current and potential future use because there are no unacceptable risks to human health or the environment associated with site-related chemical constituents. However, at FCDL #5, the completed remedy is only protective of human health and the environment for limited current and future use because hazardous substances remain in soils at levels exceeding residential exposure limits.

FCDLs #1-4 were closed with no further action in 2010, but because FCDL #5 requires LTM, NAAD 43 remains open in the Camp Navajo IAP. Note that since closure of FCDLs #1-4 it has become common to use the term NAAD 43 when referring specifically to FCDL #5. The layout of FCDL #5 is shown on Figure 7-1.

7.2 Site Chronology

A summary of the site history is found in **Table 7-1**.

Table 7-1. Chronology of Site Events at NAAD 43

Event	Date
NAAD 43 used for disposal of construction debris.	1959-1974
The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted an installation-wide preliminary assessment, including site inspections, interviews, and records reviews.	1979
Uribe and Associates conducted a RCRA Facility Assessment on the behalf of USEPA and ADEQ, consisting of site inspections, interviews, and compilation of earlier preliminary assessments and site investigations.	1993
Tetra Tech performed a remedial investigation. Activities included a geophysical survey, a passive soil gas survey, excavation of test pits, and surface and subsurface soil sampling.	1995-1996
URS performed a removal action, which included soil excavation and verification sampling.	1998-2001

Event	Date
ADEQ issued a letter designating this site as Construction Complete, No Further Remedial Action. The ADEQ letter required land use controls, annual site inspection and maintenance, and preparation of an operation and maintenance plan.	2004
MKM developed an operation and maintenance plan and land use controls. MKM also initiated site inspection and maintenance activities.	2005
MKM performed maintenance.	2008
The Decision Document was completed.	2010
CERCLA 121(c) Five-Year Review.	2010

7.3 Background

Site History

The operational history of the five landfills is unknown, but analysis of aerial photographs indicated they were active from 1959 through 1974. Site inspections of FCDLs #1-4 indicated no visual evidence of distressed vegetation, chemical staining, excavations, burial, or disposal of municipal or potentially hazardous wastes, or features that may be of environmental concern. Inspections concluded that no sampling of FCDLs #1-4 was necessary because there was no evidence of potential chemical releases, and the four landfills were not likely to have adverse environmental impacts on soil or groundwater. Therefore, no further action at FCDLs #1-4 was recommended. ADEQ concurred with this assessment in 1998.

At FCDL #5, visible material was observed on the surface at the surface and inspections identified areas where debris was deposited in trenches. Materials disposed at FCDL #5 included wood, concrete, brick, metal, glass, asphalt, roofing materials, ceramic tiles, and asbestos-containing shingles. Much of the material disposed at FCDL #5 appeared to have been burned, then consolidated in a mound at the center of the landfill area.

Physical Characteristics

Topography and Surface Water

FCDL #5 is located in the Buffer Area on the northwestern side of Camp Navajo and is approximately 4 acres in size. The site consists of a grass-covered area within a small northwest-southeast trending valley that is bisected by a dry creek bed and rimmed by pine trees. There are no natural surface water features on FCDL #5. However, excavations were not backfilled resulting in two large depressions. Occasional runoff flows across FCDL #5, and can pond in the depressions in the central portion of FCDL #5.

Geology

At FCDL #5, the surficial soils are underlain at depths of 0 to 15 feet by basalt bedrock. No faults have been identified on or near the area.

Hydrology

Shallow groundwater was not encountered during investigation and remedial actions at FCDL #5.

Natural Resources

No species of concern, including threatened and endangered species, have been reported within or near FCDL #5

Cultural Resources

No archaeological sites have been reported at NAAD 43.

Land and Resource Use

The area is signed and access is currently restricted. NAAD 43 was previously used for maneuver training, and could be used for training again.

History of Contamination

A RI was conducted at FCDL #5 in 1995 and 1996 by Tetra Tech. RI activities included a geophysical survey, a soil gas survey, surface and subsurface soil sampling, and excavation and sampling of test pits. Non-residential screening levels were designated as the appropriate screening levels. The results of the RI indicated the only metals with concentrations above the NR-SRLs were arsenic, beryllium and lead. Six SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) had concentrations above 1990s NR-SRLs (B&C, 2010).

Subsurface samples were collected up to a depth of 10 feet bls. The only metals above NR-SRLs were arsenic and beryllium. TRPH was detected in five soil boring samples, but all of the detected concentrations were several orders of magnitude below the R-SRLs. Five SVOCs, (benzo(a)anthracene, benzo(a)pyrene, (benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, were detected at concentrations above their NR-SRLs (B&C, 2010).

Additional characterization was conducted at the site in 1999. Benzo(a)pyrene and benzo(a)anthracene, were detected in 13 of 25 samples at concentrations above their NR-SRLs. As part of this effort, a leaching to groundwater evaluation was also conducted for polynuclear aromatic hydrocarbons (PAHs). Using the ADEQ leachability model, it was determined that potential impact to groundwater from PAHs was not likely.

Shallow groundwater was not identified at FCDL #5, so an evaluation of shallow groundwater quality was not conducted and shallow groundwater consumption was not evaluated in the HRA.

Two composite samples of ponded surface water were collected and analyzed for PAHs and asbestos. It was determined that site soils had not adversely impact ponded water.

A HRA was conducted for FCDL #5 as part of the characterization in 1999. Based on results of the HRA, it was concluded that limiting worker contact, restricting cattle grazing and elk hunting, and/or conducting a removal action was warranted at this site (B&C, 2010).

The removal action at FCDL #5 mitigated the unacceptable risks associated with COCs in soil by excavating impacted soil and construction debris and disposing of these materials at an appropriately permitted off-site landfill. Confirmation sample results indicated that residual COC soil concentrations were below NR-SRLs, indicating that unacceptable risks to human health no longer remained for non-residential land use.

A screening-level ERA was conducted for COPECs in soil at FCDL #5 in 1999. This assessment concluded that the organic COPECs (specifically anthracene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, and/or pyrene) in surface soils at FCDL #5 posed a potential adverse risk to the Mexican vole, elk, cattle, fescues, and other herbaceous plants. The subsequent removal action mitigated these unacceptable risks to wildlife and plants (B&C, 2010).

Analytical results for confirmation soil samples and ponded surface water are provided in DD in Appendix J.

Initial Response

A removal action consisting of soil and debris excavation and disposal was conducted in several phases in June-July 1999, November 1999, December 1999, January 2001, and May 2001. Portions of the area were excavated to bedrock, and other portions were excavated horizontally to native soil. At the conclusion of the excavation, no visible debris remained at FCDL #5.

Confirmation soil samples were collected following each phase of excavation to demonstrate that COC concentrations were below NR-SRLs. Results of confirmation sampling following the January 2001 excavation phase indicated that detected constituents remaining in soil were below NR-RSLs, except for arsenic, and a single location where one PAH, benzo[a]pyrene, exceeded the NR-SRL. The arsenic concentrations were attributed to naturally occurring background concentrations in soils at Camp Navajo. The confirmation sample locations are illustrated on Figure 7-2. However, to address the PAH result, a limited over-excavation of soil in a relatively small area in the southern portion of FCDL #5 was conducted in May 2001. The additional excavation removed soil to the bedrock interface, and confirmation sampling was considered unnecessary. Upon completion of the remedial action, a total of approximately 11,665 tons of waste and soil was disposed off-site.

Summary of Basis for Taking Action

ADEQ has designated FCDL #5 as Construction Complete, with no further remedial action required. The August 2004 ADEQ letter requires land use controls, annual site inspection and maintenance, and preparation of a management plan.

The remedial after action report concluded that because some concentrations of PAHs might remain above the R-SRLs, LUCs were appropriate. Furthermore, the HRA did not account for exposure to pieces of debris scattered across the surface and shallow subsurface beyond the excavations. Therefore, it was determined that small-scale annual inspection and maintenance are also appropriate (B&C, 2010).

7.4 Remedial Actions

Remedial Action Selection

The DD identified the following RAOs for NAAD 43: *"No hazardous substances were identified at FCDLs #1-4, so there are no unacceptable risks associated with site-related chemical constituents. Consequently, no further action is planned at these four landfills and the site IRP status is considered response complete.*

No unacceptable risks associated with site-related chemical constituents and non-residential land use remain at FCDL #5, so no further remedial action is planned and the site IRP status is considered remedy in place. Because remedial action consisting of soil/debris excavation and off-site disposal has already been implemented at FCDL #5, further evaluation of remedial alternatives was not performed. However, to satisfy CERCLA/NCP risk-based cleanup requirements, inspections, maintenance, and LUCs are appropriate to verify the effectiveness of the remedy."

Inspection, maintenance, and LUC objectives for FCDL #5 are as follows (MKM, 2005):

- Periodically inspect the land surface for debris, and collect and dispose as necessary;*
- Periodically inspect the drainage features, and maintain them as necessary to facilitate storm water runoff; and*
- Restrict activities that could impact the integrity of the land surface and drainage features."*

The selected remedy for FCDL #5 is described in the DD as *"The selected remedy for FCDL #5 is LTM and includes land surface inspection, maintenance, and LUCs. Periodic inspections are performed to confirm the integrity and to identify the need for repairs to maintain the land surface, drainage ditches, and signage. Additionally, LUCs will be recorded in an update of the Camp Navajo Real Property Development Plan and five-year reviews will be conducted to evaluate the protectiveness of the removal action and LTM program."*

Remedial Action Implementation

The remedy has been implemented with inspections (and maintenance as necessary). The LUCs include engineering controls (warning signs cautioning of subsurface hazards and administrative controls (requirement for Garrison Commander authorization prior to entry).

FCDL #5 was designated by the ADEQ as a Construction Complete, No Further Action, and requires inspections designed to identify erosion and exposed debris that would require cleanup.

The LUCs, LUC inspections and reviews, and enforcement actions associated with NAAD 43 will be described in the following documents:

- LUCIP. The LUCIP is expected to be completed in 2015-2016 and will include a description of NAAD sites, a detailed map, details regarding land use restrictions, land use controls and methods, the scope and schedule for annual reporting and the 5-year reviews, and information regarding the performance of MEC inspections;
- LTM/PCC WP. The LTM/PCC WP is planned for 2015-2016 and will be a comprehensive work plan that unifies the policies and procedures for common tasks that apply to multiple sites. The work plan will summarize the modifications and updates to the LTM program since 2005. The work plan will also include a LUC inspection and review plan, and contain checklists or forms to be used for each site.
- Camp Navajo RPDP. The RPDP will be updated in 2015-2016 to include NAAD 43 boundaries, pertinent features and information regarding land use restrictions and controls (revision planned for 2015- 2016).

Systems Operations/O&M

There are no system operating at NAAD 43. Maintenance activities include replacement of signs, as necessary.

7.5 Progress Since Last Review

The previous Five-Year Review (MKM, 2010) concluded that *"The remedy appears to be protective of human health and the environment. All threats at the site have been addressed through the removal actions at NAAD Sites 11B, 14D, 14G, and 43, through the stabilization and capping of the landfill at NAAD 40, and through the implementation of LUCs at all sites.*

Long-term protectiveness of the removal actions will continue to be monitored by groundwater sampling during year five of the LTM program. Current data indicate that the remedies are functioning as intended at all sites."

Table 7-2 summarizes the issues and recommendations, and follow-up actions, since the previous Five-Year Review. Annual inspections were conducted at FCDL #5. The annual LTM

reports summarize observations and document items collected during the inspections. Observations and activities during the 2014 inspection included the following:

The results of the FCDL #5 2014 inspection are summarized as follows:

- Signage installed at the entry point was in good condition but the fixtures holding the sign in place had come apart. The sign was re-hung;
- The drainage ways were functional; the siltation control measures (berms, straw bales, and wattles) were in place and functioning. A small portion of the hay bales and hay wattles had tipped over or were displaced over time;
- The vegetative cover was intact and healthy and no fractures were observed;
- Standing water was observed in the shallow depression on the west end;
- Non-friable asbestos tile fragments, tar balls, coal and asphalt chunks were observed in limited quantities on the landfill surface. On May 15, 2014, a five person team traversed the entire landfill surface (side by side, northwest to southeast) collecting the debris. Four 5-gallon buckets of asphalt/tar balls, one 5-gallon bucket of asbestos tile fragments, and one 5-gallon bucket of asphalt and coal chunks were collected and relinquished to the Army for disposal.

Table 7-2. Issues, Recommendations and, Actions Taken since the Last Five-Year Review

Issue	Recommendation	Follow-Up	Status
The LUCs for NAAD 43 have not been formally documented in the Camp Navajo RPDP.	Update the Camp Navajo RPDP	The plan is scheduled to be updated in 2015-2016.	To be completed in 2015-2015
	Reduce the frequency of visual inspections at NAAD 43 from semiannual to annual.	Sampling frequency was reduced to annual frequency in 2012.	Complete

7.6 Site-Specific Five-Year Review Process

Document Review

This Five-Year Review consisted of a review of relevant documents including monitoring reports, Decision Documents, and historical technical reports. For NAAD 43, the following documents were reviewed:

- Remedial Action Report, Former Construction Debris Landfill #5, Camp Navajo, Bellemont, Arizona, URS, August 2001;
- Decision Document, Five Long Term Management Sites, NAAD 11B, 14D, 14G, 40, and 43, B&C, October 2010;
- Five-Year Review Report For Five IRP Sites (NAAD 11B, 14D, 14G, 40, and 43) at Camp Navajo, Bellemont, Arizona, MKM, October 2010;
- 2012 Long-Term Management Groundwater Monitoring Report For NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, May 2013;
- 2013 Long-Term Management Groundwater Monitoring Report For NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, January 2014; and
- 2014 Long-Term Management Groundwater Monitoring Report For NAAD Sites 11B, 40, and 43, Camp Navajo, Arizona, PIKA, October 2014.

Data Review

Landfill inspection reports confirmed that NAAD 43 had been inspected in accordance with work plans. The most recent inspection in 2014 indicated that residual landfill materials including asbestos tile fragments, tar balls, coal, and asphalt chunks were observed in areas of the landfill usually submerged by ponded water. On May 15, 2014, the entire surface area of the former landfill was traversed to collect these materials. Approximately four 5-gallon buckets of asphalt/tar balls, one 5-gallon bucket of asbestos tile fragments, and one 5-gallon bucket of asphalt and coal chunks were collected and relinquished to the Army for disposal. Only minor maintenance of erosion controls was required at FCDL #5. No repair of erosional features was recommended.

Site Inspection

The site inspection was conducted on 21 May 2015. Present at the site inspection were Joan Cullen and Brittany Hyde (USACE-Louisville District), Randall Wilkinson (ARNG), Kim Birdsall (AZARNG), and Karin Harker (ADEQ). Photographs of the site as observed during the site visit are provided in Appendix B. Site Inspection forms are provided in Appendix D.

The inspection of NAAD 43 noted the following observations:

- Signs were in place indicated "No Unauthorized Admittance", "Hazardous Subsurface Conditions" and "No excavation, Construction or Training";
- No waste was observed in areas inspected; and
- Standing water was observed covering portions of FCDL #5.

Interviews

Mr. Randy Wilkinson (ARNG) was asked for information concerning the history and LUCs at NAAD 43 and he indicated that the remedy appears to be functioning as intended. He indicated that during the removal action in 2000 that a large volume of material had been removed but the area had never been backfilled which resulted in the ponding of water observed during the site visit. He indicated filling in the depressions with clean backfill would prevent ponding and the potential costs (regulatory) associated with a permanent standing body of water or wetlands.

Ms. Karin Harker (ADEQ) responded in writing that since taking over the project 7 months ago, ADEQ has visited the site twice, and that ADEQ receives regular monitoring reports from Camp Navajo. She also indicated that she is unaware of complaints, violations or other incidents requiring a response by ADEQ. She further indicated that ongoing monitoring and maintenance is acceptable, but signage could use upgrading and maintenance. In addition, depressions containing runoff water could be a potential concern.

Mr. Wayne Miller (ADEQ), former project manager for Camp Navajo, responded in writing that over the last 5 years, ADEQ personnel visited the site on average once a year. He further indicated that ongoing monitoring and maintenance at NAAD 43 is acceptable.

Interview forms are included in Appendix C.

7.7 Technical Assessment

The objective of this Five-Year Review is to evaluate if the remedy at the NAAD 43 remains protective of human health and the environment. The technical assessment of the protectiveness of the remedy is based on the responses to the following three questions posed in the USEPA Comprehensive Five-Year Review Guidance (EPA 540-R-01-007/OSWER No. 93557-03B-P, June 2001):

1. Question A: Is the remedy functioning as intended by the decision documents?
2. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents? YES

Based on the review of documents, interviews, and site inspection, the remedy is functioning as intended and remains protective of human health and the environment.

The principal objective of the removal action in 1999-2000 was to remediate petroleum contaminated soils to NR-SRLs. This objective has been met and no unacceptable risks associated with non-residential use remain at NAAD 43.

The remedy is LTM, consisting of LUCs and inspections. LUCs restrict access and residential development. Warning signs are placed at intervals of a 100 feet or less around the boundary. In addition, intrusive activities at Camp Navajo require a permit and REC. The Environmental Office monitors dig permits and RECs prior to intrusive activities. No intrusive activity was observed at NAAD 43 during the site inspection.

Annual inspections ensure that land use is consistent with non-residential use. Storm water controls are repaired as necessary. In addition, pieces of debris scattered across the surface and shallow subsurface exposed by frost heaving and thawing are collected, as necessary.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? YES

The COCs for NAAD 43 are presented in the DD and in Appendix F. Appendix F also includes historical and current SLs for groundwater, and the historical and current R-SRLs and NR-SRLs for soil at NAAD 43.

Review of exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection and current risk-based screening levels indicated the assumptions are still valid. Physical conditions and land use has not changed. The exposure assumptions and toxicity values for COCs at NAAD 43, used to develop the risk assessment at the time of the remedy selection, are still valid.

The requirement for a remedy at NAAD 43 is based on the concentrations of PAH above the residential screening level. However, additional evaluation of PAHs and an updated HRA may be warranted in the future. PAHs can be expected to have attenuated time due to natural processes since the HRA was conducted as part of the RI in 2001.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? NO

There have been no changes in the physical conditions at FCDL #5 that would impact the effectiveness of the remedy.

7.7 Technical Assessment Summary

A review of documents, interviews, and site inspection indicated that remedy is protective of human health and the environment as intended by the DD. Potential exposure to contaminants and waste remaining above residential screening in the subsurface are addressed with LUCs and LTM. There have been no changes in physical conditions or land use since the remedy was put in place. LUCs are in place, enforced, and prevent exposure of receptors to potential

contaminants in the subsurface by limiting intrusive activities. On-going inspections ensure that land use remains consistent with LUCs and that the remedy remains protective of human health and the environment.

7.8 Issues

No issues were identified during the Five-Year Review that affect current or future protectiveness.

7.9 Recommendations and Follow-up Actions

Replacement of excavated soils with clean soil and regrading low lying areas may be warranted. Development of a permanent surface water body over a large portion of FCDL #5 could limit observations during inspections.

Additional evaluation of PAHs and an updated HRA may be warranted in the future. PAHs can be expected to have attenuated time due to natural processes since the HRA was conducted as part of the RI in 2001.

7.10 Protectiveness Statement

The remedy at NAAD 43 is protective of human health and the environment. The remedy is LTM, consisting of LUCs and inspections. The remedy is protective for the following reasons:

- Soil and surface water were investigated, and soil removal actions completed in 2001 mitigated risks associated with soils;
- Shallow Groundwater was not identified during removal actions. Regional groundwater is found at depths greater than 1,000 feet; There are no current complete exposure pathways;
- There are no complete exposure pathways for humans and wildlife at NAAD 43;
- LUCs restrict access and residential development at NAAD 43;
- Warning signs are installed at 100-foot intervals around the boundary. These signs were observed to be in good condition during the site inspection;
- Dig permits and RECs are required for intrusive activities at Camp Navajo and are monitored regularly by the Environmental Office to ensure the protectiveness of the remedy; and
- Inspections on an ongoing basis ensure that LUCs remain appropriate for future land use and site conditions, or are updated if conditions change.

7.11 Next Review

The next Five-Year Review for NAAD 43 will be conducted in October 2020.

8.0 SUMMARY OF SITES CLOSED SINCE 2010 FIVE-YEAR REVIEW

The previous Five-Year Review (MKM, 2010) addressed the remedies at NAAD 11B, NAAD 14D, NAAD 14G, NAAD 40 and NAAD 43. The recommendations presented in the Five-Year Review included closure of NAAD 14D and NAAD 14G, with termination of LUCs and groundwater monitoring, as well as abandonment of wells. The following is a brief summary of these sites.

8.1 NAAD 14D, Building 322, Paint Operations

NAAD 14D is the former site of Building 322, located directly west of Building 375 in the Ammunition Workshop Area. The Upper Reservoir Road is adjacent to the northern side of NAAD 14D, and railroad tracks are present along the southern side. Building 322 was originally a 4,840-square-foot facility used for degreasing, cleaning, and spray painting ammunition. It contained two paint booths and four acid stripping tanks. Based on data from geophysical surveys, drains from the paint booths connected through a series of pipes and possibly discharged to a nearby drainage channel adjacent to the railroad tracks. The channel drains southward underneath Lower Reservoir Road. Another pipe terminated in the field west of the building into a drainage channel that empties into Gus's Pond.

Extensive soil, groundwater, and surface water investigations were conducted at NAAD 14D and are summarized in the IRP Buyout Closure Report (B&C, 2005). Results of the Tier 1 HRA indicated that detected chemicals in soil at NAAD 14D passed the NR-SRL screen. A limited number of constituents were carried into a Tier 2 HRA because the reporting limits exceeded the NR-SRL. Results of the Tier 1 and Tier 2 HRA concluded that there was no unacceptable risk to human health attributable to site-related chemical constituents in soil at NAAD 14D.

Chemical constituents detected in soil were screened in a Tier 1 leaching evaluation for GPL exceedances. Detected constituents passed the Tier 1 leaching evaluation indicating that none of the detected constituents posed an unacceptable risk to groundwater quality.

Detected chemical constituents in groundwater were below their respective AWQs. The following chemicals detected in groundwater did not have AWQs: 1,3-dinitrobenzene, carbon disulfide, delta BHC, endrin ketone, and zinc. The compound 1,3-dinitrobenzene was carried through and identified as a COC in the LTM Work Plan. The detected concentrations of copper, zinc and carbon disulfide were below SLs. Delta BHC and endrin ketone were detected, but these were also detected in laboratory quality assurance samples were suspected to be lab contaminants.

Concentrations of detected chemical constituents in surface water were below their respective SLs.

IRAs were conducted in 1996 and 2004. Soils exceeding the R-SRLs soils were excavated and disposed off-site.

Further remedial action was determined to be unnecessary because interim removal actions were been completed. Contaminants in soil did not present an unacceptable risk, and the soil source areas that could adversely impact surface water or groundwater quality had been removed. However, LTM consisting of groundwater monitoring was performed to verify that sources for transfer of contaminants to shallow water-bearing strata within the Camp Navajo Clay were no longer present.

The analysis of the data generated during three years of LTM found that few contaminants were present and that detected concentrations of metals were decreasing or stable. Beryllium and cadmium were detected at concentrations above the SL in the primary sample collected from well 00-03 in Spring 2008. Primary and duplicate samples were collected and analyzed for metals in Fall 2008 to validate the Spring 2008 data. Concentrations of beryllium and cadmium in both the primary and duplicate samples were non-detect.

Trend analysis of the data generated during three years of LTM indicated that contaminants had not been detected above the SL. NAAD 14D was removed from the LTM sampling program in Fall 2008 because ramp-down requirements were met. Remedial action objectives were achieved. The soil removal activities achieved the objective of preventing further contamination of groundwater. The LTM ramp-down conditions, specified in the LTM WP (MKM, 2005), were achieved for the NAAD 14D wells. The analytical data was of sufficient quantity and quality to support the conclusion that no COCs were present in groundwater at NAAD 14D.

8.2 NAAD 14G, Building 327 Rust Removal

NAAD 14G is the former site of Building 327, located in the Ammunition Workshop Area. The Upper Reservoir Road is adjacent to the northern side of the building, and railroad tracks are present along the southern side of the structure. Building 327 was an elongate structure with an area of 11,911 square feet on a raised concrete foundation. Building 327 was used for ammunition repair and disposal. Specific tasks included repacking shells, disassembling boosters, spray painting, and small arms ammunition disposal.

Extensive soil, groundwater, and surface water investigations were conducted at NAAD 14G and are summarized in the IRP Buyout Closure Report (B&C, 2005). Results of the Tier 1 HRA indicated that detected chemicals in soil at NAAD 14G passed the NR-SRL screen. A limited number of constituents with reporting limits that exceeded the R-SRL were carried into a Tier 2 HRA. The HRA concluded that there was no unacceptable risk to human health due to site-related chemical constituents in soil at NAAD 14G.

Chemical constituents detected in soil were screened in a Tier 1 leaching evaluation for GPL exceedances. The leaching evaluation determined that site-related chemical constituents in soil at NAAD 14G have not adversely impacted groundwater quality.

Detected concentrations of chemical constituents in groundwater were below their respective AWQS values, with the exception of a beryllium concentration in one sample. The following chemicals did not have AWQS and were detected in groundwater characterization samples at

NAAD 14G: 1,3-dinitrobenzene, carbon disulfide, copper and zinc. The detected concentrations were below current Tap Water RSLs. No adverse impact to groundwater was indicated, which is consistent with the findings of the leaching evaluation.

Detected concentrations of chemical constituents in surface water were below their respective numeric AWQS values. No adverse impact to surface water at NAAD 14G was indicated.

Prior to final characterization, the detected constituents remaining in soil at NAAD 14G with concentrations above the R-SRLs included arsenic, barium, beryllium, cadmium, chromium, lead, and mercury. Lead in surface soil exceeded the R-SRL. Barium in groundwater was the only constituent with concentrations above the AWQS values.

An interim removal action was conducted at NAAD 14G to remove COCs in soil that exceeded R-SRLs. Verification samples were submitted for analysis of priority pollutant metals. Laboratory analysis of the verification samples indicated detectable COCs, but concentrations were below the R-SRLs or laboratory reporting limits.

Further remedial action was determined to be unnecessary because the interim removal action removed source material and remaining contaminants in soil did not present an unacceptable risk. However, LTM consisting of groundwater monitoring was performed to verify that sources for transfer of contaminants to shallow water-bearing strata within the Camp Navajo Clay are no longer present.

Trend analysis of the data generated during three years of LTM indicated that concentrations of contaminants were below the respective SLs, with the exception of one anomalous sample result. In Fall 2007, concentrations of arsenic, beryllium, and cadmium exceeded the SL in the duplicate sample from monitoring well 97-03. However, these elements were not detected in the primary sample, indicating that the results of the duplicate were inaccurate. These elements were not detected in subsequent samples.

NAAD 14G was removed from the LTM sampling program in Spring 2008 because ramp-down requirements were met. Remedial action objectives were achieved. The soil removal activities have achieved the objective of preventing further contamination of groundwater. The LTM ramp-down conditions, specified in the LTM WP (MKM, 2005a), have been achieved for the NAAD 14G wells. The analytical data was of sufficient quantity and quality to support the conclusion that no COCs were present in groundwater at NAAD 14G.

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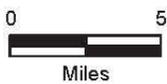
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APPENDIX A

FIGURES



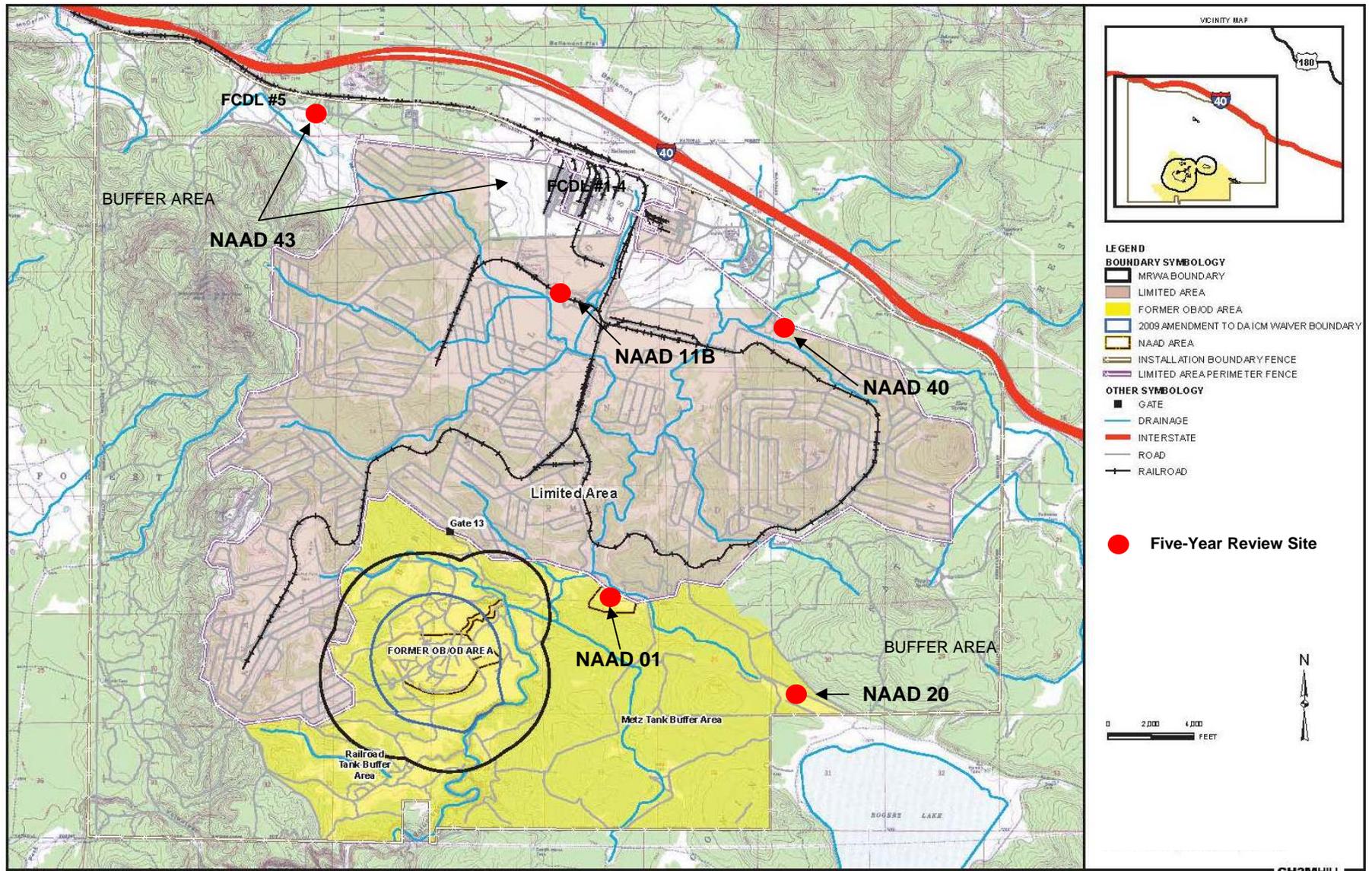
Sources:
Brown & Caldwell, ESRI



Prepared by AMEC for MKM Engineers, Inc

FIGURE 1-1
SITE LOCATION MAP
CAMP NAVAJO
BELLEMONT, ARIZONA



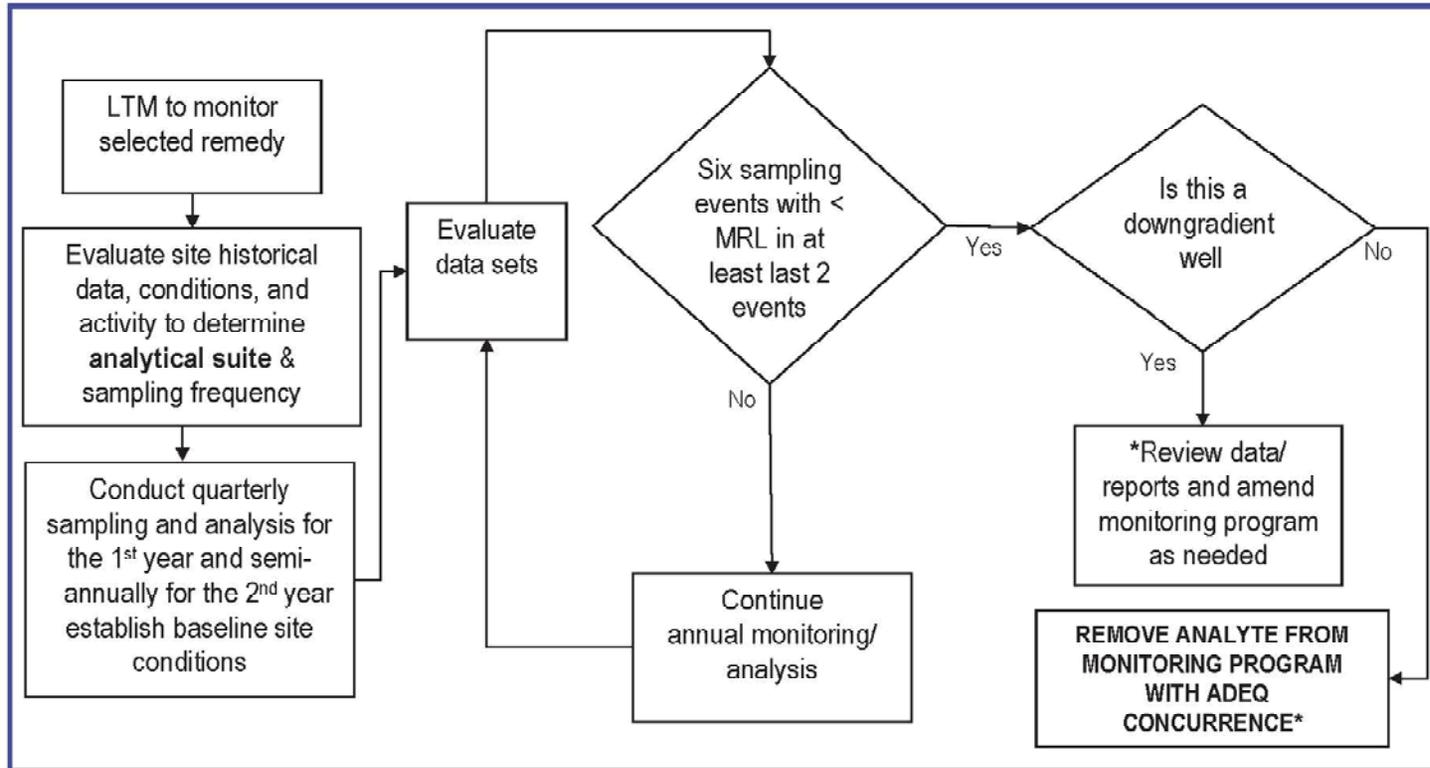


**FIGURE 2-1
LOCATION OF FIVE-YEAR REVIEW SITES AT CAMP NAVAJO**



FIGURE 2-2

Performance Monitoring – Ramp Down Each Analytical Suite (By Well)

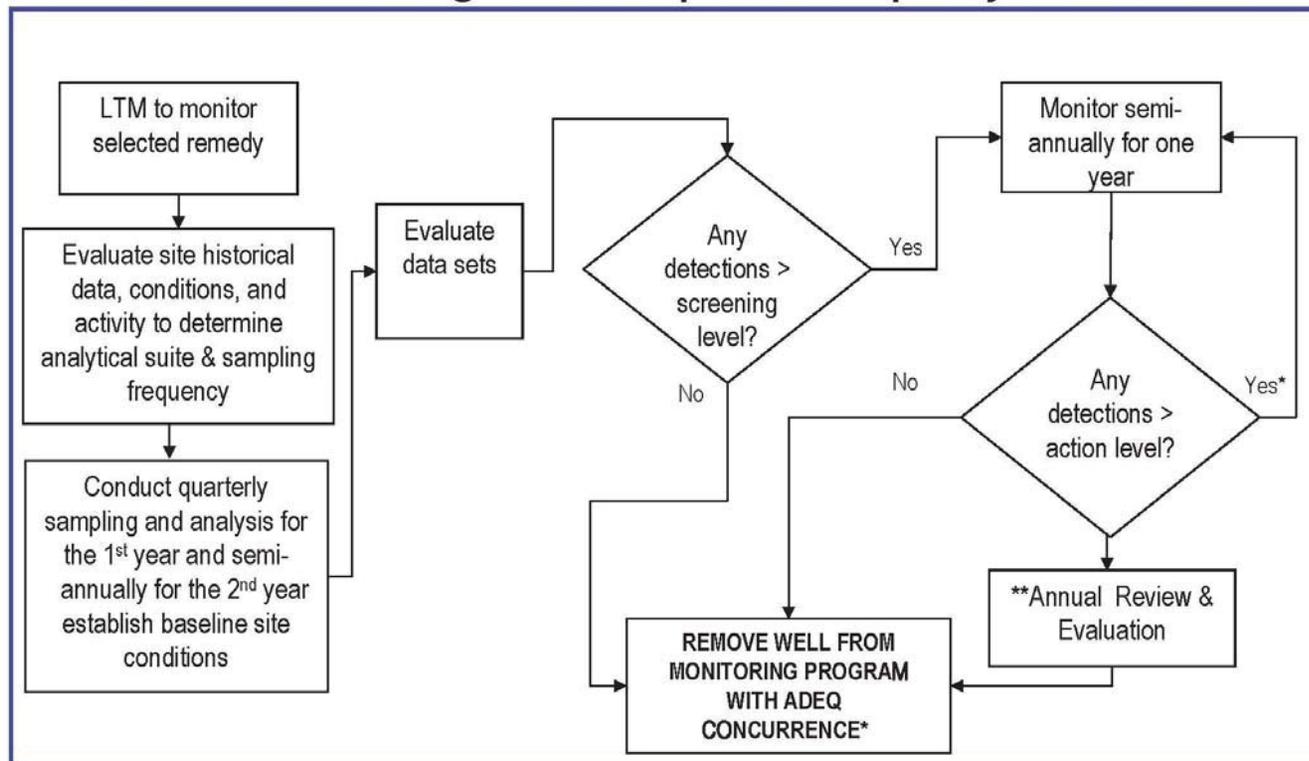


*If contaminant is present in other wells continue to monitor, if not, remove from LTM program.



FIGURE 2-3

Performance Monitoring – Well Ramp Down Frequency Decision Matrix



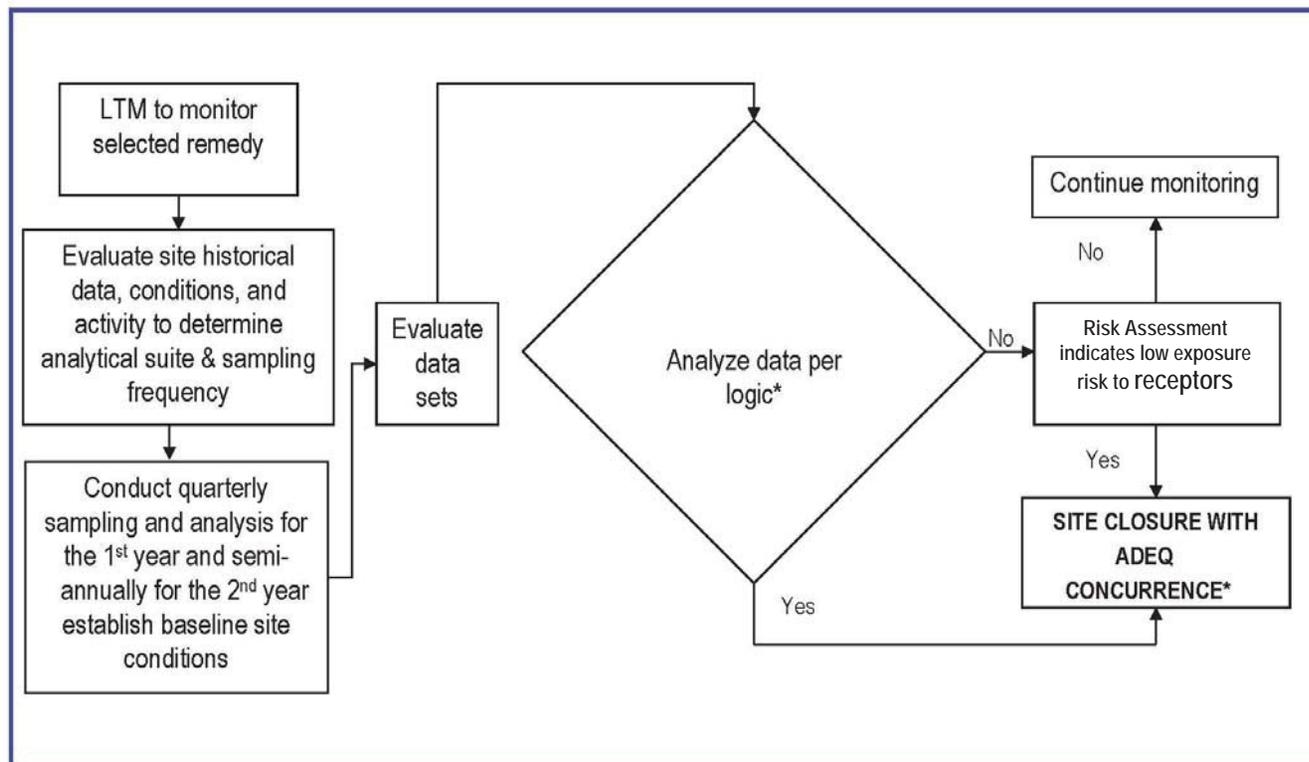
*Downgradient wells remain in the monitoring program at the most conservative frequency consistent with other wells in the program for the specific site. This maybe quarterly or semiannual monitoring depending on how far in to the program the monitoring has progressed (1st year - quarterly; 2nd year - semi annually).

**Review & evaluate selected remedy; data quality and usability; apply for regulatory adjustment to monitoring requirements. After 2nd year of monitoring, review and evaluate for regulatory adjustment or continue monitoring semi-annually.

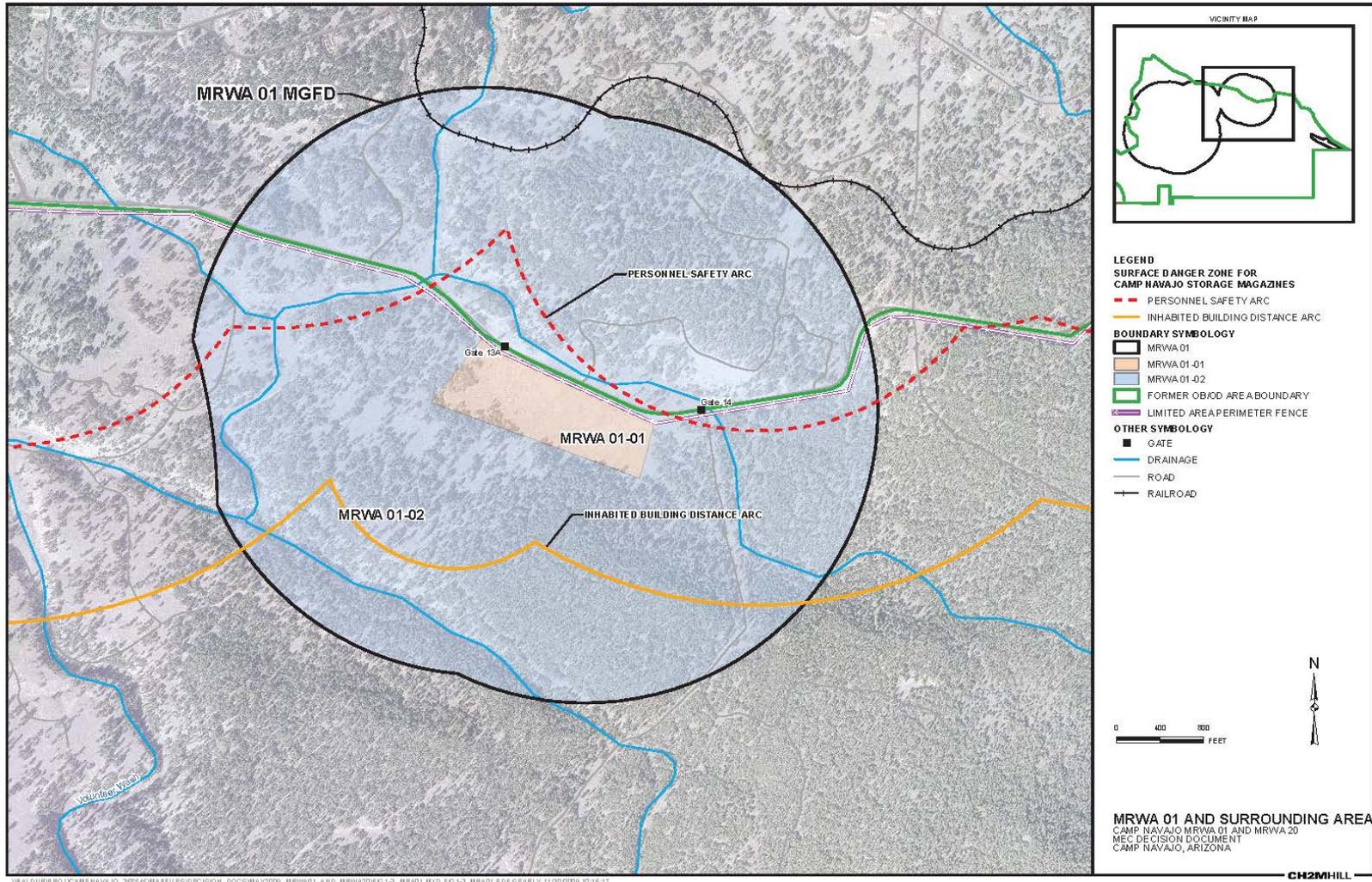


FIGURE 2-4

Performance Monitoring – Site Ramp Down Frequency Decision Matrix



*If, after the first year of quarterly sampling and an additional year of semi-annual sampling (six sampling events), only minor exceedences (less than 15% based on Laboratory Control Sample criteria in Master QAPP) to the screening criteria are observed in onsite or adjacent monitoring wells, and COCs are not detected at concentrations greater than the screening criteria in downgradient well(s), the site may be removed from LTM with concurrence by the ADEQ.



\\ALDUR\PROJ\CAMP NAVAJO_36542\BA\FILES\DECISION_DOCS\WY2009_BRIING1_AND_BRIING2\FE-1-3_BRIING1.MXD FG 1-3_BRIING1.PDF SEARLY 11/20/09 10:16:37

FIGURE 3-1
NAAD 01 SITE LAYOUT

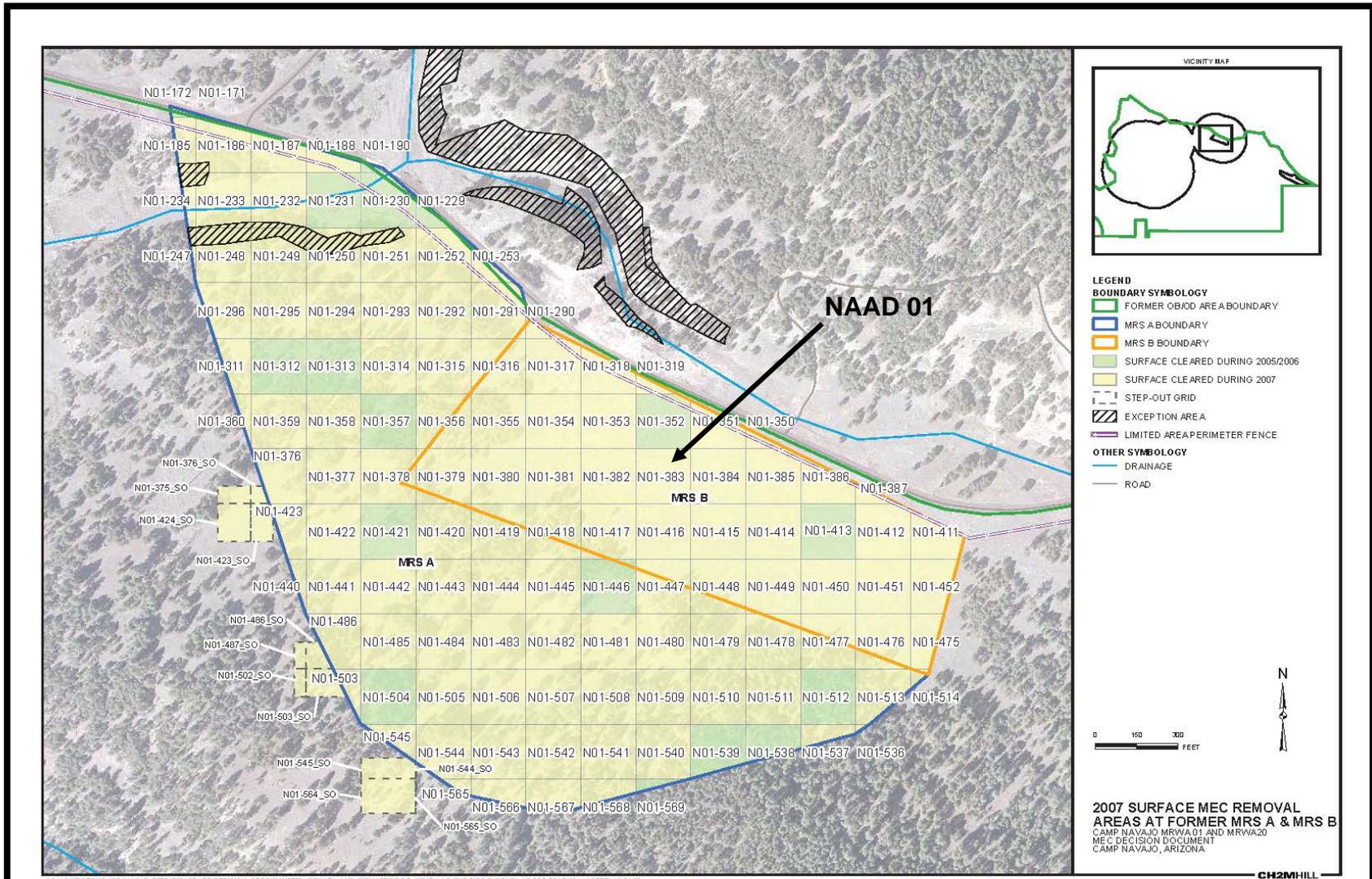


FIGURE 3-2A
NAAD -1 SURFACE MEC REMOVAL AREA

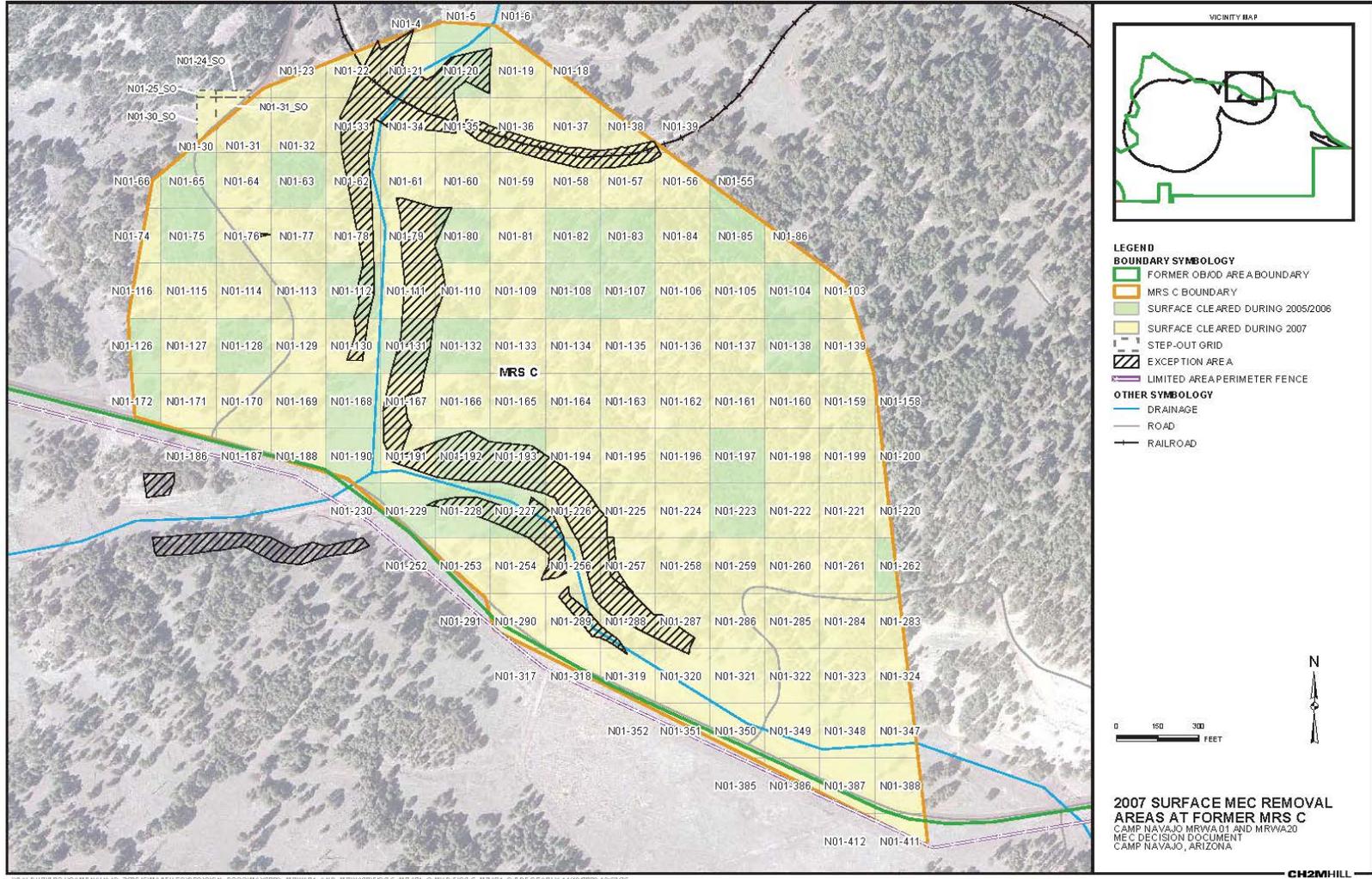


FIGURE 3-2B

NAAD 01 SURFACE MEC REMOVAL AREA

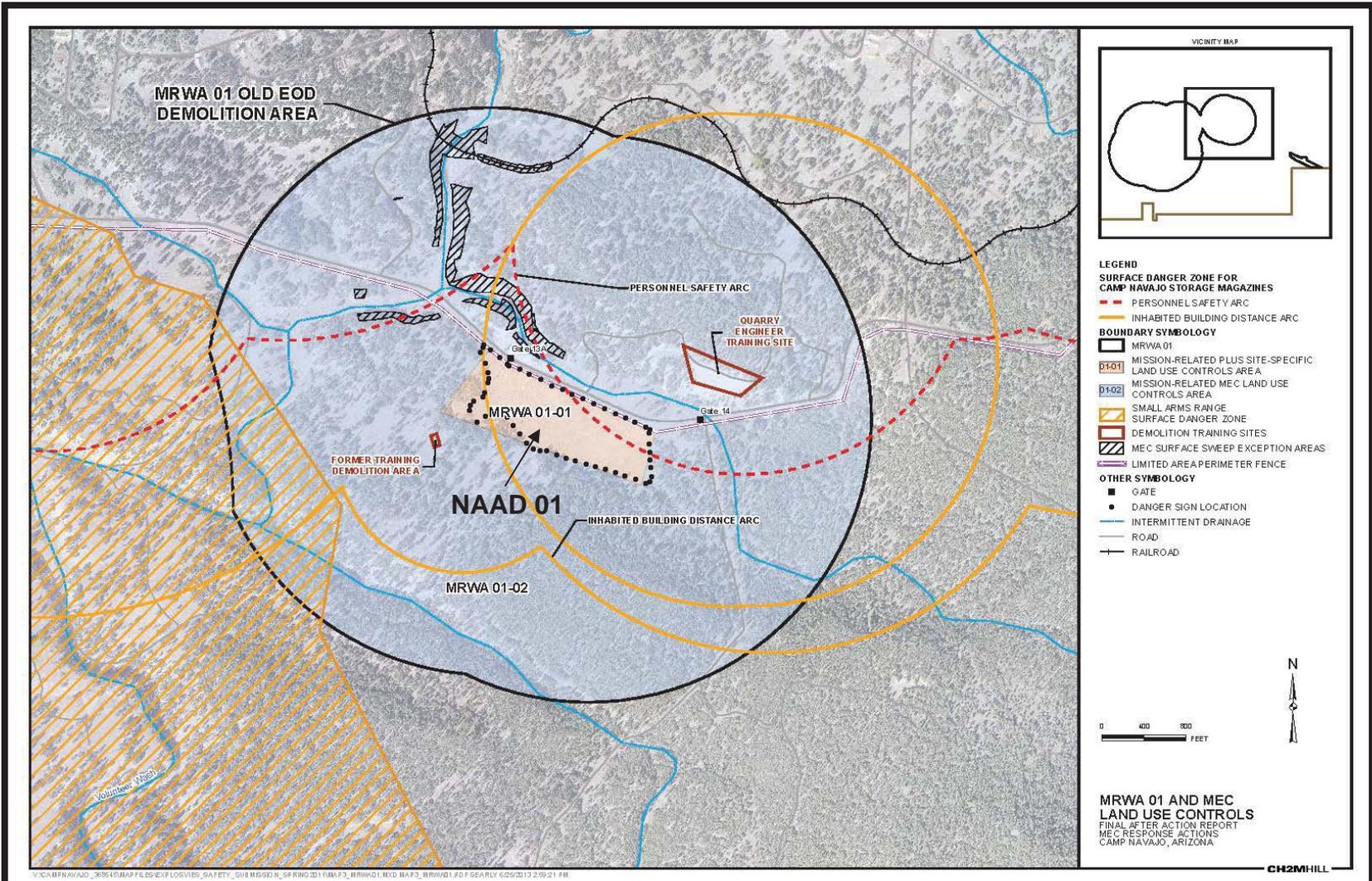
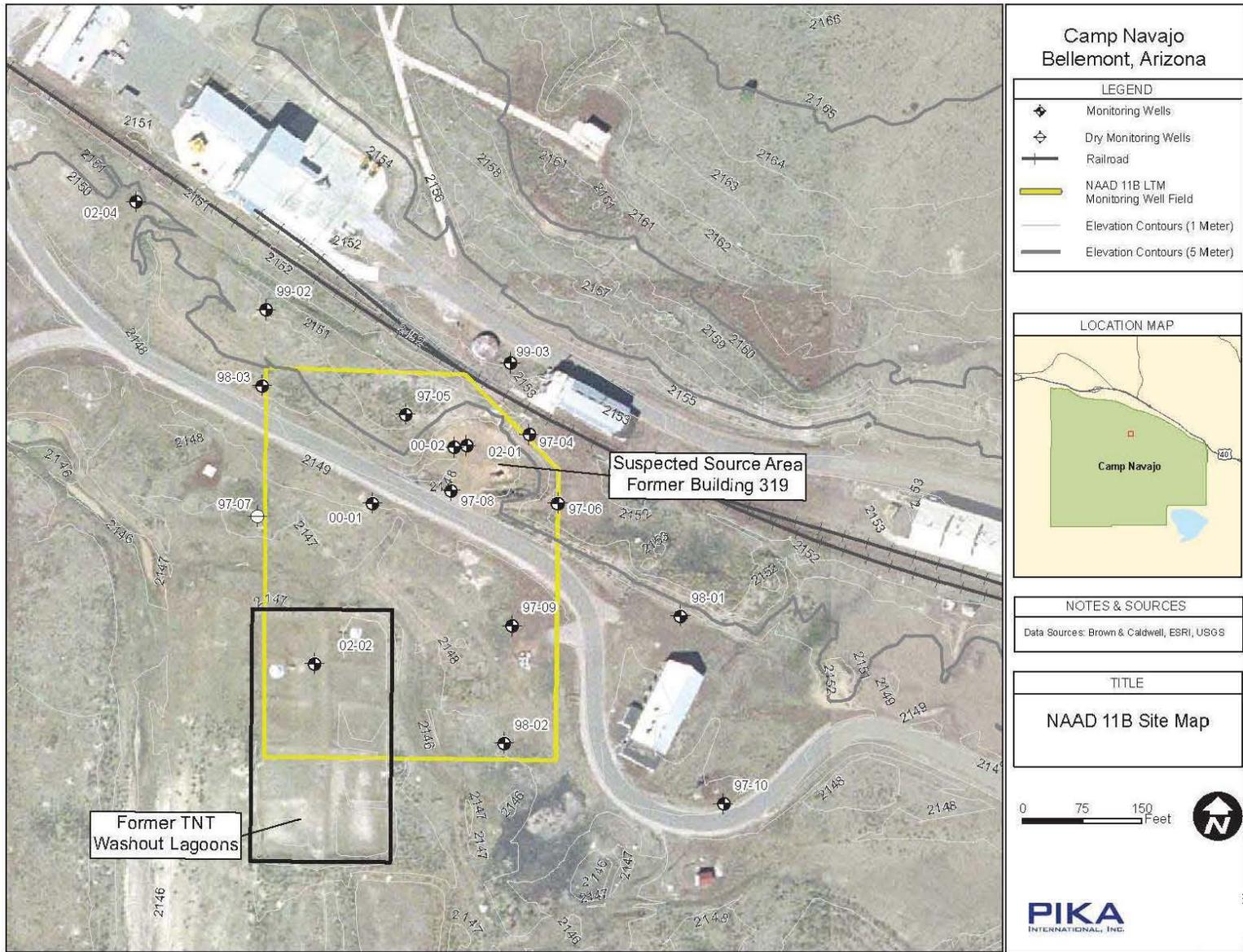


FIGURE 3-3

NAAD 01 LAND USE CONTROLS



**FIGURE 4-1
NAAD 11B SITE LAYOUT**

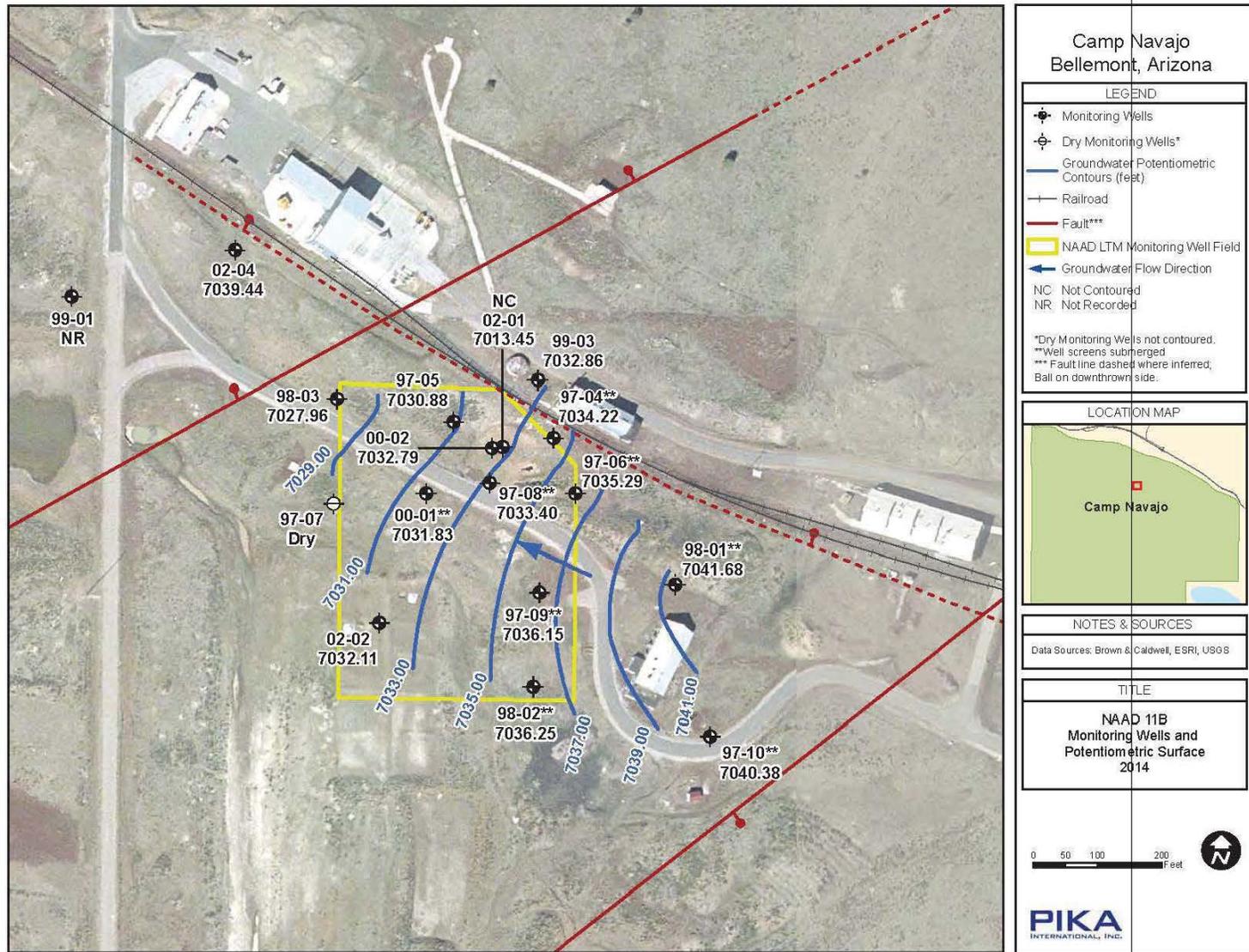
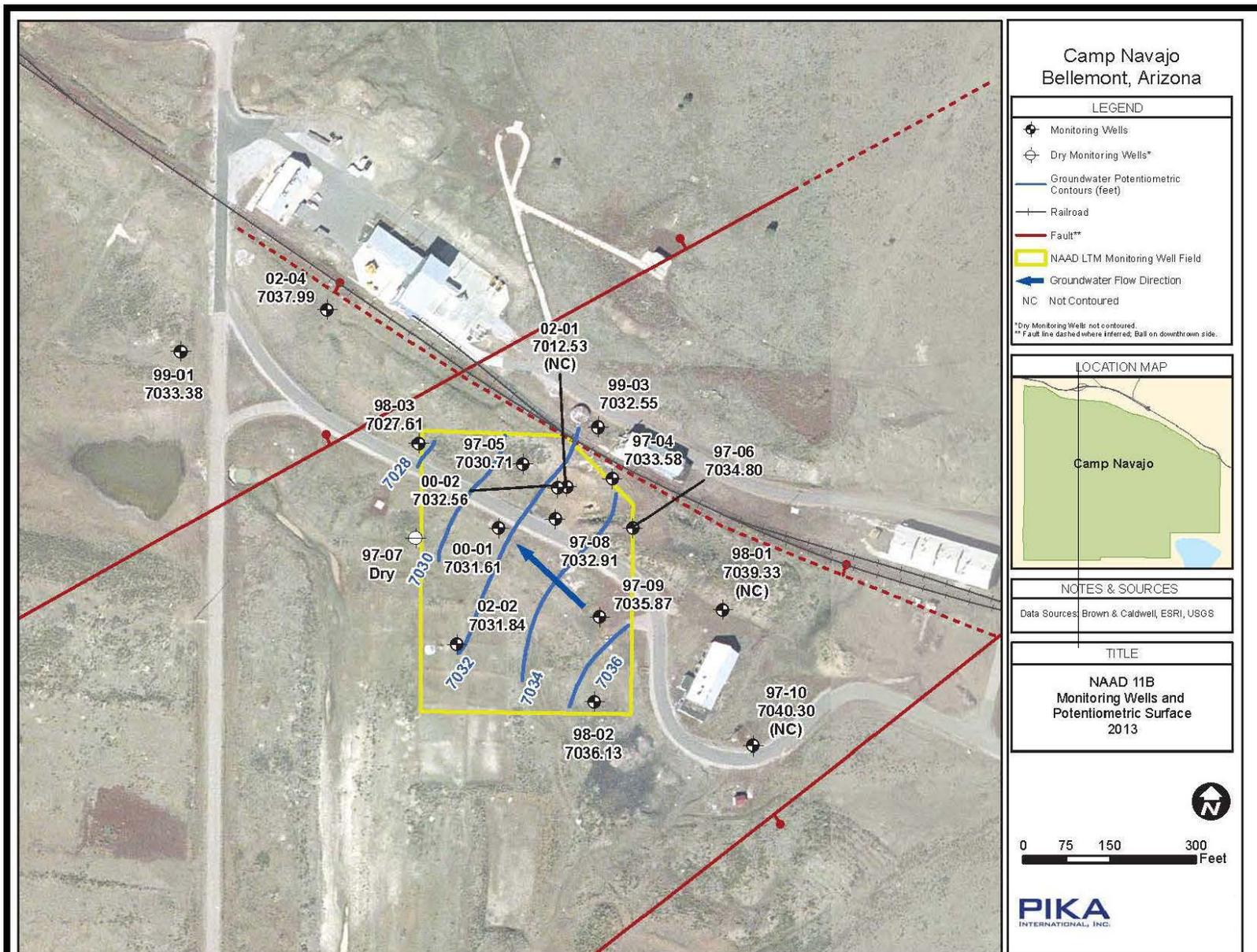
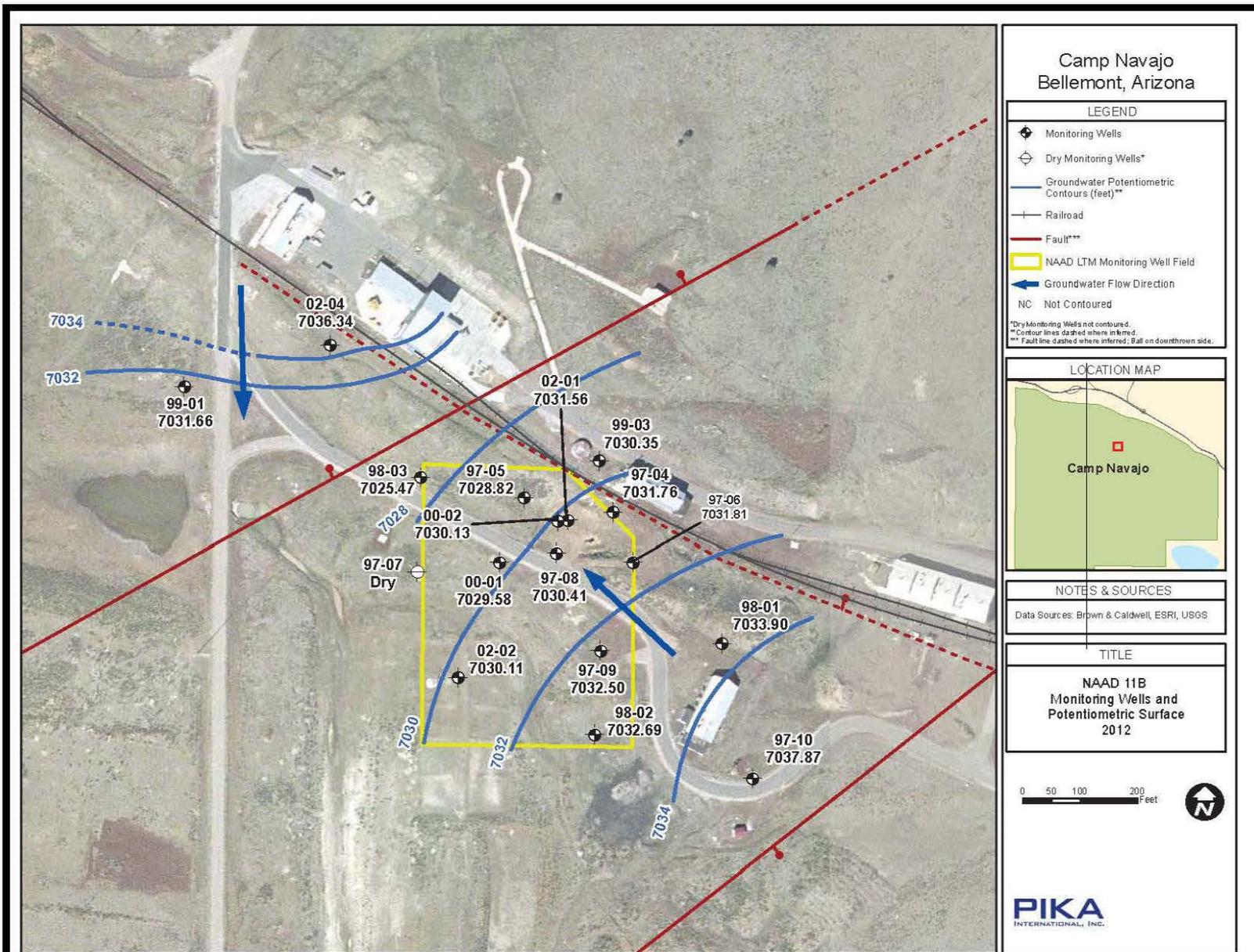


FIGURE 4-2

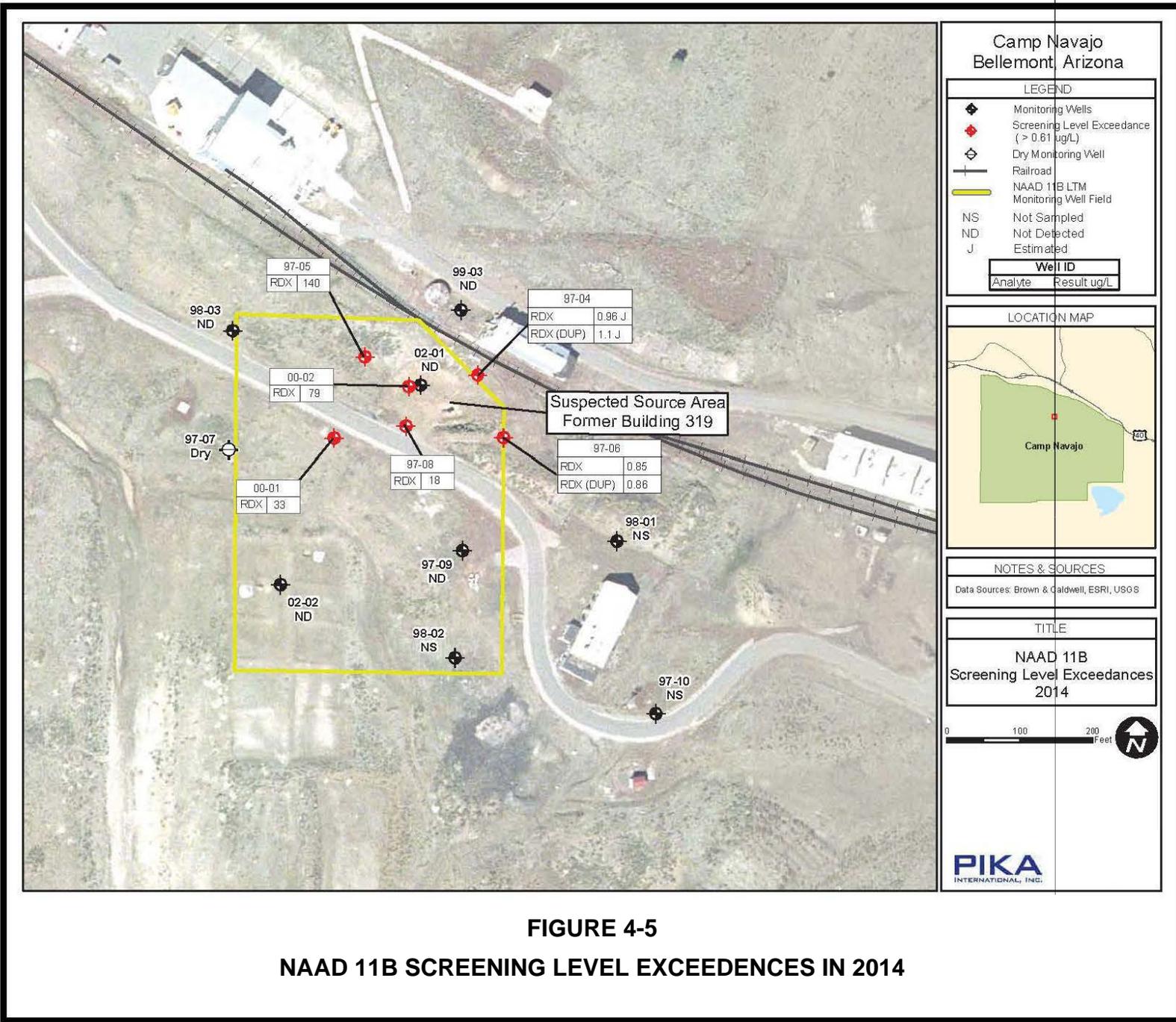
NAAD 11B GROUNDWATER POTENTIOMETRIC SURFACE IN 2014



**FIGURE 4-3
NAAD 11B POTENTIOMETRIC SURFACE IN 2013**



**FIGURE 4-4
NAAD 11B POTENTIOMETRIC SURFACE IN 2012**



**FIGURE 4-5
NAAD 11B SCREENING LEVEL EXCEEDENCES IN 2014**

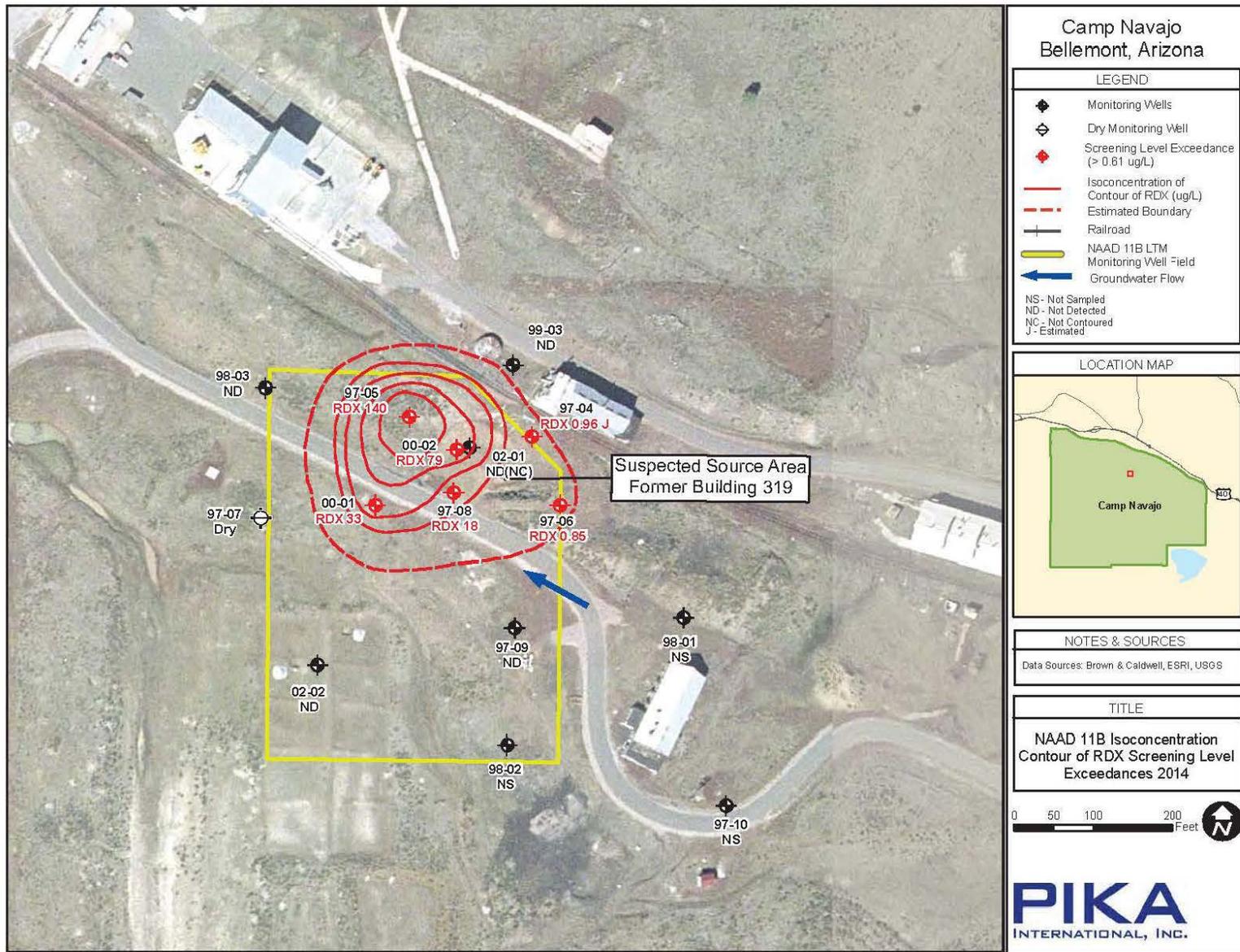


FIGURE 4-6
NAAD 11B ISOCONCENTRATION CONTOUR MAP OF RDX IN 2014

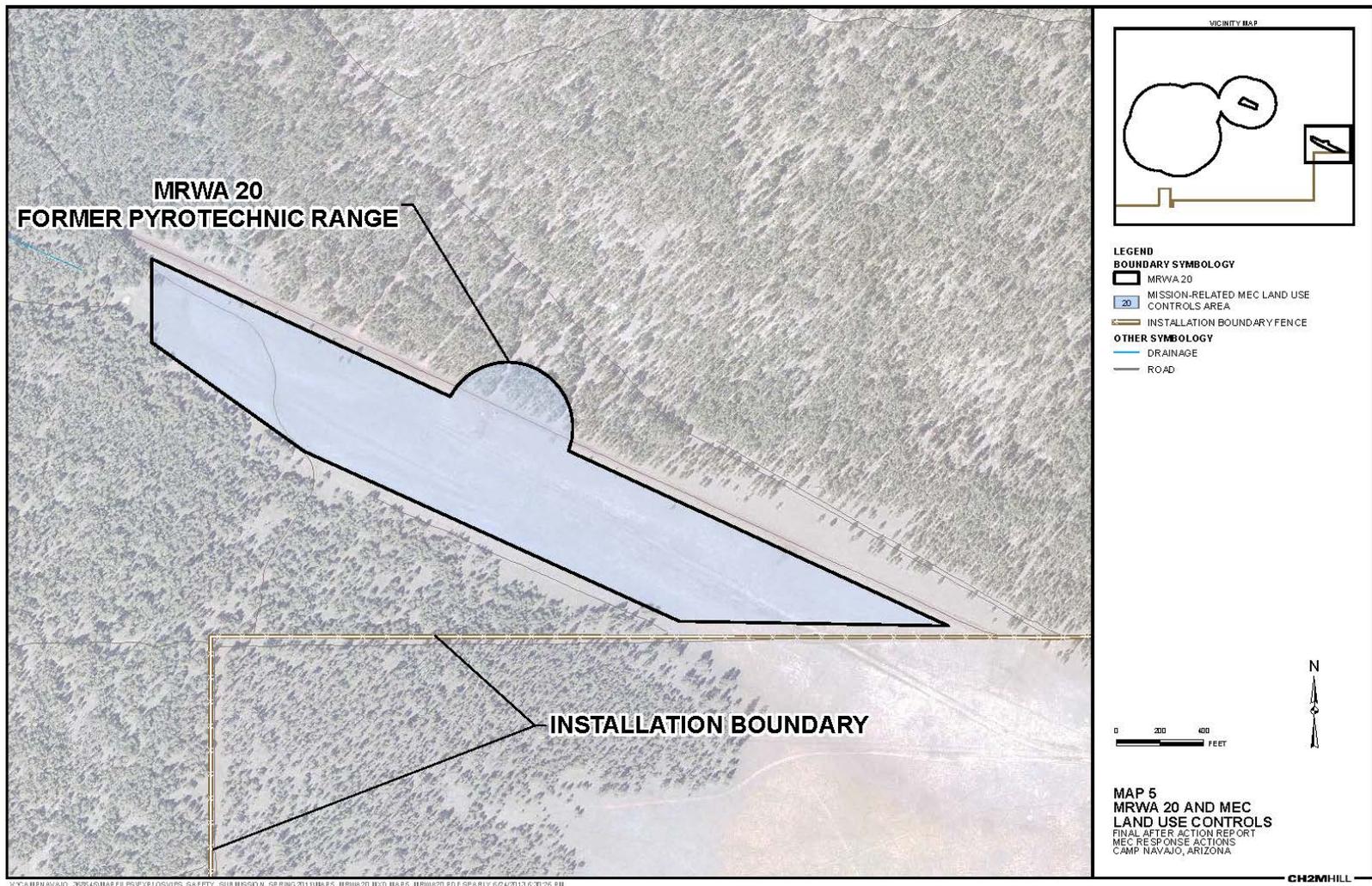
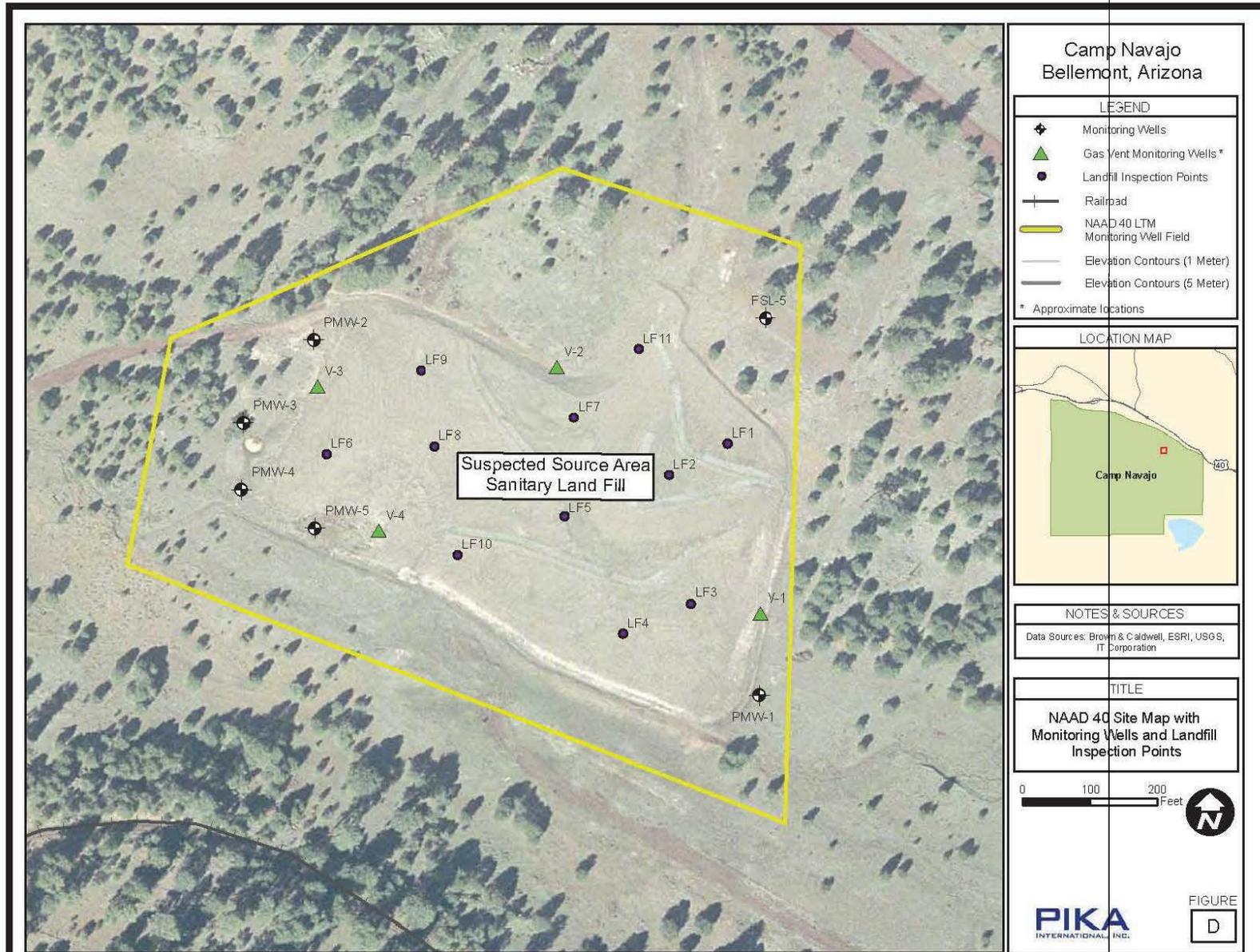


FIGURE 5-1

NAAD 20 SITE LAYOUT AND LAND USE CONTROLS



**FIGURE 6-1
SITE LAYOUT OF NAAD 40**

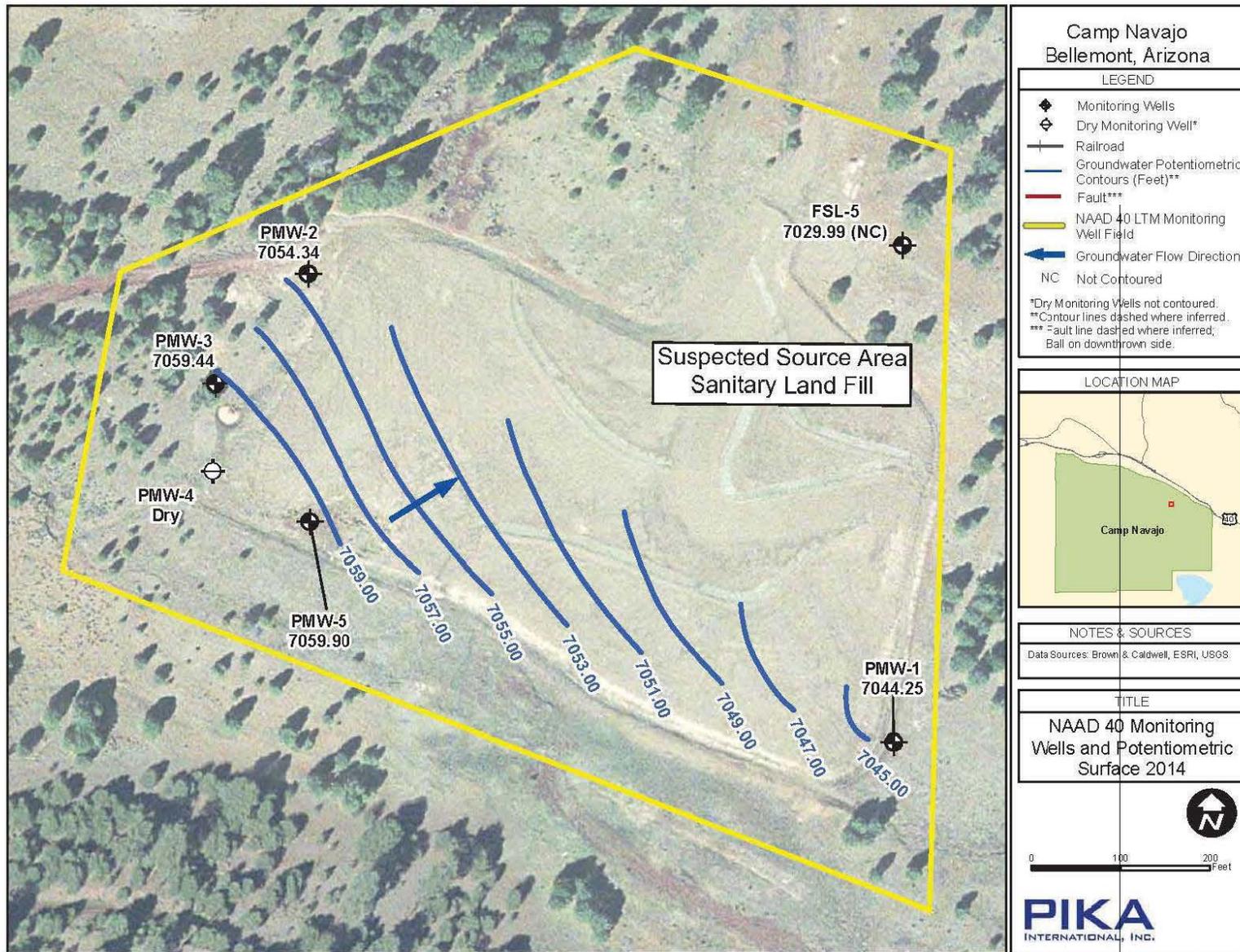


FIGURE 6-2

NAAD 40 GOUNDWATER POTENTIOMETRIC SURFACE

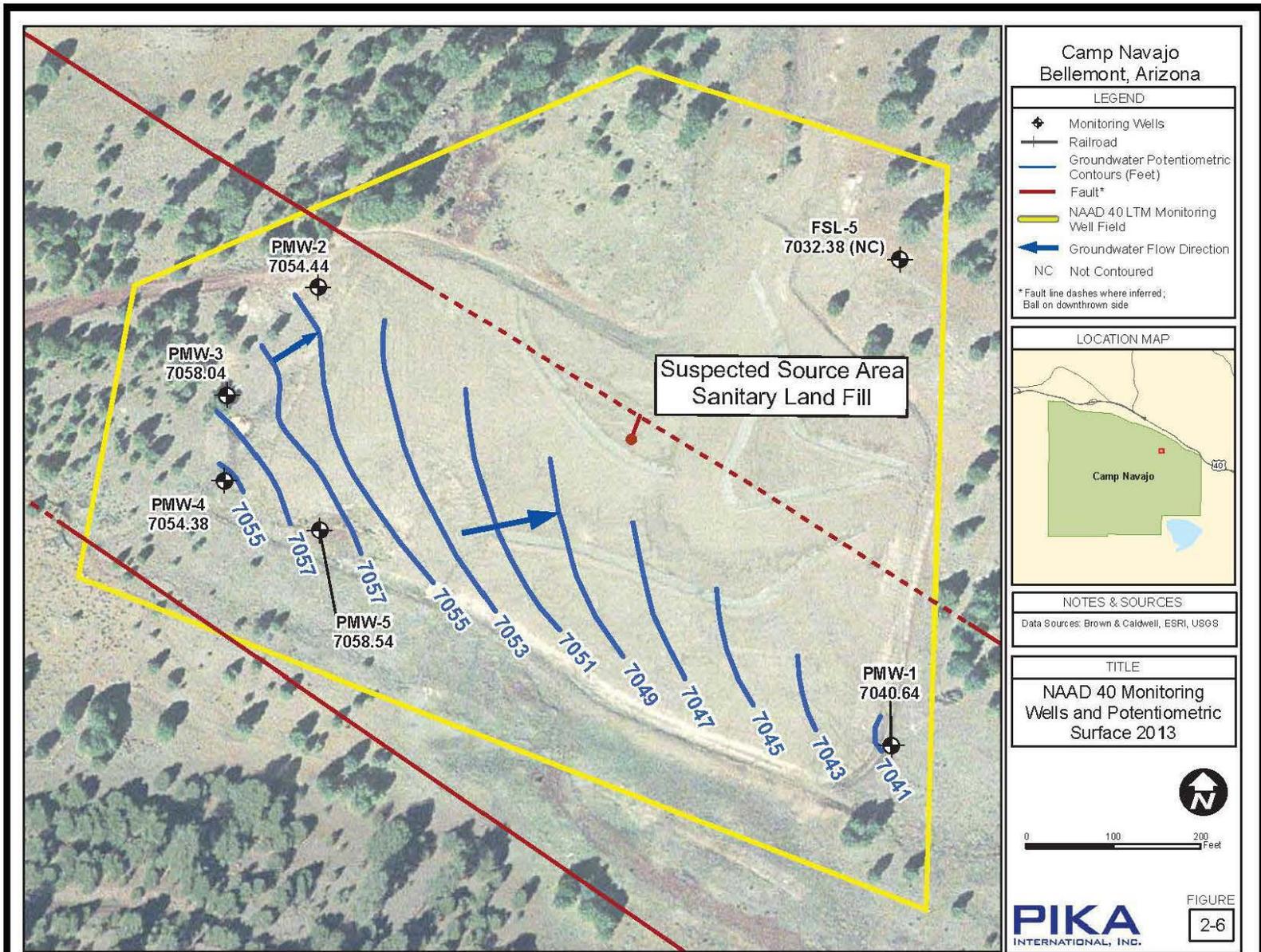


FIGURE 6-3

NAAD 40 GROUNDWATER POTENTIOMETRIC SURFACE IN 2013

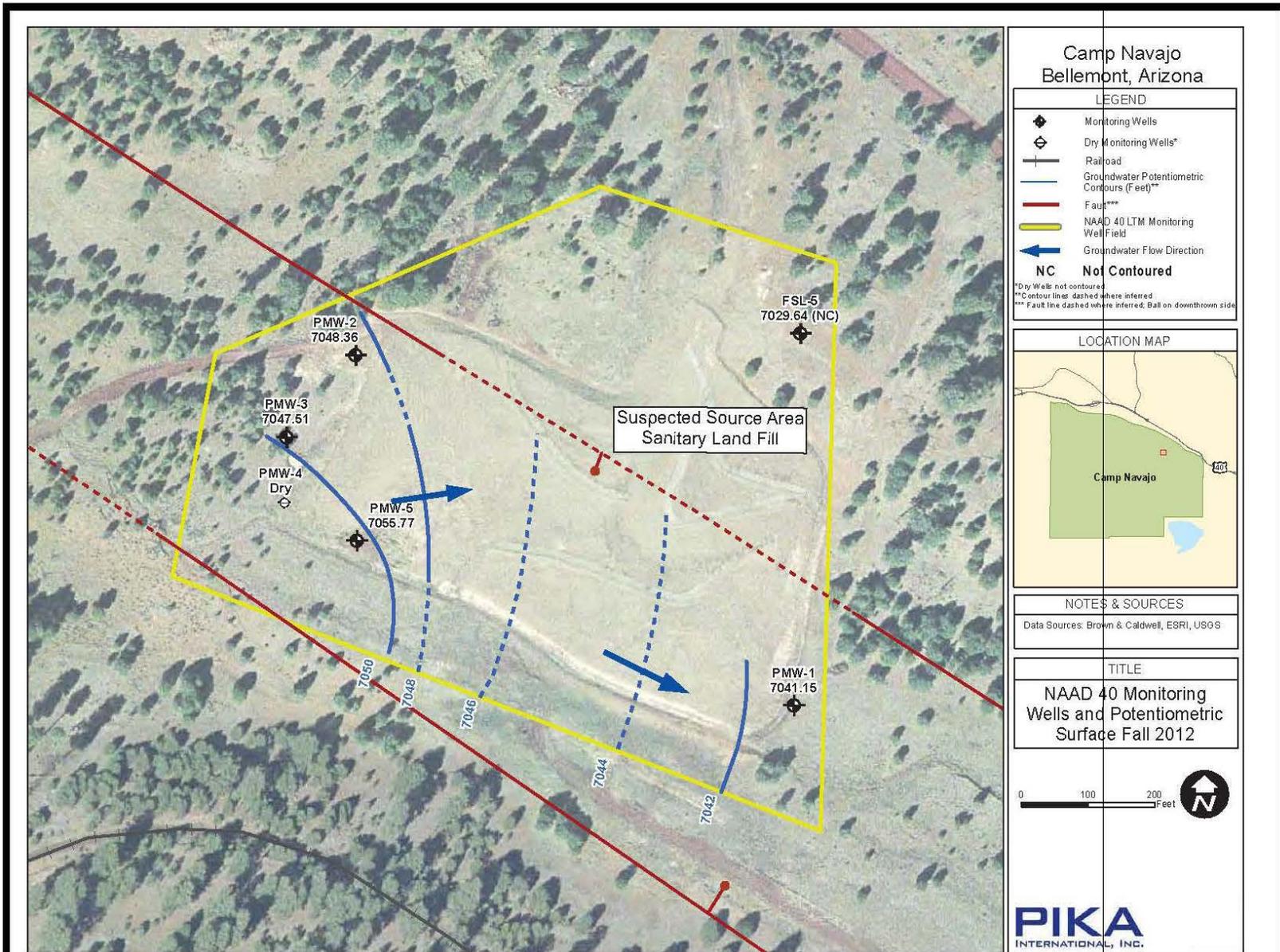


FIGURE 6-4
NAAD 40 GROUNDWATER POTENTIOMETRIC SURFACE IN 2012



**Camp Navajo
Belmont, Arizona**

LEGEND

-  NAAD43 Boundary
-  Elevation Contours (1 Meter)
-  Elevation Contours (5 Meter)

LOCATION MAP



NOTES & SOURCES

Data Sources: Brown & Caldwell, ESRI, USGS

TITLE

NAAD 43 Site Map

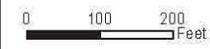


FIGURE 7-1

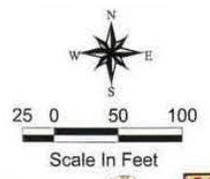
NAAD 43 SITE LAYOUT



Confirmation Sample Locations FCDL#5 Camp Navajo

Legend

- URS Confirmation Locations (7/99)
- URS Confirmation Locations (11/99)
- URS Confirmation Locations (12/99)
- URS Confirmation Locations (1/01)
- ▭ NR-SRL Remediation
- ▭ R-SRL Remediation
- ▭ Grid Cell Boundary
- ▭ Basalt Depression
- ▭ Basalt Outcrop



X:\a\user\GIS\proj_m\map\figure_4.pdf

FIGURE 7-2

NAAD 43 CONFIRMATION SAMPLING LOCATIONS

APPENDIX B

PHOTOGRAPHS



PHOTOGRAPH 3-1 - NAAD 01
FENCE AND SIGNAGE AT ACCESS GATE TO SITE, 21 MAY 2015



PHOTOGRAPH 3-2 - NAAD 01
VIEW OF SITE FROM WEST LOOKING EAST, 21 MAY 2015



PHOTOGRAPH 3-3 - NAAD 01
FENCE ADJACENT TO NORTHERN BOUNDARY. 21 MAY 2015



PHOTOGRAPH 3-3 - NAAD 01
EXAMPLE OF SIGNS AROUND PERIMETER OF SITE, 21 MAY 2015



PHOTOGRAPH 4-1 - NAAD 11B
SUSPECTED SOURCE AREA, 21 MAY 2015



PHOTOGRAPH 4-2 - NAAD 11B
SUSPECTED SOURCE AREA, WASHOUT LAGOONS WERE
BEYOND ROAD, 21 MAY 2015



PHOTOGRAPH 4-3 - NAAD 11B
FORMER WASHOUT LAGOONS ON SOUTH SIDE OF SITE,
21 MAY 2015



PHOTOGRAPH 4-4 - NAAD 11B
EXAMPLE OF MONITORING WELL AND PAD, 21 MAY 2015



PHOTOGRAPH 5-1 - NAAD 20
FORMER PYROTECHIC RANGE VIEWED FROM NORTH
TOWARD SOUTH, 21 MAY 2015



PHOTOGRAPH 5-2- NAAD 20
SOUTHWEST CORNER OF FORMER PYROTECHNIC RANGE
21 MAY 2015



PHOTOGRAPH 6-1 NAAD 40
LANDFILL CAP AT FORMER SANTIARY LANDILL, 21 MAY
2015



PHOTOGRAPH 6-2 NAAD 40
LANDFILL CAP AT FORMER SANTIARY LANDILL,
21 MAY 2015



PHOTOGRAPH 6-3
DRAINAGE CONTROL AT FORMER SANITARY LANDFILL,
21 MAY 2015



PHOTOGRAPH 7-1 - NAAD 43
SIGNAGE AT FORMER CONSTRUCTION DEBRIS LANDFILL #5
21 MAY 2015



PHOTOGRAPH 7-2 - NAAD 43
PONDED WATER AT SITE, 21 MAY 2015

APPENDIX C

INTERVIEW RECORDS

Interview Record

Camp Navajo Five-Year Review

NAAD 01, NAAD 11B, NAAD 20, NAAD 40, and NAAD 43

Name: Karin Harker

Date: June 5, 2015

Title: Hydrologist II

Organization: State of Arizona Department of Environmental Quality (ADEQ)

Telephone No: 602.771.0361

E-Mail Address: harker.karin@azdeq.gov

1. What is your overall impression of the program?

The program appears acceptable and moving forward reasonably well, although more communication regarding site progress would be helpful.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the sites? If so, please give purpose and results.

Since taking over the project seven months ago, ADEQ personnel visited the sites twice with the exception of NAAD 20 which was visited once. The site visits were associated with preparation for this Five-Year Review and a groundwater sampling event for NAADs 11B, 40 and 43. ADEQ receives regular monitoring reports from Camp Navajo contractor for NAAD sites 11B, 40 and 43. Randy Wilkinson (NGB) has made information and the site accessible. Continual communication regarding scheduled field activities, annual inspections, sampling events, and expected reporting activities would be helpful and appreciated.

3. Have there been any complaints, violations, or other incidents related to the sites requiring a response by your office? If so, please give details of the events and results of the responses.

For the LTM sites, there are none that I am aware of within the last seven months.

4. Do you feel well informed about the activities and progress related to the sites?

Yes. NGB has been very good about sending information and responding to our comments and questions. However, it was reported to have been sporadic in the past. Routine communications regarding activities would be helpful and appreciated.

5. Do you have any comments, suggestions, or recommendations regarding management or operation of the sites?

According to the JEP, the LTM reports and five-year reviews should continue in the future.

NAAD 01 monitoring for potential munitions and explosives of concern, base-wide munition awareness educational programs, land use controls and access controls should be maintained. Annual inspections and reports should be conducted.

NAAD 11B ongoing monitoring is acceptable. The long-term monitoring agreement is an agency-accepted document, and the groundwater monitoring and contaminant analytics are acceptable. However, the hydrogeologic regime, contaminant delineation, contaminant fate, and contaminant transport may be differently interpreted by different individuals.

NAAD 20 monitoring for potential munitions and explosives of concern, base-wide munition awareness educational programs, land use controls and access controls should be maintained. Annual inspections and reports should be conducted in addition to fence preservation.

NAAD 40 ongoing monitoring and maintenance is acceptable. The protectiveness of the landfill cap should continue to be surveyed due to creep potential.

NAAD 43 ongoing monitoring and maintenance is acceptable. Signage could use upgrading and maintenance. In addition, depressions containing runoff water could be a potential concern.

Regularly scheduled project status meetings or teleconference would be helpful.

Interview Record
Camp Navajo Five-Year Review
NAAD 01, NAAD 11B, NAAD 20, NAAD 40, and NAAD 43

Name: Wayne Miller

Date: May 28, 2015

Title: Engineering Specialist III

Organization: State of Arizona Department of Environmental Quality (ADEQ)

Telephone No: 602.771.4121

E-Mail Address: miller.wayne@azdeq.gov

1. What is your overall impression of the program?

NAAD 01 (a.k.a. MRWA 01): Old EOD demolition Area – Program acceptable.

NAAD 11B: Building 318/319 TNT washout facility - Program acceptable.

NAAD 20: Former pyrotechnic range - Program acceptable.

NAAD 40: Former sanitary landfill - Program acceptable.

NAAD 43: Former construction debris landfill #5 - Program acceptable.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the sites? If so, please give purpose and results.

NAAD 01: Not in preceding 3 years. But not expecting activities at this site.

NAAD 11B: Yes. ADEQ receives regular monitoring reports from Camp Navajo contractor. Over the last 5 five years, ADEQ personnel visit Camp Navajo facility on average once a year.

NAAD 20: Not in preceding 3 years. But not expecting activities at this site

NAAD 40: Yes. ADEQ receives regular monitoring reports from Camp Navajo contractor. Over the last 5 five years, ADEQ personnel visit Camp Navajo facility on average once a year.

NAAD 43: Yes. ADEQ receives regular monitoring reports from Camp Navajo contractor. Over the last 5 five years, ADEQ personnel visit Camp Navajo facility on average once a year.

Wayne Miller, ADEQ

3. Have there been any complaints, violations, or other incidents related to the sites requiring a response by your office? If so, please give details of the events and results of the responses.

NAAD 01: None.

NAAD 11B: None.

NAAD 20: None.

NAAD 40: None.

NAAD 43: None.

4. Do you feel well informed about the activities and progress related to the sites?

NAAD 01: Yes.

NAAD 11B: Yes.

NAAD 20: Yes.

NAAD 40: Yes.

NAAD 43: Yes.

5. Do you have any comments, suggestions, or recommendations regarding management or operation of the sites?

NAAD 01: Monitoring for potential munitions and explosives of concern, base-wide munition awareness education programs, land use controls and access controls should be maintained.

NAAD 11B: Ongoing monitoring acceptable. The long-term monitoring agreement is an agency-accepted document, and the groundwater monitoring and contaminant analytics are acceptable. However, the hydrogeologic regime, contaminant delineation, contaminant fate, and contaminant transport may be differently interpreted by different individuals.

NAAD 20: Monitoring for potential munitions and explosives of concern, base-wide munition awareness education programs, land use controls and access controls should be maintained.

NAAD 40: Ongoing monitoring and maintenance acceptable.

NAAD 43: Ongoing monitoring and maintenance acceptable.

INTERVIEW RECORD		
Site Name: Camp Navajo, Bellemont, Arizona		EPA ID No.: AZ7213820635
Subject: Status of IRP LTM Sites, NAAD 01, NAAD 11B, NAAD 20, NAAD 40, and NAAD 43		Time:
Location of Visit:		Date: 21 May 2015
Type: Telephone X Visit Other	9 Incoming 9 Outgoing	
Contact Made By:		
Name: Joan Cullen	Title: Technical Manager	Organization: USACE-LRL
Individual Contacted:		
Name: Randy Wilkinson	Title: IRP Environmental Manager	Organization: ARNG
Telephone No: 602-267-3208 Fax No: E-Mail Address: Randall.W.Wilkinson2.CTR@mail.mil	Street Address: City, State, Zip: Camp Navajo, Bellemont, Arizona	
Summary Of Conversation		
<p>Mr. Randall Wilkinson (ARNG) is the IRP Environmental Manager at Camp Navajo. He has been responsible for managing the program for approximately 20 years. Mr. Wilkinson was asked for information concerning the history, LUCs, and status of LTM Sites NAAD 01, 11B, 20, 40, and 43 during and after the site inspection. Mr. Wilkinson provides copies of electronic copies of reports subsequent to the visit.</p> <p>Mr. Wilkinson indicated that he observes the LTM sites several times a year to confirm that that there were no activities on or near the five Sites that could impact the protectiveness of the remedy. He indicated that remedies at all sites appeared to be working as intended. The Camp Navajo Real Property Development Plan, LUCIP, and LTM/Post Closure Car Plan would be updated in 2015-2016, depending on funding availability.</p> <p>Mr. Wilkinson provided information concerning the security and access controls, training, and site specific LUCs such as signs. Mr. Wilkinson indicated that a ARNG was currently in the process of contracting a comprehensive scope of work for LTM for the next several years. Background, historical information, and inspection/sampling activities provided by Mr. Wilkinson have incorporated in the main text of the report.</p>		

APPENDIX D

SITE INSPECTION CHECKLISTS

Please note that “O&M” is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as “system operations” since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Camp Navajo	Date of inspection: 21 May 2015
Location and Region:	EPA ID: AZ7213820635
Agency, office, or company leading the five-year review: USACE	Weather/temperature: Overcast/Windy/68°F
NAAD 01 - Remedy Includes: Access controls and Institutional controls NAAD 11B - Remedy Includes: Access (Installation) controls, Groundwater monitoring, and Institutional controls NAAD 20 - Remedy Includes: Access (Installation) controls and Institutional controls NAAD 40 - Remedy Includes: Landfill cover/containment, Access controls, Groundwater monitoring, and Institutional controls NAAD 43 - Remedy Includes: Access (Installation) controls and Institutional controls G	
Attachments: X Inspection team roster attached X Site maps are provided in Appendix A	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Randall Wilkinson</u> <u>Environmental Remediation Manager (ARNG)</u> <u>21 May 2015</u> <div style="display: flex; justify-content: space-between; width: 100%;"> Name Title Date </div> Interviewed <input checked="" type="checkbox"/> at site and at office Phone no. <u>928-773-3208</u> Interview Form Provided in Appendix C.	
2. O&M staff <u>There are no systems operating at the LTM sites. Repairs to access controls and Land fill cover are made as needed by Camp Navajo contractors</u>	
3. Local regulatory authorities and response agencies Agency <u>Arizona Department of Environmental Quality(ADEQ)</u> Contact <u>Karin Harker</u> <u>Project Manager/Hydrologist II</u> <u>15 June 2015</u> <u>602-771-0361</u> <div style="display: flex; justify-content: space-between; width: 100%;"> Name Title Date Phone no. </div> Interview record provided in Appendix C. Agency <u>Arizona Department of Environmental Quality (ADEQ)</u> Contact <u>Wayne Miller</u> <u>Former Project Manager/Engineer Sp. III</u> <u>28 May 2015</u> <u>602-771-4121</u> <div style="display: flex; justify-content: space-between; width: 100%;"> Name Title Date Phone no. </div> Interview Record is provided in Appendix C.	
4. Other interviews (optional) Report attached.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents <input checked="" type="checkbox"/> O&M manual G As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	G Readily available	G Up to date	G N/A
2.	Site-Specific Health and Safety Plan G Contingency plan/emergency response plan Remarks _____ Mission related training requirements and education _____	G Readily available	G Up to date	X N/A
3.	O&M and OSHA Training Records Remarks _____ Mission related training requirements and education _____	G Readily available	G Up to date	G N/A
4.	Permits and Service Agreements G Air discharge permit G Effluent discharge G Waste disposal, POTW G Other permits _____ Remarks _____	G Readily available	G Up to date	X N/A
5.	Gas Generation Records Remarks _____ Landfill Gas Monitoring is conducted on an annual basis at NAAD 40. Readily Available	X Readily available	X Up to date	N/A
6.	Settlement Monument Records Remarks _____	X Readily available	X Up to date	N/A
7.	Groundwater Monitoring Records Remarks _____	X Readily available	X Up to date	G N/A
8.	Leachate Extraction Records Remarks _____	G Readily available	G Up to date	X N/A
9.	Discharge Compliance Records G Air G Water (effluent) Remarks _____	G Readily available	G Up to date	X N/A
10.	Daily Access/Security Logs Remarks _____ Maintained by Security Office	X Readily available	G Up to date	G N/A

C. Institutional Controls (ICs)				
1.	Implementation and enforcement			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency <u>at least annually</u>			
	Responsible party/agency <u>ARNG</u>			
	Contact <u>Randy Wilkinson</u>			
	Name	Title	Date	Phone no.
	Reporting is up-to-date	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	<u>Sites will be added to the Camp Navajo Real Property Management Plan when next updated in 2015-2016</u>			
2.	Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			

D. General				
1.	Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			

2.	Land use changes on site	<input type="checkbox"/> N/A		
	Remarks <u>No Land us changes since Decision Document</u>			

3.	Land use changes off site	<input checked="" type="checkbox"/> N/A		
	Remarks _____			

VI. GENERAL SITE CONDITIONS				
A. Roads				
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A		
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input checked="" type="checkbox"/> N/A
	Remarks _____			

B. Other Site Conditions			
Remarks _____ _____ _____ _____ _____			
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable for NAAD 40			
A. Landfill Surface -Landfill covers inspected by MKM in May 2015			
1.	Settlement (Low spots) Areal extent _____ Remarks _____	G Location shown on site map Depth _____	<input checked="" type="checkbox"/> Settlement not evident
2.	Cracks Lengths _____ Widths _____ Depths _____ Remarks _____	G Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident
3.	Erosion Areal extent _____ Remarks _____	G Location shown on site map Depth _____	<input checked="" type="checkbox"/> Erosion not evident
4.	Holes Areal extent _____ Remarks _____	G Location shown on site map Depth _____	<input checked="" type="checkbox"/> Holes not evident
5.	Vegetative Cover G Trees/Shrubs (indicate size and locations on a diagram) Remarks _____	G Grass G Cover properly established	<input checked="" type="checkbox"/> No signs of stress
6.	Alternative Cover (armored rock, concrete, etc.) Remarks _____		<input checked="" type="checkbox"/> N/A
7.	Bulges Areal extent _____ Remarks _____	G Location shown on site map Height _____	<input checked="" type="checkbox"/> Bulges not evident

8.	Wet Areas/Water Damage G Wet areas G Ponding G Seeps G Soft subgrade Remarks _____	G Wet areas/water damage not evident G Location shown on site map G Location shown on site map G Location shown on site map G Location shown on site map	Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____
9.	Slope Instability Areal extent _____ Remarks _____	G Slides G Location shown on site map	<input checked="" type="checkbox"/> No evidence of slope instability
B. Benches G Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench Remarks _____	G Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks _____	G Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks _____	G Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels G Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Remarks _____	G Location shown on site map Depth _____	<input checked="" type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Remarks _____	G Location shown on site map Areal extent _____	G No evidence of degradation
3.	Erosion Areal extent _____ Remarks _____	G Location shown on site map Depth _____	<input checked="" type="checkbox"/> No evidence of erosion

4.	Undercutting	G Location shown on site map	X No evidence of undercutting
	Areal extent_____	Depth_____	
	Remarks_____		
5.	Obstructions	Type_____	X No obstructions
	G Location shown on site map	Areal extent_____	
	Size_____		
	Remarks_____		
6.	Excessive Vegetative Growth	Type_____	
	G No evidence of excessive growth		
	X Vegetation in channels does not obstruct flow		
	G Location shown on site map	Areal extent_____	
	Remarks_____		
D. Cover Penetrations G Applicable X N/A			
1.	Gas Vents	G ActiveG Passive	
	G Properly secured/locked	G Functioning	G Routinely sampled G Good condition
	G Evidence of leakage at penetration		G Needs Maintenance
	G N/A		
	Remarks_____		
2.	Gas Monitoring Probes		
	X Properly secured/locked	X Functioning	X Routinely sampled X Good condition
	G Evidence of leakage at penetration		G Needs Maintenance G N/A
	Remarks_____		
3.	Monitoring Wells (within surface area of landfill)		
	X Properly secured/locked	G Functioning	X Routinely sampled X Good condition
	G Evidence of leakage at penetration		G Needs Maintenance G N/A
	Remarks_____		
4.	Leachate Extraction Wells		
	G Properly secured/locked	G Functioning	G Routinely sampled G Good condition
	G Evidence of leakage at penetration		G Needs Maintenance X N/A
	Remarks_____		
5.	Settlement Monuments	G Located	X Routinely surveyed G N/A
	Remarks_____		

E. Gas Collection and Treatment G Applicable X N/A			
1.	Gas Treatment Facilities G Flaring G Thermal destruction G Collection for reuse G Good condition G Needs Maintenance Remarks _____ _____		
2.	Gas Collection Wells, Manifolds and Piping G Good condition G Needs Maintenance Remarks _____ _____		
3.	Gas Monitoring Facilities (<i>e.g.</i> , gas monitoring of adjacent homes or buildings) G Good condition G Needs Maintenance G N/A Remarks _____ _____		
F. Cover Drainage Layer G Applicable X N/A			
1.	Outlet Pipes Inspected G Functioning G N/A Remarks _____ _____		
2.	Outlet Rock Inspected G Functioning G N/A Remarks _____ _____		
G. Detention/Sedimentation Ponds G Applicable X N/A			
1.	Siltation Areal extent _____ Depth _____ G N/A G Siltation not evident Remarks _____ _____		
2.	Erosion Areal extent _____ Depth _____ G Erosion not evident Remarks _____ _____		
3.	Outlet Works G Functioning G N/A Remarks _____ _____		
4.	Dam G Functioning G N/A Remarks _____ _____		

H. Retaining Walls			G Applicable	X N/A
1.	Deformations	G Location shown on site map	G Deformation not evident	
	Horizontal displacement_____		Vertical displacement_____	
	Rotational displacement_____			
	Remarks_____			

2.	Degradation	G Location shown on site map	G Degradation not evident	
	Remarks_____			

I. Perimeter Ditches/Off-Site Discharge			G Applicable	X N/A
1.	Siltation	G Location shown on site map	G Siltation not evident	
	Areal extent_____		Depth_____	
	Remarks_____			

2.	Vegetative Growth	G Location shown on site map	G N/A	
	G Vegetation does not impede flow			
	Areal extent_____		Type_____	
	Remarks_____			

3.	Erosion	G Location shown on site map	G Erosion not evident	
	Areal extent_____		Depth_____	
	Remarks_____			

4.	Discharge Structure	G Functioning	G N/A	
	Remarks_____			

VIII. VERTICAL BARRIER WALLS			G Applicable	X N/A
1.	Settlement	G Location shown on site map	G Settlement not evident	
	Areal extent_____		Depth_____	
	Remarks_____			

2.	Performance Monitoring	Type of monitoring_____		
	G Performance not monitored			
	Frequency_____		G Evidence of breaching	
	Head differential_____			
	Remarks_____			

IX. GROUNDWATER/SURFACE WATER REMEDIES		G Applicable	X N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines		G Applicable	X N/A
1.	Pumps, Wellhead Plumbing, and Electrical G Good condition G All required wells properly operating G Needs Maintenance G N/A Remarks _____ _____ _____		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances G Good condition G Needs Maintenance Remarks _____ _____		
3.	Spare Parts and Equipment G Readily available G Good condition G Requires upgrade G Needs to be provided Remarks _____ _____		
B. Surface Water Collection Structures, Pumps, and Pipelines		G Applicable	G N/A
1.	Collection Structures, Pumps, and Electrical G Good condition G Needs Maintenance Remarks _____ _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances G Good condition G Needs Maintenance Remarks _____ _____		
3.	Spare Parts and Equipment G Readily available G Good condition G Requires upgrade G Needs to be provided Remarks _____ _____		

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
D. Monitoring Data for NAAD 11B and NAAD 40			
1.	Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		

D. Monitored Natural Attenuation			
1.	Monitoring Wells (natural attenuation remedy)		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	Remarks _____		<input type="checkbox"/> N/A
X. OTHER REMEDIES			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			
XI. OVERALL OBSERVATIONS			
A. Implementation of the Remedy			
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).			
<p>Access to all sites are limited by Mission-related security measures, escorts by personnel with training and clearance. LUCs appear to be appropriate for current and future land use. No exposure pathways were observed. Annual monitoring reports document annual inspections which include sampling of groundwater at NAAD 11B and NAAD 40, and landfill cover inspections at NAAD 40 and NAAD 43. Repairs are made as needed to the landfill cover, fences and signs as needed. The remedy appears to be effective in protecting human health and the environment.</p> <p>_____</p> <p>_____</p>			
B. Adequacy of O&M			
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.			
<p>_____</p> <p>The LTM Management Plan proposed for the five sites (MKM, 2005) appears to be comprehensive and effective in minimizing potential problems with the remedies. A new contract is proposed for continuing the LTM program for the next five years and will include LTM for NAAD 01 and NAAD 20.</p> <p>_____</p> <p>_____</p> <p>_____</p>			

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

_No issues or observations identified that would call into question of protectiveness in the future. _____

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

APPENDIX E

PUBLIC NOTICE



Run for the Wall riders find parking spots in front of the American Legion in Williams. Ryan Williams/WGCN

• **Run**

From Page 1A

the group continues this tradition every May. Public awareness is only part of the Run For The Wall. The ride provides all veterans the opportunity to get their own welcome home and start their healing process.

The Run for the Wall crew has been stopping in Williams for years. Some of the riders have made the ride annually for more than a decade. They know each other.

The American Legion has been feeding the riders for the same number of years. The Mathew J. Broehm VFW Post 12128 auxiliary served breakfast the next day along with the Wild West Junction.

Rodger Ely, a member of the Legion and VFW in Williams, said the event was a great success.

"They were very thankful," he said. "We welcomed them as a host and they accepted that."

Ely said the event isn't just for veterans.

"I think we need to instill in the community that this is a community event," Ely said. "It's just that the hosts happen to be the mayor, the Legion and the VFW."

Community members and organizations help make the event a success. Guy Mikkelsen and the Williams Food Bank help with food along with Safeway and a number of community members. The Legion buys the meat for the pit barbecue meal. The American Legion Auxiliary provided dessert.

"Community people were hands on to help us do it because if we just did it from the American Legion it would cost us a couple grand," Ely said.

Memorial Day Parade, May 23



Perico, Avila lifetime Williams resident and Korean War veteran is this year's Grand Marshal for the Memorial Day parade, May 23.

A Heroes in our Hearts theme and around 30 floats will be featured at the annual parade. Following the parade the first Veterans Tribute banquet fundraiser barbecue will be held from 11 a.m. to 2 p.m. at Glassburn Park.

The fundraiser is a three tier community tribute to all veterans, past and present, and will raise money for a banquet to be held on November 11, which is Veterans Day, at the Lost Canyon Elk Horn Lodge. All citizens of Williams and surrounding communities will be welcome to join the banquet.

Citizens and businesses who buy a donation of \$12.50 can sponsor a veteran's meal for the evening.

Donations that exceed the cost of the meals will be donated to Epsilon Sigma Alpha to help send packages to troops abroad. Photo/Ryan Williams Photography

.....
Around Williams
.....

Thrift shop has a drop off box

The Bill Williams Senior Thrift Shop has a drop off box. It is the red box at the northwest corner of the parking lot. The thrift shop appreciates all donations but cannot sell large televisions, furniture, mattresses or kitchen appliances. Items donated should be serviceable. The drop off is always open for donations.

Read more at
williamsnews.com

Charged With a DUI?
Certified Ignition Interlock Install Center
• Removable
• Talking
• Open 7 Days
• No Installation charge
Complete Car Care
2710 East Route 66, Flagstaff, Arizona 86004
1-928-526-1026

ACTOS?
If you have been taking ACTOS (Pioglitazone) and have been diagnosed with **Bladder Cancer** or are experiencing the following symptoms: Blood in Urine, Urinary Urgency, Pain in Urination, Back or Abdominal Pain
Call us immediately at 877.369.8800, as you may have a legal claim.
Your personal, professional consultation is FREE
Moeller Law Office
3433 E. Fort Lowell, Ste 105
Tucson, AZ 85716
While this firm maintains joint responsibility, most cases are referred to other attorneys for principal responsibility.

Dentistry FOR THE ENTIRE Family
Timberline DENTAL
SERVICES INCLUDE:
White Fillings • Cosmetic Dentistry
Dentures • Implants • Crowns
Partials • Bridges • Children's Dentistry
Dr. Brandon & Dawn Tills
928.856.2100
401 W. Railroad Ave. • Williams, AZ

.....
Around Williams
.....

Folklorico dancing open to community

Folklorico dance classes meet from 5:30-6:30 p.m. Tuesday and Thursday at the Williams Rodeo Barn. All community members are welcome to attend. More information is available from Armando Padilla at (928) 380-4637.

is open Wednesday 1 p.m. to 4 p.m. at the Family Harvest Church, 220 S. 7th St.

Maternity closet open

The Hope Crisis Pregnancy Center Williams Baby and Maternity Closet

FLAGFOODOC.COM
DR. EDWARD WIEBE
DR. RACHEL O'CONNOR
(928) 226-7555
Podiatrist - Foot Specialist
8 West Columbus Ave. CALL FOR APPOINTMENT

williamsnews.com

Early deadlines for May 27th issue

of the **Williams-Grand Canyon News.**

Thurs. noon deadline for all advertising and 'Around Williams' submissions.

ST. JOSEPH THE WORKER CATHOLIC CHURCH
Welcome
Willkommen
Bienvenido
Bienvenidos
Benvenuto
Witaj
Saturday Vigil Mass:
5:00 pm in English
7:00 pm en Español
Sunday Mass:
8:00 am in English
GET YOUR MASS ON ROUTE 66
900 W. GRANT AVENUE
On 9th Street just south of West Route 66
Fr. Killian McCaffrey 928-635-2430

Notice of Five-Year Review
Camp Navajo
Bellemont, Coconino County, Arizona

The U.S. Army Corps of Engineers (USACE) is conducting a five-year review of five Installation Restoration Program sites at Camp Navajo, Bellemont, Arizona. Camp Navajo is a former Army ammunition depot that is now used for military training by the Arizona Army National Guard. The five-year review is conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The first five-year review was performed in 2010.

The sites include NAAD-01 (Old EOD Demolition Area), NAAD-11B (Former TNT Washout Facility), NAAD-20 (Former Pyrotechnic Range), NAAD-40 (Former Sanitary Landfill), and NAAD-43 (Former Construction Debris Landfill). The purpose of the five-year review is to ensure that the land use controls and monitoring are functioning as intended and continue to be protective of public health and safety and the environment.

To conduct this review, the USACE will review the site conditions as well as the status of land use controls. Once this five-year review is completed (anticipated in October 2015), the document will be available for public review at the Northern Arizona University Cline Library Special Collections in Flagstaff and at the Arizona Department of Environmental Quality Records Center in Phoenix. For more information contact:

Randy Wilkinson, CSU-CEMML
Army National Guard Directorate
Environmental Programs Division
Camp Navajo
P.O. Box 16123
Bellemont, Arizona 86015
randall.w.wilkinson2_ctr@mail.mil
(928) 773-3208

BNSF train catches fire in Flagstaff

MICHELLE MCMANIMON

Safely stopped
A BNSF Railway train caught fire on its way through Flagstaff Tuesday morning.

BNSF spokesperson Lena Kent said the fire started around 9:45 a.m. inside a car on a train used by the freight company to transport employees for BNSF business. The train, which was heading west toward California, stopped behind the Railroad Springs neighborhood in West Flagstaff.

"It was just the one business car that had a fire inside in the kitchen area," Kent said.

The Flagstaff Fire Department dispatched four units and a battalion chief to the smoking train car. They worked with BNSF personnel to put out the flames. The fire was extinguished before it could spread to any other cars on the train.

"It was put out and that train has been moved," Kent said.

One person was treated for smoke inhalation. No other injuries were reported.

"We did have people onboard but nobody was injured," Kent said. The affected car was removed from the tracks. The rest of the train was then allowed to continue on to

its final destination in California.

Kent said the fire did not cause any major delays for other rail traffic.

She stressed that although the fire was technically on a passenger train, no members of the public were on it. "We don't use it for the general public," Kent said. "You can't buy a ticket like an Amtrak train. It's not a passenger train in that fashion, but it does hold passengers. It's not our freight car. It's what we use for our own personal company business."

The cause of the fire is under investigation.

The reporter can be reached at mcmanimon@azdailysun.com or 556-2261.

Longer term car loans gain in popularity

AMY EDELEN

Consume less
When Tucson resident Valerie Vinyard purchased a new car in 2010, she expected to take out a five-year loan, but the dealership presented her with a longer financing option to reduce her monthly payments.

Vinyard opted for a six-year car loan to reduce her payments to about \$200 a month, which shaved off \$50 to \$100 each payment. "I didn't know six-year car loans existed," said Vinyard, a spokeswoman for AAA Arizona. "It's a nice cushion. If you are at a super low interest rate, it doesn't really hurt you. I took advantage of it and appreciated it."

Since the Great Recession, more consumers are signing up for longer car loans. Although the move can lower monthly payments, experts warn it could mean more debt because of interest paid over a longer period of time.

The national average for a new car loan term was 66 months, with a monthly payment of \$482 in 2014, according to a report by Experian Automotive.

And the percentage of car owners with longer loans has grown as well: In 2014, 26 percent of new car financing fell in between the 73 to 84 month range, compared to 13 percent in 2008, according to the Experian report.

In Arizona, consumers sign up for longer car loans — three months longer than the national average with a monthly payment of \$481.

Melinda Zabritski, senior director of Experian Automotive, said a couple of factors have led to longer-term car loans. Consumers are still bouncing back from the Great Recession, while the cost of vehicles has increased.

"The average value (of a vehicle) is up about \$2,000 in the past four years," she said.

Zabritski said this trend likely will continue, with loans falling into the 75-month range. "But it's important to not let that bring you into a car you can't afford," she said.

"If you are a person that only likes to own a car for a couple of years, then a longer-term car loan might not be the best thing for you."

Vinyard said she paid her car loan off early in three years to eliminate debt.

Longer-term loans can be very helpful, but it's important to understand the risks, she said.

"There are more cars than pros, unless you approach it smartly," she said. "It's important as a consumer to enter a long-term agreement with a clear head."

Loan terms and payments have increased for the used car sector, too.

Since 2010, the national average loan term increased slightly, from 57 months to 62 months for used cars. The average payment increased from \$340 to \$355, according to Experian.

Chris Kukla, senior vice president of the National Center for Responsible Lending, a nonprofit that advocates for fair lending practices, said auto lending has increased significantly since the Great Recession.

The nonprofit published a report titled "The State of Lending in America & Its Impact on U.S. Households," that looked at transparency and regulation in the auto loan industry, as well as the cause of expensive and unsustainable loans for consumers.

"Part of what we are looking at is if there are bubbles in the auto lending industry," he said. "We've been looking at it if there are practices in the auto loan industry that are a concern. Certainly lengthening loan terms are a concern."

Kukla said the nonprofit also has seen significant growth in car loans longer than five years, with loans as long as 84 months.

However, consumers may think they are going to be in the car longer and the cars may not last as long as the loan term.

"Our concern is that we're seeing a rise in negative equity," he said.

"Consumers are rolling their old loan into a new car loan."

Agent who shot into Mexico wants case dismissed

TUCSON (AP) — A federal judge is considering throwing out a civil rights lawsuit against a U.S. Border Patrol agent who fatally shot a teenager across the U.S.-Mexico border on grounds that the boy was in Mexico at the time and therefore wasn't protected by the U.S. Constitution.

U.S. District Court Judge Raner C. Collins heard arguments in the motion to dismiss his hearing on Tuesday in Tucson.

The ACLU filed a lawsuit in Tucson against agent Lonnie Swartz. It sued on behalf of Araceli Rodriguez, the mother of 16-year-old Jose Antonio Elena Rodriguez.

The teen was in Nogales, Sonora, near the tall, steel fence that divides the United States and Mexico when Swartz shot him from Nogales, Arizona, on Oct. 10, 2012. An autopsy showed Elena Rodriguez was shot about 10 times.

The Border Patrol has said Elena Rodriguez was among a group of people throwing rocks at agents across the border, endangering

their lives. The ACLU says the shooting was another example of border agents using excessive force without consequences. Araceli Rodriguez says her son was walking home from playing basketball with friends and never had a rock or any other weapon.

Swartz has not been charged, and an investigation by the FBI is ongoing. He is still an agent with the Border Patrol, his attorney, Sean Chapman, said.

Chapman declined to comment after the Tuesday hearing. He told Collins during oral arguments that constitutional protections did not extend to Elena Rodriguez.

"Even if Agent Swartz's alleged conduct plausibly violated the Fifth Amendment, (Elena Rodriguez) was not entitled to substantive due process because he neither came within the territory of the United States nor developed substantial connections with this country to justify its extraterritorial application," Chapman wrote in his motion

to dismiss.

In a similar case out of Texas, a federal appeals court found the family of another Mexican teen killed by an agent cannot sue in the United States. U.S. Border Patrol agent Jesus Mesa Jr. shot 15-year-old Sergio Adrian Hernandez Guereca in June 2010 near a bridge between El Paso, Texas, and Ciudad Juarez, Chihuahua. Authorities said Mesa was trying to arrest immigrants who had illegally crossed into the country when rock-throwers attacked him. Mesa fired his weapon across the Rio Grande, striking Hernandez Guereca twice.

ACLU attorney Lee Geleert told Collins that the Texas case shouldn't bear too much weight on his decision. "There's no black hole where our agents can escape liability," Geleert said.

Collins did not issue a ruling on Tuesday and said he would take arguments into consideration. "I have a feeling no matter how I rule, it will not be the last word," the judge said.

Investigation sought into threats sent to 2 mosques

PHOENIX (AP) — A civil rights group has asked the FBI to investigate a threatening letter sent to a Phoenix mosque that was once a place of worship for suspects in a shooting three weeks ago at a Texas cartoon contest featuring cartoons of the Prophet Muhammad.

The Council on American-Islamic Relations says one of its lawyers spoke with an FBI agent about the letter that was mailed over the weekend to the Islamic Community Center of Phoenix, where

Texas shooting suspects Elton Simpson and Nadir Soofi used to worship.

An identical letter also was sent to the Islamic Community Center of Tempe, said Kristy Sabah, operations coordinator for the advocacy group's Arizona chapter.

Simpson and Soofi opened fire on May 3 in a Dallas suburb on an unarmed security officer stationed outside the contest, authorities said.

The security guard was wounded in the leg before the gunmen were killed at the scene.

Simpson regularly attended the Phoenix mosque for about 10 years, but he quit a few months before the shooting.

Soofi infrequently attended the mosque and stopped altogether about a year ago.

The letter opens with a reference to Simpson's Dallas suburb on an unarmed security officer stationed outside the contest, authorities said.

The security guard was wounded in the leg before the gunmen were killed at the Prophet Muhammad.

FBI spokesman Anthony Farinacci said the agency is following up on the information it was given on the letter.

Usama Shami, president of Islamic Community Center of Phoenix, said the mosque gets threats from time to time but that the letter addressed to him contains threats that were more violent in nature.

"We are not educating people to do violent acts, so why are we being held responsible in the minds of some people?" Shami said.

POLICE LOG

Sex offender notification

Detectives with the Flagstaff Police Department would like to make the following Level 2 (intermediate risk to the community) sex offender notification:

Patrick Benally, 50, is living at 3109 N. Schevene Blvd. in Flagstaff. Benally pleaded guilty in 2000 to Sexual Abuse of a Child in Utah. He also pleaded guilty to aggravated assault of a minor in Flagstaff in 2006. Benally is not wanted by police at this time.

Notification that Level 2 and Level 3 sex offenders are living in the community is required by Arizona law.

Resident abuse of this information to threaten, intimidate or



Benally

harass sex offenders will not be tolerated by the police department.

If residents have information about current criminal activity by any offender, contact the police department at 774-1414.

For more information on sex offenders in the Flagstaff area, visit the Arizona Department of Public Safety sex offender website at www.azsexoffender.com.

City and county residents who want to report a crime but wish to remain anonymous may call Silent Witness at 774-6111 or (877) 29-CRIME. Rewards of up to \$2,000 are given for information that leads to an arrest.

School districts seek board members

Consolidated School District board.

A candidate must be a registered voter in Arizona and must be a resident of the school district in order to be eligible. Applications for both positions can be downloaded at www.coconino.az.gov/schoolboardapplication.

All applications must be received by 5 p.m. June 22.

Emery Cowan can be reached at (928) 556-2250 or ecowan@azdailysun.com

LOTTERY

MEGA MILLIONS: 01:39-52:69:72 (12)
FANTASY 5: 07:08-10:19:34

Woods Watch training offered tonight

or against fire restrictions, especially on forested lands.

Volunteers will assist northern Arizona law enforcement officers in watching access points to the forest.

Citizens who have attended this training in previous years are asked to attend again as a review and to receive updated information. The Coconino County Sheriff's Office will also provide Woods Watch re-certification and new volunteer training will be offered today at 6 p.m., at the Law Enforcement Administration Facility located at 911 E. Sawmill Road.

Volunteers will be trained to assist local officials in watching for and properly reporting people accessing closed areas or people who are using fire carelessly

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Camp Navajo
Bellemont, Coconino County, Arizona

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Randy Wilkinson, CSU-CEMML
Army National Guard Directorate
Environmental Programs Division
Camp Navajo
P.O. Box 16123
Bellemont, Arizona 86015
randy.w.wilkinson2_cdr@army.mil
(928) 773-3208

THE CITY OF FLAGSTAFF RECREATION SERVICES PRESENTS:

National Senior Health & Fitness Day Fair

Wednesday, May 27, 8:30 a.m. - 2:00 p.m.
@ The Flagstaff Aquaplex, 1702 N. 4th Street
KEYNOTE SPEAKER AT 10:30 AM

Dr. Donald Hales M.D. Northern Arizona Orthopaedics
"High-tech Backs: The Minimally Invasive Spine Surgeries of Today"
A board certified orthopaedic spine surgeon, Dr. Hales specializes in treating problems of the spine and neck with minimally invasive and traditional techniques, such as total disc replacements, fusions and kyphoplasty. The goals of his surgical procedures are designed to stop a patient's pain, stabilize the neck or back, and restore some or all of the lost range of motion of the spine.

Fun FREE Activities:

- Free Climbing Wall
- Information Booths
- Door Prizes
- Giveaways
- Fun Fitness Walk
- New Brain Aerobics from Haven Health
- Pickleball
- Free classes
- Water aerobics
- Water walking
- Keynote Speaker

Purchase your Lunch Ticket by May 22nd! \$8.00 per Lunch!
8:30 a.m. - Kick the day off with a "Fun Fitness Walk"

For more information or to purchase lunch tickets, contact:
Joe C. Montoya Community & Senior Center, 245 N. Thorpe Rd. Flagstaff, AZ 86001
Phone: (928) 774-1068

Northern Arizona Orthopaedics
Northern Arizona Healthcare Flagstaff Medical Center

APPENDIX F

CONTAMINANTS OF CONCERN AND CURRENT REGULATORY STANDARDS

Table F-1
Summary of Compounds of Concern

Compounds of Concern	NAAD 11B	NAAD 40	NAAD 43
1,3,5-Trinitrobenzene	X		
2,4,6-Trinitrotoluene	X		
2-Amino-4,6-Dinitrotoluene	X		
4-Amino-2,6-Dinitrotoluene	X		
Hexahydro-1,3,5-trinitro-1,3,5-triazine	X		
Arsenic	X		X
Barium		X	
Beryllium	X	X	X
Cadmium		X	
Chromium	X	X	
Lead		X	X
Mercury		X	
Perchlorate			
Benzo(a)pyrene		X	X
Benzo(b)fluoranthene		X	X
Dibenzo(a,h)anthracene		X	X
Indeno(1,2,3-cd)pyrene		X	X
Nitrate		X	
Aroclor 1248			X

Table F-2

Historical vs. Current Arizona Remediation Levels

Analyte Name	Original (2004) AZ SRL Residential (mg/kg)	Current (2007) AZ SRL Residential (mg/kg)	Original (2004) AZ SRL Non-Residential (mg/kg)	Current (2007) AZ SRL Non-Residential (mg/kg)
Arsenic	1.0E+01	1.0E+01	1.0E+01	1.0E+01
Barium	5.3E+03	1.5E+04	1.1E+05	1.7E+05
Beryllium	1.4E+00	1.5E+02	1.1E+01	1.9E+03
Boron	5.9E+03	1.6E+04	6.1E+04	2.0E+05
Cadmium	3.8E+01	3.9E+01	8.5E+02	5.1E+02
Chromium (Total) ¹	2.1E+03	NL	4.5E+03	NL
Chromium III	7.7E+04	1.2E+05	1.0E+07	1.0E+06
Chromium VI	3.0E+01	3.0E+01	6.4E+01	6.5E+01
Lead	4.0E+02	4.0E+02	2.0E+03	8.0E+02
1,3,5-Trinitrobenzene	3.3E+00	1.8E+03	3.4E+01	1.8E+04
1,3-Dinitrobenzene	6.5E+00	6.1E+00	6.8E+01	6.2E+01
2,4,6-Trinitrotoluene	3.3E+01	1.8E+01	3.4E+02	3.1E+02
2-Amino-4,6-Dinitrotoluene	NL	NL	NL	NL
4-Amino-2,6-Dinitrotoluene	NL	NL	NL	NL
Benzo(a)pyrene	6.1E-01	6.9E-02	2.6E+00	2.1E+00
Benzo(b)fluoranthene	6.1E+00	6.9E-01	2.6E+01	2.1E+01
Dibenzo(a,h)anthracene	6.1E-01	6.9E-02	2.6E+00	2.1E+00
TRPH (DRO / GRO)	NL	NL	NL	NL
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	4.0E+01	5.0E+00	1.7E+02	1.6E+02
Nitrate	1.0E+05	Site Specific per R18-7-207	1.0E+06	Site Specific per R18-7-207
Polychlorinated Biphenols	2.5E+00	2.5E-01	1.3E+01	7.4E+00
Indeno(1,2,3-cd)pyrene	NL	6.9E-01	NL	2.1E+01

Note:

1. The AZ SRL for 1/6 ratio Cr VI/Cr III was used to evaluate Chromium.

Highlight = Value is higher than previous

Highlight = Value is lower than previous

Abbreviations

AZ SRL - Arizona Soil Remediation Levels

mg/kg - milligram per kilogram

NL - Not Listed

**Table F-3
Historical vs. Current Preliminary Screening Guidance**

Analyte (PCOC)	2004 Tap Water PRG (ug/l)	Revised Tap Water RSL - Jun 2015 (ug/l)	AWQS 1992 (ug/l)	NWQC - 2009 (ug/l)	Other Comparable Standards (ug/l)	Revised Other Comparable Standards (ug/l)	2004 Preliminary Screening Guidance (ug/l)	Revised Preliminary Screening Guidance (ug/l)	Regulatory Source
1,3,5-Trinitrobenzene	1100	590	NE	NE	NA	NA	1100	590	USEPA RSL ¹
1,3-Dinitrobenzene	3.6	2	NE	NE	NA	NA	3.6	2	USEPA RSL ¹
2,4,6-Trinitrotoluene (TNT)	2.2	0.98	NE	NE	NA	NA	2.2	0.98	USEPA RSL ¹
2-Amino-4,6-dinitrotoluene	7.3 ²	39	NE	NE	NA	NA	7.3	39	USEPA RSL ¹
4-Amino-2,6-dinitrotoluene	7.3 ²	39	NE	NE	NA	NA	7.3	39	USEPA RSL ¹
Arsenic	0.045	0.052	10 ⁴	10	NA	NA	10 ⁴	10	Arizona NWQC
Barium	2600	3800	2000	2000	NA	NA	2000	2000	AWQS
Benzo(a)pyrene	0.0092	0.0034	0.2	0.2	NA	NA	0.2	0.2	Arizona NWQC
Benzo(b)fluoranthene	0.092	0.034	NE	NE	NA	NA	0.092	0.034	USEPA RSL ¹
Indeno(1,2,3-cd)pyrene	0.092	0.034	NE	NE	NA	NA	0.092	0.034	USEPA RSL ¹
Beryllium	73	25	4	4	NA	NA	4	4	Arizona NWQC
Cadmium	18	9.2	5	5	NA	NA	5	5	Arizona NWQC
Chromium, Total	NE	NE	100	100	NA	NA	100	100	Arizona NWQC
Chromium, Hexavalent	110	0.035	NE	21	NA	NA	110	21	Arizona NWQC
Dibenzo(a,h)anthracene	0.0092	0.0034	NE	0.005	NA	NA	0.0092	0.005	Arizona NWQC
Nitrate as N	10000	32000	10000	10000	NA	NA	10000	10000	Arizona NWQC
PCBs - 1254 (Aroclor 1248)	0.034	0.0078	0.5	0.5	NA	NA	0.5	0.5	USEPA RSL ¹
RDX (cancer / noncancer)	0.61	0.7	NE	NE	2.1 ⁷	2 ⁸	0.61	0.7	USEPA RSL ¹
TRPH (DRO / GRO)	NE	NE	NE	NE	NE	NE	NE	NE	Will be further evaluated if detected.

¹ If no AWQS has been established, and the concentration of the compound in the sample exceeds the alternate screening guidance (i.e. USEPA Region Regional Screening Levels [RSLs] for Chemical Contaminants at Superfund Sites), a site-specific screening value may be developed for that compound using the ADEQ Guidance.

² The Tap Water PRG for aminodinitrotoluene was used as the preliminary screening guidance for 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene because risk based PRGs for the individual analytes were not available

³ Analyte specific RSLs for 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene

⁴ EPA Drinking Water Standard effective Nov 2014

⁵ Arizona Department of Health Services Health Based Guideline

⁶ USEPA Interim Drinking Water Health Advisory for perchlorate

⁷ USEPA Integrated Risk Information System (IRIS) Reference dose as drinking water level

⁸ USEPA Lifetime Noncancer Health Advisory for RDX

⁹ USEPA MCL

Highlight = Value is higher than original values (200-

Highlight = Value is lower than original values (200-

Abbreviations

AWQS = Aquifer Water Quality Standard

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

HA = Health Advisory

HBGL = Health Based Guidance Level

MCL = Maximum Contaminant Level

NA = Not Applicable

NE = Not Established

NWQC = Numeric Water Quality Criteria

PCOC = Potential Contaminant of Concern

PRG = Preliminary Remediation Goal

RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine

RSL = Regional Screening Level

TNT = 2,4,6-Trinitrotoluene

TRPH = Total Recoverable Petroleum Hydrocarbons

ug/l = micrograms per liter

References

Tapwater RSLs Source: <http://www.epa.gov/region9/superfund/prg/index.html>

AWQS and NWQC Source: http://www.azsos.gov/public_services/Title_18/18-11.htm

APPENDIX G

NAAD 11B GROUNDWATER ANALYSIS, TIME SERIES PLOTS, AND MANN-KENDALL STATISTICAL ANALYSIS

Table 4-4

NAAD 11B Detected Explosives Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
97-04	ND11B-WTR-97-04-3Q08-A	10/23/2008	8330	2-A-4,6-DNT	0.33 NJ	0.051	73
97-04	ND11B-WTR-97-04-1Q09-A	4/7/2009	8330	2-A-4,6-DNT	0.34	0.051	73
97-04	ND11B-WTR-97-04-1Q09-B	4/7/2009	8330	2-A-4,6-DNT	0.35 NJ	0.051	73
97-04	ND11B-WTR-97-04-1Q10-A	4/12/2010	8330	2-A-4,6-DNT	0.24 J	0.2	73
97-04	ND11B-WTR-97-04-1Q10-B	4/12/2010	8330	2-A-4,6-DNT	0.26 J	0.2	73
97-04	ND11B-WTR-97-04-3Q10-A	10/12/2010	8330	2-A-4,6-DNT	0.25 J	0.2	73
97-04	ND11B-WTR-97-04-3Q10-B	10/12/2010	8330	2-A-4,6-DNT	0.29 J	0.2	73
97-04	ND11B-WTR97-04-1Q07-A	3/7/2007	8330	RDX	1.3	0.052	0.61
97-04	ND11B-WTR97-04-1Q08-A	4/8/2008	8330	RDX	1.2 J	0.05	0.61
97-04	ND11B-WTR-97-04-1Q09-A	4/7/2009	8330	RDX	3.8	0.052	0.61
97-04	ND11B-WTR-97-04-1Q09-B	4/7/2009	8330	RDX	3.9	0.052	0.61
97-04	ND11B-WTR-97-04-3Q09-A	10/6/2009	8330	RDX	0.57	0.052	0.61
97-04	ND11B-WTR-97-04-1Q10-A	4/12/2010	8330	RDX	2 J	0.21	0.61
97-04	ND11B-WTR-97-04-1Q10-B	4/12/2010	8330	RDX	2 J	0.22	0.61
97-04	ND11B-WTR-97-04-2012-A	8/9/2012	8330	RDX	0.55 J	0.2	0.61
97-04	ND11B-WTR-97-04-2012-B	8/9/2012	8330	RDX	0.54 J	0.2	0.61
97-04	ND11B-WTR97-04-2013-A	5/21/2013	8330	RDX	1.2 J	0.21	0.61
97-04	ND11B-WTR97-04-2014-A	5/13/2014	8330	RDX	0.96 J	0.23	0.61
97-04	ND11B-WTR97-04-2014-B	5/13/2014	8330	RDX	1.1 J	0.21	0.61
97-05	ND11B-WTR97-05-4Q05-A	11/2/2005	8330	2-A-4,6-DNT	4	0.021	73
97-05	ND11B-WTR97-05-1Q06-A	1/30/2006	8330	2-A-4,6-DNT	3	0.021	73
97-05	ND11B-WTR97-05-2Q06-A	4/18/2006	8330	2-A-4,6-DNT	0.95 J	0.021	73

Table 4-4
NAAD 11B Detected Explosives Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
97-05	ND11B-WTR97-05-1Q08-A	4/9/2008	8330	2-A-4,6-DNT	2.9	0.51	73
97-05	ND11B-WTR-97-05-3Q08-A	10/22/2008	8330	2-A-4,6-DNT	4.1	0.51	73
97-05	ND11B-WTR-97-05-3Q09-A	10/6/2009	8330	2-A-4,6-DNT	5.1	0.51	73
97-05	ND11B-WTR-97-05-2012-A	8/10/2012	8330	2-A-4,6-DNT	3.6 J	0.51	30
97-05	ND11B-WTR97-05-2013-A	5/21/2013	8330	2-A-4,6-DNT	7.8 J	2.2	30
97-05	ND11B-WTR97-05-2013-B	5/21/2013	8330	2-A-4,6-DNT	4.4 J	2.2	30
97-05	ND11B-WTR97-05-2014-A	5/13/2014	8330	2-A-4,6-DNT	1.9 J	0.2	30
97-05	ND11B-WTR97-05-4Q05-A	11/2/2005	8330	4-A-2,6-DNT	25	0.29	73
97-05	ND11B-WTR97-05-1Q06-A	1/30/2006	8330	4-A-2,6-DNT	20	0.44	73
97-05	ND11B-WTR97-05-2Q06-A	4/18/2006	8330	4-A-2,6-DNT	13J	0.029	73
97-05	ND11B-WTR97-05-1Q07-A	3/6/2007	8330	4-A-2,6-DNT	10	0.29	73
97-05	ND11B-WTR97-05-4Q07-A	10/19/07	8330	4-A-2,6-DNT	8.3	0.29	73
97-05	ND11B-WTR97-05-1Q08-A	4/9/2008	8330	4-A-2,6-DNT	19	0.58	73
97-05	ND11B-WTR-97-05-3Q08-A	10/22/2008	8330	4-A-2,6-DNT	31	0.58	73
97-05	ND11B-WTR-97-05-1Q09-A	4/8/2009	8330	4-A-2,6-DNT	2.8	0.29	73
97-05	ND11B-WTR-97-05-3Q09-A	10/6/2009	8330	4-A-2,6-DNT	22	0.58	73
97-05	ND11B-WTR-97-05-2012-A	8/10/2012	8330	4-A-2,6-DNT	17 J	0.2	30
97-05	ND11B-WTR97-05-2013-A	5/21/2013	8330	4-A-2,6-DNT	13	2.2	30
97-05	ND11B-WTR97-05-2013-B	5/21/2013	8330	4-A-2,6-DNT	12	2.2	30
97-05	ND11B-WTR97-05-2014-A	5/13/2014	8330	4-A-2,6-DNT	16 J	0.2	30
97-05	ND11B-WTR97-05-4Q05-A	11/2/2005	8330	RDX	170	0.94	0.61
97-05	ND11B-WTR97-05-1Q06-A	1/30/2006	8330	RDX	130J	1.4	0.61
97-05	ND11B-WTR97-05-2Q06-A	4/18/2006	8330	RDX	97 J	0.56	0.61
97-05	ND11B-WTR97-05-1Q07-A	3/6/2007	8330	RDX	110	0.26	0.61
97-05	ND11B-WTR97-05-4Q07-A	10/19/2007	8330	RDX	97	0.26	0.61
97-05	ND11B-WTR97-05-1Q08-A	4/9/2008	8330	RDX	160	0.52	0.61
97-05	ND11B-WTR-97-05-3Q08-A	10/22/2008	8330	RDX	210	0.52	0.61
97-05	ND11B-WTR-97-05-1Q09-A	4/8/2009	8330	RDX	66	0.26	0.61
97-05	ND11B-WTR-97-05-3Q09-A	10/6/2009	8330	RDX	150	0.52	0.61
97-05	ND11B-WTR-97-05-1Q10-A	4/12/2010	8330	RDX	160 J	2.1	0.61
97-05	ND11B-WTR-97-05-3Q10-A	10/14/2010	8330	RDX	150 J	2.1	0.61
97-05	ND11B-WTR-97-05-2012-A	8/10/12	8330	RDX	140 J	2.1	0.61
97-05	ND11B-WTR97-05-2013-A	5/21/2013	8330	RDX	120 J	2.1	0.61
97-05	ND11B-WTR97-05-2013-B	5/21/2013	8330	RDX	110 J	2.1	0.61

Table 4-4
NAAD 11B Detected Explosives Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
97-06	ND11B-WTR97-06-4Q05-A	11/2/2005	8330	RDX	1	0.094	0.61
97-05	ND11B-WTR97-05-2014-A	5/13/2014	8330	RDX	140	4.1	0.61
97-06	ND11B-WTR97-06-1Q06-A	1/30/2006	8330	RDX	0.91J	0.094	0.61
97-06	ND11B-WTR97-06-2Q06-A	4/19/2006	8330	RDX	1	0.094	0.61
97-06	ND11B-WTR97-06-3Q06-A	7/11/2006	8330	RDX	0.76	0.052	0.61
97-06	ND11B-WTR97-06-1Q07-B	3/7/2007	8330	RDX	1.1	0.052	0.61
97-06	ND11B-WTR97-06-1Q07-A	3/7/2007	8330	RDX	1.3	0.052	0.61
97-06	ND11B-WTR97-06-4Q07-A	10/18/2007	8330	RDX	1	0.052	0.61
97-06	ND11B-WTR-97-06-3Q09-A	10/6/2009	8330	RDX	1.1	0.052	0.61
97-06	ND11B-WTR-97-06-1Q10-A	4/12/2010	8330	RDX	0.83 J	0.2	0.61
97-06	ND11B-WTR-97-06-2012-A	8/9/2012	8330	RDX	0.85 J	0.2	0.61
97-06	ND11B-WTR97-06-2013-A	5/21/2013	8330	RDX	1.0 J	0.22	0.61
97-06	ND11B-WTR97-06-2014-A	5/13/2014	8330	RDX	0.85	0.2	0.61
97-06	ND11B-WTR97-06-2014-B	5/13/2014	8330	RDX	0.86	0.2	0.61
97-08	ND11B-WTR97-08-4Q05-B	11/1/2005	8330	4-A-2,6-DNT	5.5	0.029	73
97-08	ND11B-WTR97-08-4Q05-A	11/1/2005	8330	4-A-2,6-DNT	6.2	0.029	73
97-08	ND11B-WTR97-08-1Q06-B	1/31/2006	8330	4-A-2,6-DNT	2.2	0.029	73
97-08	ND11B-WTR97-08-1Q06-A	1/31/2006	8330	4-A-2,6-DNT	2	0.029	73
97-08	ND11B-WTR97-08-2Q06-B	4/18/2006	8330	4-A-2,6-DNT	1.5	0.029	73
97-08	ND11B-WTR97-08-2Q06-A	4/18/2006	8330	4-A-2,6-DNT	1.5	0.029	73
97-08	ND11B-WTR97-08-3Q06-A	7/11/2006	8330	4-A-2,6-DNT	1.3	0.12	73
97-08	ND11B-WTR97-08-4Q07-B	10/18/2007	8330	4-A-2,6-DNT	1.9J	0.29	73
97-08	ND11B-WTR97-08-4Q07-A	10/18/2007	8330	4-A-2,6-DNT	2.1J	0.29	73
97-08	ND11B-WTR97-08-1Q08-A	4/10/2008	8330	4-A-2,6-DNT	4.3	0.58	73
97-08	ND11B-WTR97-08-1Q08-B	4/10/2008	8330	4-A-2,6-DNT	4.6	0.58	73
97-08	ND11B-WTR-97-08-3Q08-A	10/22/2008	8330	4-A-2,6-DNT	4.2	0.58	73
97-08	ND11B-WTR-97-08-1Q09-A	4/8/2009	8330	4-A-2,6-DNT	17	0.58	73
97-08	ND11B-WTR-97-08-3Q09-A	10/5/2009	8330	4-A-2,6-DNT	1.9	0.29	73
97-08	ND11B-WTR-97-08-2012-A	8/7/2012	8330	4-A-2,6-DNT	0.71	0.2	30
97-08	ND11B-WTR97-08-2013-A	5/21/2013	8330	4-A-2,6-DNT	1.8 J	1.1	30
97-08	ND11B-WTR97-08-2014-A	5/14/2014	8330	4-A-2,6-DNT	0.66	0.21	30
97-08	ND11B-WTR97-08-4Q05-B	11/1/2005	8330	RDX	130	0.94	0.61
97-08	ND11B-WTR97-08-4Q05-A	11/1/2005	8330	RDX	150	0.94	0.61
97-08	ND11B-WTR97-08-1Q06-B	1/31/2006	8330	RDX	55J	0.94	0.61
97-08	ND11B-WTR97-08-1Q06-A	1/31/2006	8330	RDX	54J	0.94	0.61
97-08	ND11B-WTR97-08-2Q06-B	4/18/2006	8330	RDX	37	0.19	0.61
97-08	ND11B-WTR97-08-2Q06-A	4/18/2006	8330	RDX	35	0.19	0.61
97-08	ND11B-WTR97-08-3Q06-A	7/11/2006	8330	RDX	42	0.1	0.61

Table 4-4
NAAD 11B Detected Explosives Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
97-08	ND11B-WTR97-08-1Q07-A	3/6/2007	8330	RDX	38	0.1	0.61
97-08	ND11B-WTR97-08-4Q07-B	10/18/2007	8330	RDX	63	0.26	0.61
97-08	ND11B-WTR97-08-4Q07-A	10/18/2007	8330	RDX	63	0.26	0.61
97-08	ND11B-WTR97-08-1Q08-A	4/10/2008	8330	RDX	140	0.52	0.61
97-08	ND11B-WTR97-08-1Q08-B	4/10/2008	8330	RDX	140	0.52	0.61
97-08	ND11B-WTR-97-08-3Q08-A	10/22/2008	8330	RDX	110	0.52	0.61
97-08	ND11B-WTR-97-08-1Q09-A	4/8/2009	8330	RDX	130	0.52	0.61
97-08	ND11B-WTR-97-08-3Q09-A	10/5/2009	8330	RDX	59	0.26	0.61
97-08	ND11B-WTR-97-08-1Q10-A	4/12/2010	8330	RDX	65 J	2.2	0.61
97-08	ND11B-WTR-97-08-3Q10-A	10/13/2010	8330	RDX	68	1	0.61
97-08	ND11B-WTR-97-08-2012-A	8/7/2012	8330	RDX	20	0.2	0.61
97-08	ND11B-WTR97-08-2013-A	5/21/2013	8330	RDX	56	1.1	0.61
97-08	ND11B-WTR97-08-2014-A	5/14/2014	8330	RDX	18	0.21	0.61
98-02	ND11B-WTR98-02-4Q05-A	11/2/2005	8330	RDX	1.1	0.094	0.61
98-02	ND11B-WTR98-02-1Q06-A	1/31/2006	8330	RDX	0.95 J	0.094	0.61
98-02	ND11B-WTR98-02-2Q06-A	4/18/2006	8330	RDX	1	0.094	0.61
98-02	ND11B-WTR98-02-3Q06-B	7/11/2006	8330	RDX	0.89	0.052	0.61
98-02	ND11B-WTR98-02-1Q07-A	3/7/2007	8330	RDX	1.1	0.052	0.61
98-02	ND11B-WTR98-02-4Q07-A	10/18/2007	8330	RDX	0.2	0.052	0.61
98-02	ND11B-WTR98-02-1Q08-A	4/10/2008	8330	RDX	0.94	0.05	0.61
98-02	ND11B-WTR-98-02-3Q08-A	10/23/2008	8330	RDX	0.6	0.052	0.61
98-02	ND11B-WTR-98-02-3Q09-A	10/6/2009	8330	RDX	0.77	0.052	0.61
98-02	ND11B-WTR-98-02-1Q10-A	4/14/2010	8330	RDX	0.43	0.2	0.61
99-03	ND11B-WTR99-03-1Q08-A	4/8/2008	8330	2-A-4,6-DNT	0.2 J	0.05	73
99-03	ND11B-WTR-99-03-3Q08-A	10/22/2008	8330	2-A-4,6-DNT	0.23	0.051	73
99-03	ND11B-WTR-99-03-1Q09-A	4/7/2009	8330	2-A-4,6-DNT	0.3	0.051	73
99-03	ND11B-WTR-99-03-3Q10-A	10/13/2010	8330	2-A-4,6-DNT	0.39 J	0.2	73
99-03	ND11B-WTR99-03-4Q07-A	10/19/2007	8330	RDX	0.93J	0.052	0.61
99-03	ND11B-WTR99-03-1Q08-A	4/8/2008	8330	RDX	0.22 J	0.05	0.61
99-03	ND11B-WTR-99-03-1Q09-A	4/7/2009	8330	RDX	0.2 NJ	0.052	0.61
99-03	ND11B-WTR-99-03-3Q09-A	10/6/2009	8330	RDX	0.25	0.052	0.61
99-03	ND11B-WTR-99-03-1Q10-A	4/13/2010	8330	RDX	0.52	0.2	0.61
99-03	ND11B-WTR-99-03-2012-A	8/10/2012	8330	RDX	0.35 UJ	0.2	0.61
99-03	ND11B-WTR99-03-2013-A	5/21/2013	8330	RDX	0.24 J	0.22	0.61
00-01	ND11B-WTR00-01-4Q05-A	11/2/2005	8330	2,4,6-TNT	3.3	0.026	2.2
00-01	ND11B-WTR-00-01-3Q08-A	10/21/2008	8330	2,4,6-TNT	3.8	0.72	2.2
00-01	ND11B-WTR-00-01-3Q10-A	10/13/2010	8330	2,4,6-TNT	1.3 J	1.0	2.2
00-01	ND11B-WTR-00-01-2012-A	8/10/2012	8330	RDX	57 J	2	0.61

Table 4-4
NAAD 11B Detected Explosives Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
00-01	ND11B-WTR-00-01-2012-B	8/10/2012	8330	RDX	66 J	2	0.61
00-01	ND11B-WTR00-01-2013-A	5/22/2013	8330	RDX	47	1.1	0.61
00-01	ND11B-WTR00-01-2014-A	5/14/2014	8330	RDX	33	0.64	0.61
00-02	ND11B-WTR0002-4Q05-A	11/1/2005	8330	2-A-4,6-DNT	2.5	0.021	73
00-02	ND11B-WTR0002-1Q06-A	1/30/2006	8330	2-A-4,6-DNT	3.1	0.021	73
00-02	ND11B-WTR0002-4Q07-A	10/18/2007	8330	2-A-4,6-DNT	2.6J	0.51	73
00-02	ND11B-WTR0002-1Q08-A	4/9/2008	8330	2-A-4,6-DNT	2	0.51	73
00-02	ND11B-WTR-00-02-3Q08-A	10/21/2008	8330	2-A-4,6-DNT	2.8	0.51	73
00-02	ND11B-WTR-00-02-3Q09-A	10/6/2009	8330	2-A-4,6-DNT	3.9	0.51	73
00-02	ND11B-WTR-00-02-1Q10-A	4/12/2010	8330	2-A-4,6-DNT	3.2 J	2.1	73
00-02	ND11B-WTR-00-02-1Q10-B	4/12/2010	8330	2-A-4,6-DNT	3.9 J	2.0	73
00-02	ND11B-WTR-00-02-3Q10-A	10/13/2010	8330	2-A-4,6-DNT	2.2 J	0.9	73
00-02	ND11B-WTR-00-02-3Q10-B	10/13/2010	8330	2-A-4,6-DNT	2.4 J	1.0	73
00-02	ND11B-WTR-00-02-2012-A	8/7/2012	8330	2-A-4,6-DNT	2.2 J	0.21	30
00-02	ND11B-WTR-00-02-2012-B	8/7/2012	8330	2-A-4,6-DNT	2.9 J	0.21	30
00-02	ND11B-WTR00-02-2013-A	5/21/2013	8330	2-A-4,6-DNT	4.8	2.1	30
00-02	ND11B-WTR00-02-2014-A	5/14/2014	8330	2-A-4,6-DNT	2.1 J	0.21	30
00-02	ND11B-WTR0002-4Q05-A	11/1/2005	8330	4-A-2,6-DNT	22	0.29	73
00-02	ND11B-WTR0002-1Q06-A	1/30/2006	8330	4-A-2,6-DNT	24	0.58	73
00-02	ND11B-WTR00-02-1Q07-A	3/7/2007	8330	4-A-2,6-DNT	18	0.58	73
00-02	ND11B-WTR0002-4Q07-A	10/18/2007	8330	4-A-2,6-DNT	14J	0.58	73
00-02	ND11B-WTR0002-1Q08-A	4/9/2008	8330	4-A-2,6-DNT	18	0.58	73
00-02	ND11B-WTR-00-02-3Q08-A	10/21/2008	8330	4-A-2,6-DNT	23	0.58	73
00-02	ND11B-WTR-00-02-3Q09-A	10/6/2009	8330	4-A-2,6-DNT	18	0.58	73
00-02	ND11B-WTR-00-02-1Q10-A	4/12/2010	8330	4-A-2,6-DNT	18 J	2.1	73
00-02	ND11B-WTR-00-02-1Q10-B	4/12/2010	8330	4-A-2,6-DNT	18 J	2.0	73
00-02	ND11B-WTR-00-02-3Q10-A	10/13/2010	8330	4-A-2,6-DNT	23 J	0.9	73
00-02	ND11B-WTR-00-02-3Q10-B	10/13/2010	8330	4-A-2,6-DNT	24 J	1.0	73
00-02	ND11B-WTR-00-02-2012-A	8/7/2012	8330	4-A-2,6-DNT	12 J	0.21	30
00-02	ND11B-WTR-00-02-2012-B	8/7/2012	8330	4-A-2,6-DNT	11 J	0.21	30
00-02	ND11B-WTR00-02-2013-A	5/21/2013	8330	4-A-2,6-DNT	19	2.1	30
00-02	ND11B-WTR00-02-2014-A	5/14/2014	8330	4-A-2,6-DNT	11	0.21	30
00-02	ND11B-WTR0002-4Q05-A	11/1/2005	8330	RDX	180	0.94	0.61
00-02	ND11B-WTR0002-1Q06-A	1/30/2006	8330	RDX	160J	1.9	0.61
00-02	ND11B-WTR00-02-1Q07-A	3/7/2007	8330	RDX	160	0.52	0.61
00-02	ND11B-WTR0002-4Q07-A	10/18/2007	8330	RDX	130	0.52	0.61
00-02	ND11B-WTR0002-1Q08-A	4/9/2008	8330	RDX	130	0.52	0.61
00-02	ND11B-WTR-00-02-3Q08-A	10/21/2008	8330	RDX	160	0.52	0.61

**Table 4-4
NAAD 11B Detected Explosives Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
00-02	ND11B-WTR-00-02-1Q09-A	4/8/2009	8330	RDX	120	0.52	0.61
00-02	ND11B-WTR-00-02-3Q09-A	10/6/2009	8330	RDX	120	0.52	0.61
00-02	ND11B-WTR-00-02-1Q10-A	4/12/2010	8330	RDX	150 J	2.1	0.61
00-02	ND11B-WTR-00-02-1Q10-B	4/12/2010	8330	RDX	140 J	2.0	0.61
00-02	ND11B-WTR-00-02-3Q10-A	10/13/2010	8330	RDX	120 J	0.99	0.61
00-02	ND11B-WTR-00-02-3Q10-B	10/13/2010	8330	RDX	120 J	1.0	0.61
00-02	ND11B-WTR-00-02-2012-A	8/7/2012	8330	RDX	92 J	2.1	0.61
00-02	ND11B-WTR-00-02-2012-B	8/7/2012	8330	RDX	87 J	2.1	0.61
00-02	ND11B-WTR00-02-2013-A	5/21/2013	8330	RDX	130	2.1	0.61
00-02	ND11B-WTR00-02-2014-A	5/14/2014	8330	RDX	79	1.0	0.61
02-02	ND11B-WTR -02-02-1Q09-A	4/7/2009	8330	2,4,6-TNT	0.23	0.072	2.2
02-02	ND11B-WTR-02-02-4Q05-A	11/2/2005	8330	2-A-4,6-DNT	0.31	0.021	73
02-02	ND11B-WTR-02-02-3Q08-A	10/21/2008	8330	2-A-4,6-DNT	0.43	0.051	73
02-02	ND11B-WTR-02-02-1Q09-A	4/7/2009	8330	2-A-4,6-DNT	6.4	0.051	73
02-02	ND11B-WTR-02-02-3Q09-A	10/6/2009	8330	2-A-4,6-DNT	0.59 J	0.063	73
02-02	ND11B-WTR-02-02-1Q10-A	4/14/2010	8330	2-A-4,6-DNT	2.3 J	0.2	73
02-02	ND11B-WTR-02-02-3Q10-A	10/13/2010	8330	2-A-4,6-DNT	1.5 J	0.2	73
02-02	ND11B-WTR02-02-2013-A	5/21/2013	8330	2-A-4,6-DNT	2.0	1.1	30
02-02	ND11B-WTR02-02-2013-B	5/21/2013	8330	2-A-4,6-DNT	2.4 J	1.1	30
02-02	ND11B-WTR-02-02-2014-A	5/12/2014	8330	2-A-4,6-DNT	2.7 J	0.2	30
02-02	ND11B-WTR-02-02-4Q05-A	11/2/2005	8330	4-A-2,6-DNT	0.73	0.029	73
02-02	ND11B-WTR-02-02-3Q08-A	10/21/2008	8330	4-A-2,6-DNT	0.57	0.058	73
02-02	ND11B-WTR-02-02-1Q09-A	4/7/2009	8330	4-A-2,6-DNT	13	0.058	73
02-02	ND11B-WTR-02-02-3Q09-A	10/6/2009	8330	4-A-2,6-DNT	0.53 J	0.072	73
02-02	ND11B-WTR-02-02-1Q10-A	4/14/2010	8330	4-A-2,6-DNT	2.5 NJ	0.2	73
02-02	ND11B-WTR-02-02-3Q10-A	10/13/2010	8330	4-A-2,6-DNT	2.7 J	0.2	73
02-02	ND11B-WTR02-02-2013-A	5/21/2013	8330	4-A-2,6-DNT	2.7 J	1.1	30
02-02	ND11B-WTR02-02-2013-B	5/21/2013	8330	4-A-2,6-DNT	3.2 J	1.1	30
02-02	ND11B-WTR-02-02-2014-A	5/12/2014	8330	4-A-2,6-DNT	4.8 J	0.2	30

Highlighted results are greater than the SL

1,3,5-TNB – 1,3,5-trinitrobenzene
 2-A-4,6-DNT – 2-amino-4,6-dinitrotoluene
 4-A-2,6-DNT – 4-amino-2,6 dinitrotoluene
 J – estimated value
 MDL – method detection limit
 MW – monitoring well

NJ – tentatively identified
 SL – screening level
 TNT – 2,4,6-trinitrotoluene
 RDX – hexahydro-1,3,5-trinitro-1,3,5-triazine
 µg/L – micrograms per Liter

**Table 4-5
NAAD 11B Detected Metals Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result µg/L	MDL µg/L	SL µg/L
97-04	ND11B-WTR-97-04-1Q10-A	4/12/2010	6010B	Chromium	0.78 J	0.66	100
97-04	ND11B-WTR-97-04-1Q10-B	4/12/2010	6010B	Chromium	0.74 J	0.66	100
98-03	ND11B-WTR98-03-2013-A	5/21/2013	6020	Arsenic	2.0 J	0.33	10
98-03	ND11B-WTR98-03-2013-A	5/21/2013	6020	Chromium	0.50 J	0.50	100
98-03	ND11B-WTR98-03-2014-A	5/14/2014	6020	Arsenic	3.9 J	0.33	10
99-03	ND11B-WTR-99-03-1Q10-A	4/13/2010	6010B	Chromium	1.1 J	0.66	100
00-01	ND11B-WTR00-01-4Q05-A	11/2/2005	6010B	Arsenic	5J	4.7	10
00-01	ND11B-WTR00-01-2Q06-A	4/19/2006	6010B	Arsenic	5.7J	2.7	10
00-01	ND11B-WTR00-01-1Q08-A	4/9/2008	6010B	Arsenic	57	4.4	10
00-01	ND11B-WTR-00-01-2012-A	8/10/2012	6010B	Arsenic	1.5J	0.33	10
00-01	ND11B-WTR-00-01-2012-B	8/10/2012	6010B	Arsenic	1.6J	0.33	10
00-01	ND11B-WTR00-01-1Q06-A	2/1/2006	6010B	Beryllium	0.62	0.3	4
00-01	ND11B-WTR00-01-1Q08-A	4/9/2008	6010B	Beryllium	35	0.47	4
00-01	ND11B-WTR00-01-4Q05-A	11/2/2005	6010B	Chromium	1.2J	0.9	100
00-01	ND11B-WTR00-01-1Q08-A	4/9/2008	6010B	Chromium	27	2.6	100
00-01	ND11B-WTR-00-01-1Q10-A	4/14/2010	6010B	Chromium	3.2 J	0.66	100
00-01	ND11B-WTR-00-01-2012-A	8/10/2012	6010B	Chromium	0.65 J	0.5	100
00-01	ND11B-WTR-00-01-2012-B	8/10/2012	6010B	Chromium	0.63 J	0.5	100
02-02	ND11B-WTR-02-02-4Q05-A	11/2/2005	6010B	Arsenic	6.3 J	4.7	10
02-02	ND11B-WTR-02-02-4Q05-A	8/10/2012	6010B	Arsenic	2.2 J	0.33	10
02-02	ND11B-WTR-02-02-1Q10-A	4/14/2010	6010B	Chromium	0.83 J	0.66	100

Highlighted results are greater than the SL

J – estimated value

MDL – method detection limit

MW – monitoring well

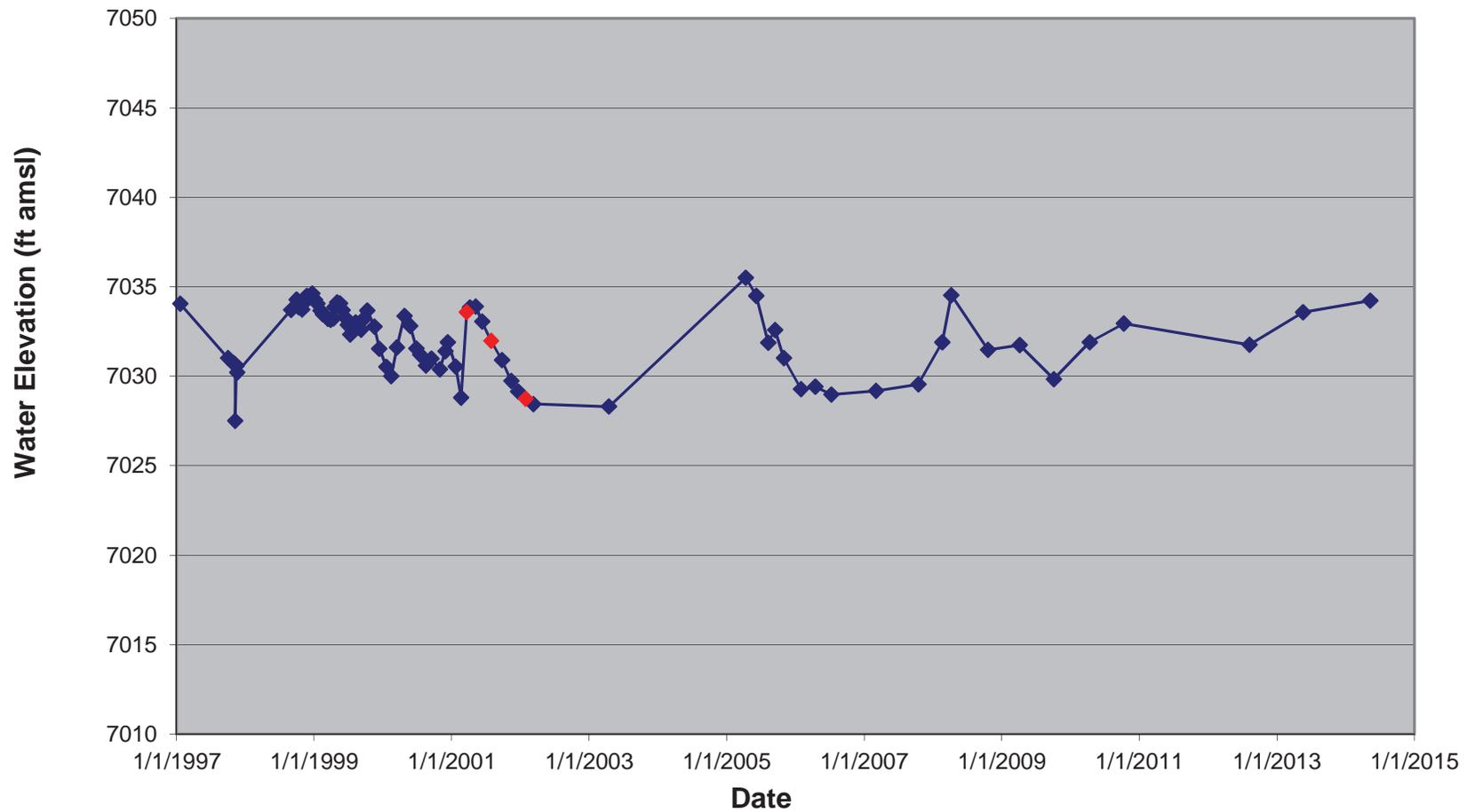
SL – screening level

µg/L – micrograms per Liter

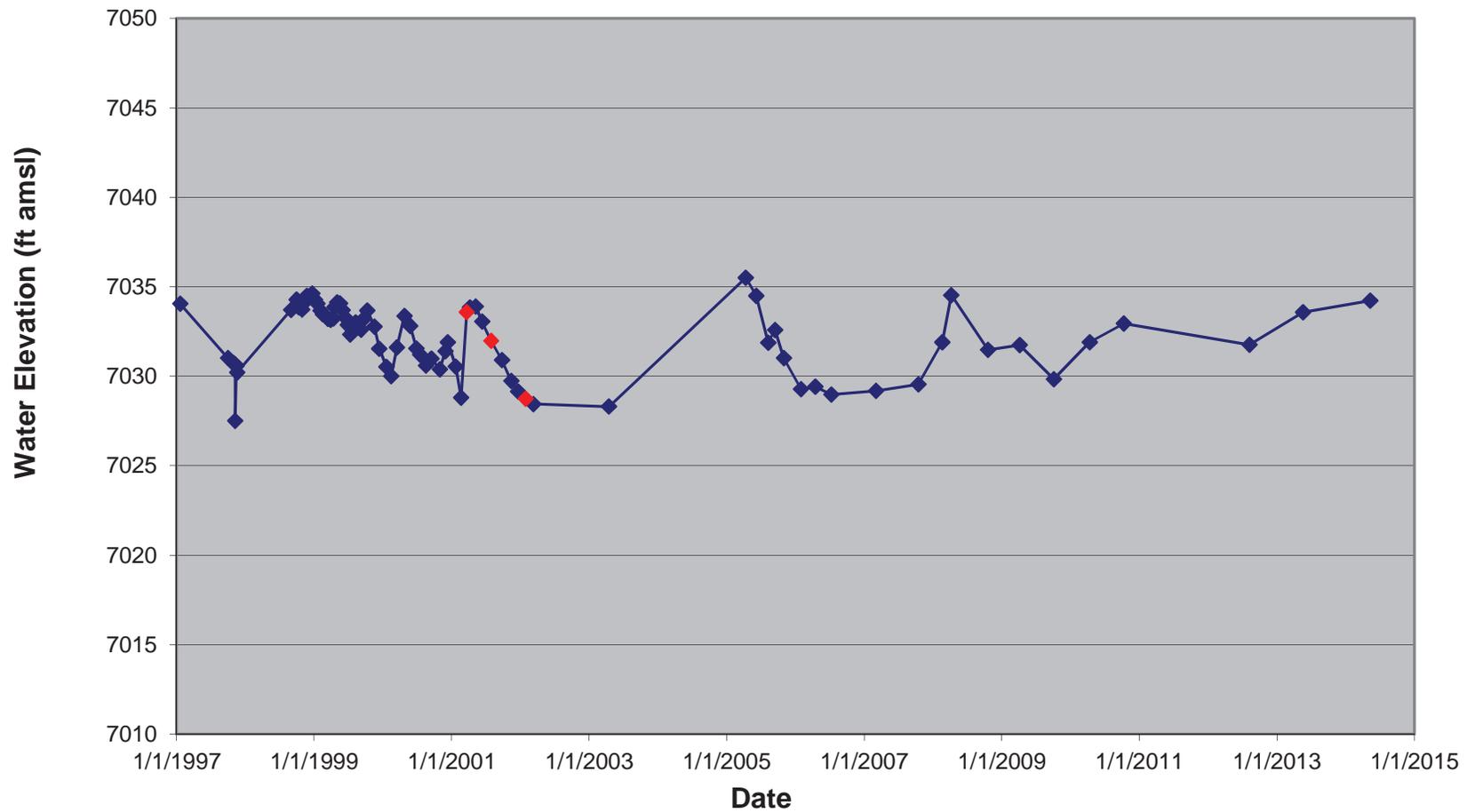
NAAD 40

Site History – The FSL (NAAD 40) is a capped landfill, approximately six acres in size, in a shallow alluvial valley in the eastern standard magazine area of Camp Navajo. The FSL was in operation from the 1940s until 1966, receiving primarily household waste. The site received dried sewage sludge between 1966 and 1981, but has been inactive since then. The FSL was capped in 2001 as documented in the *Construction Report, Closure Construction* (ITC, 2002). The purpose of the LTM groundwater program at NAAD 40 is to detect contaminants that may be released from the waste consolidated beneath the landfill cap.

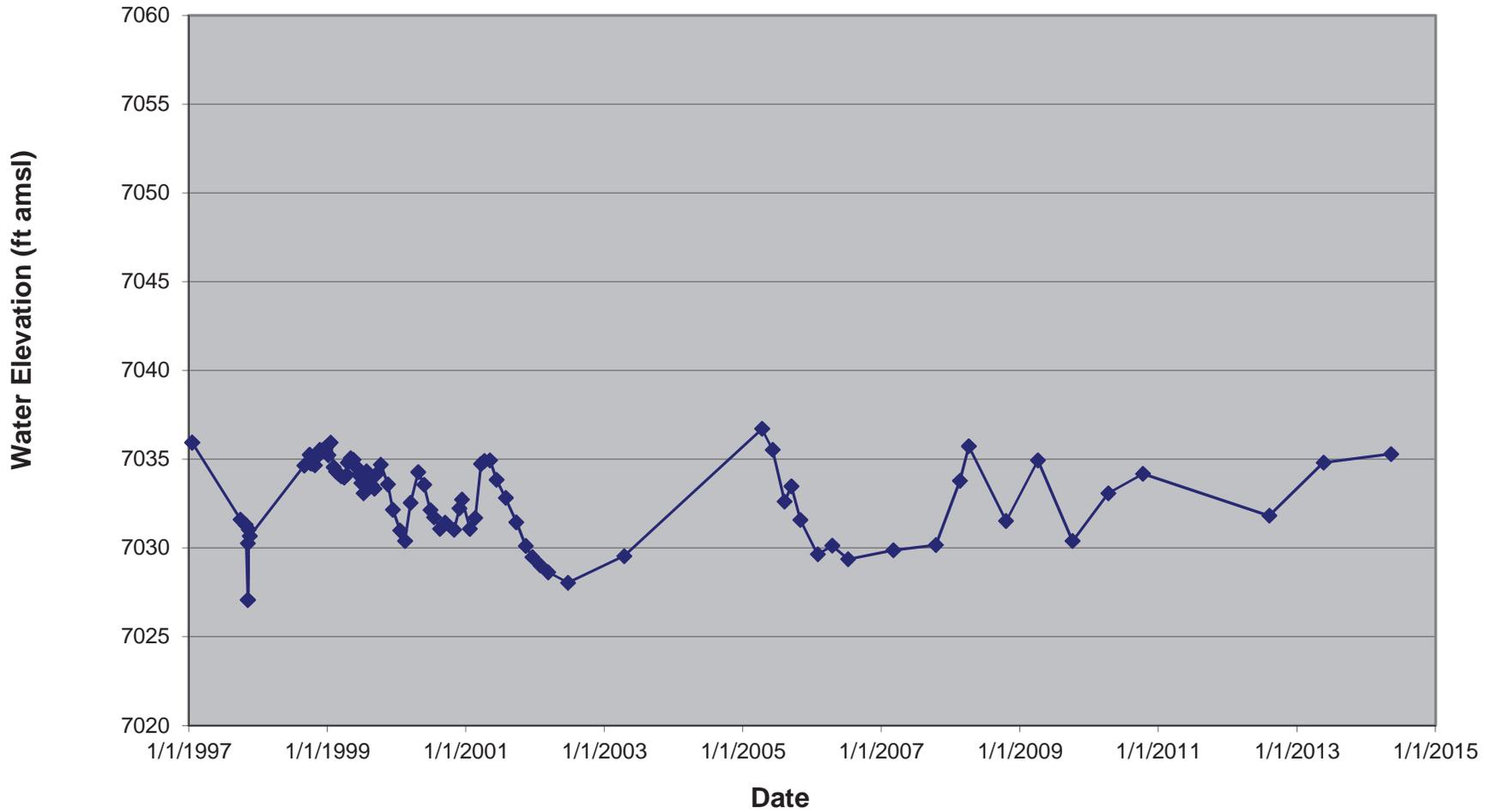
Historical Water Elevation for Monitoring Well 97-04



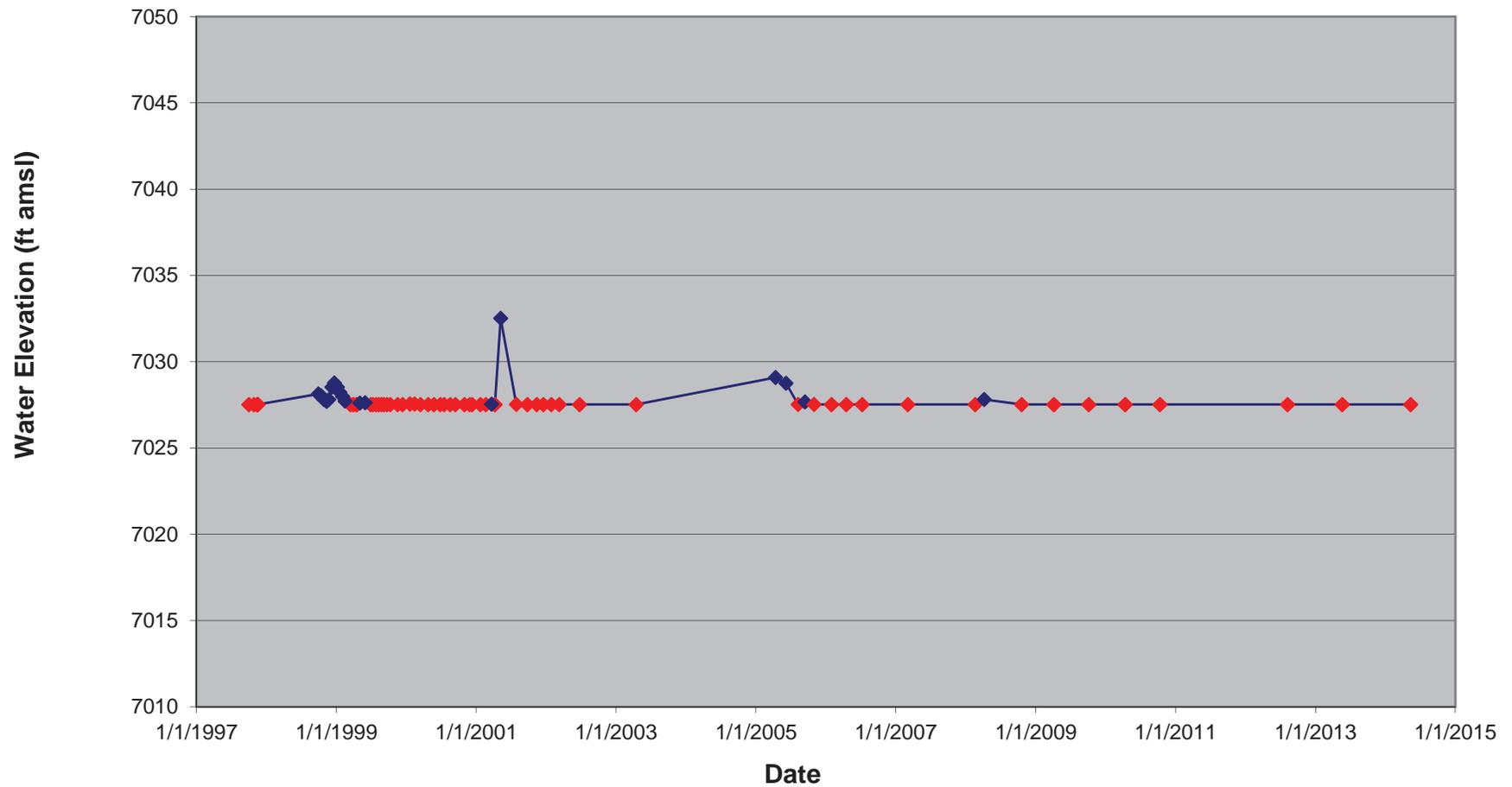
Historical Water Elevation for Monitoring Well 97-04



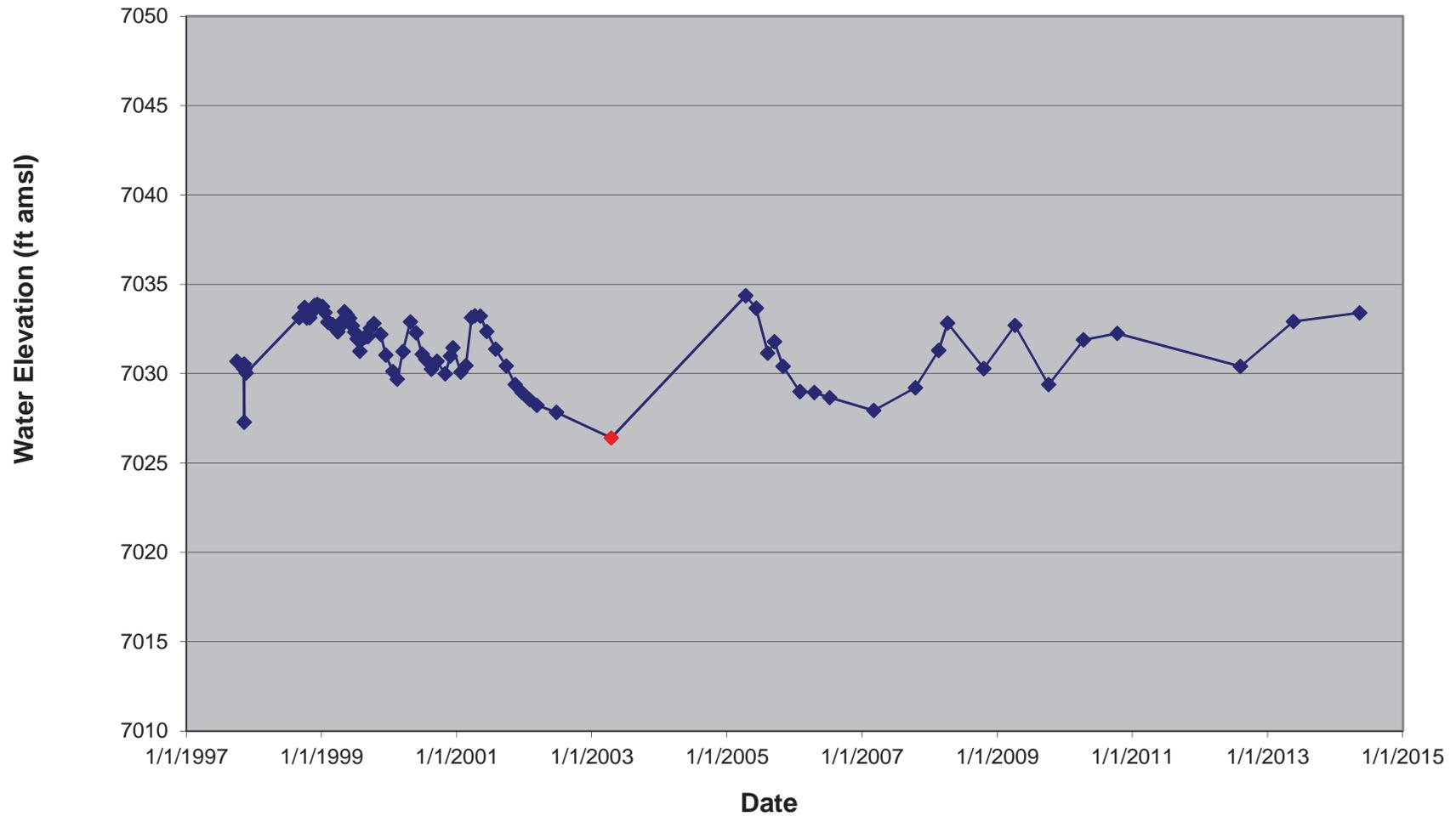
Historical Water Elevation for Monitoring Well 97-06



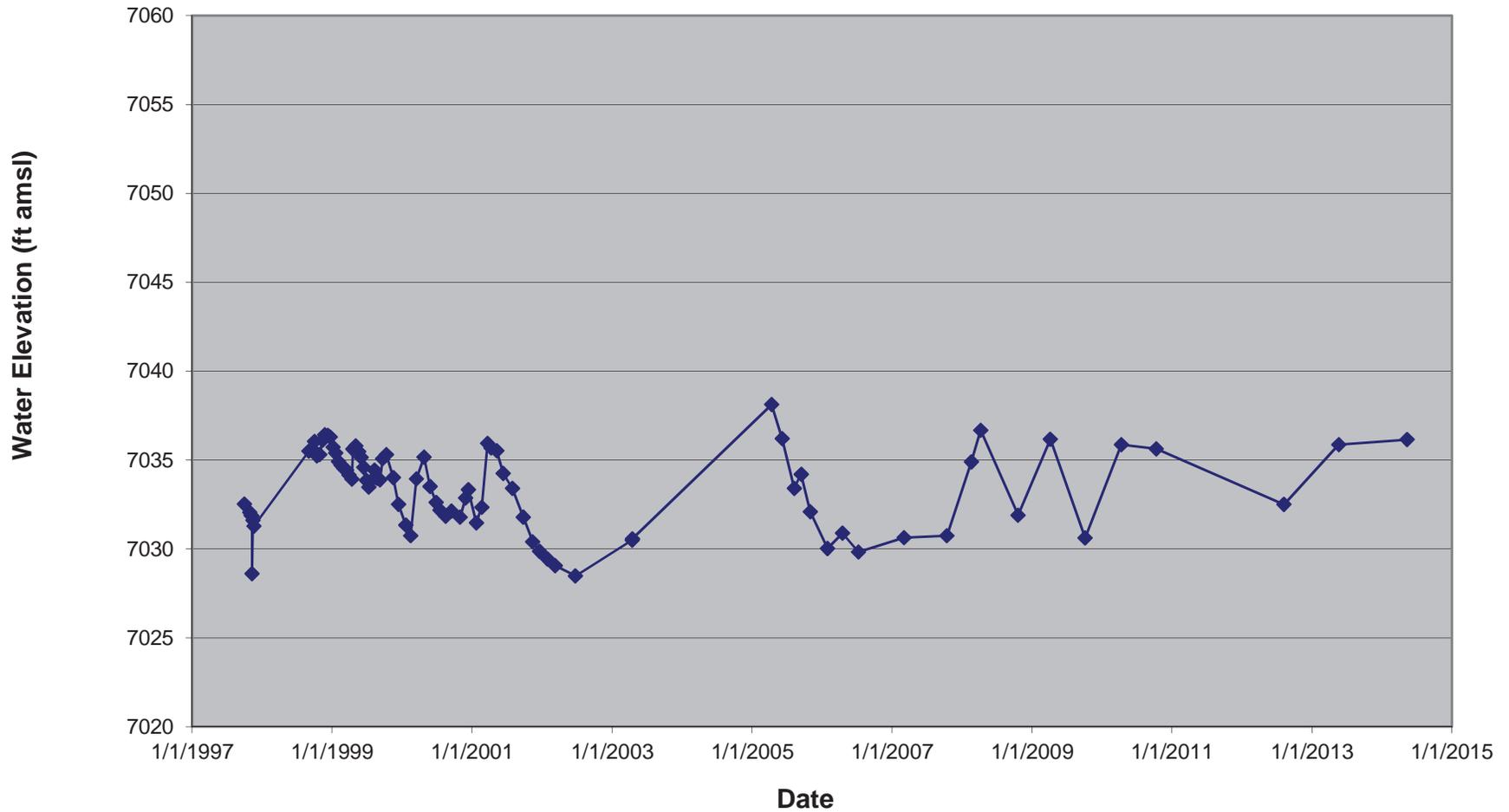
Historical Water Elevation for Monitoring Well 97-07



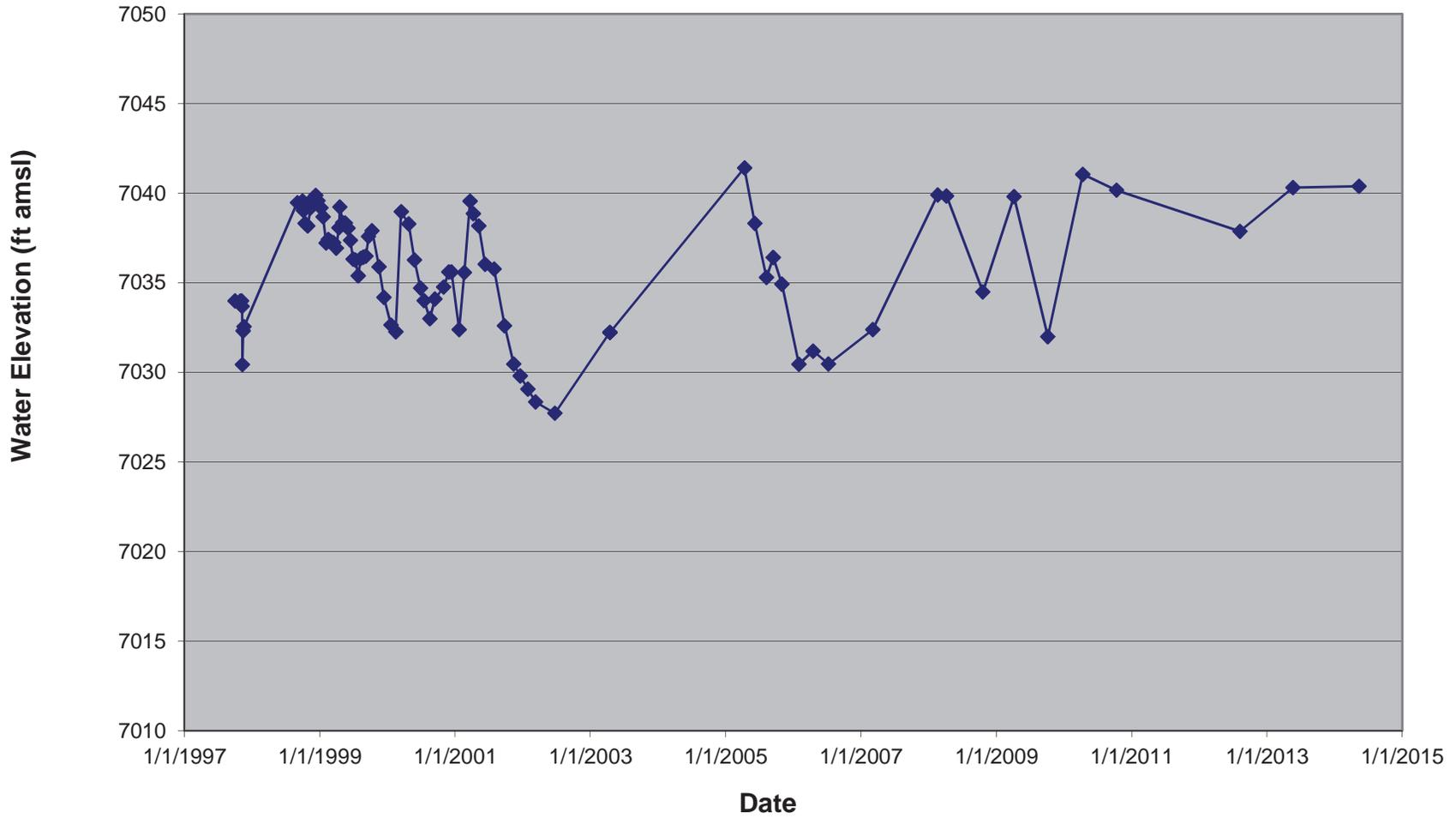
Historical Water Elevation for Monitoring Well 97-08



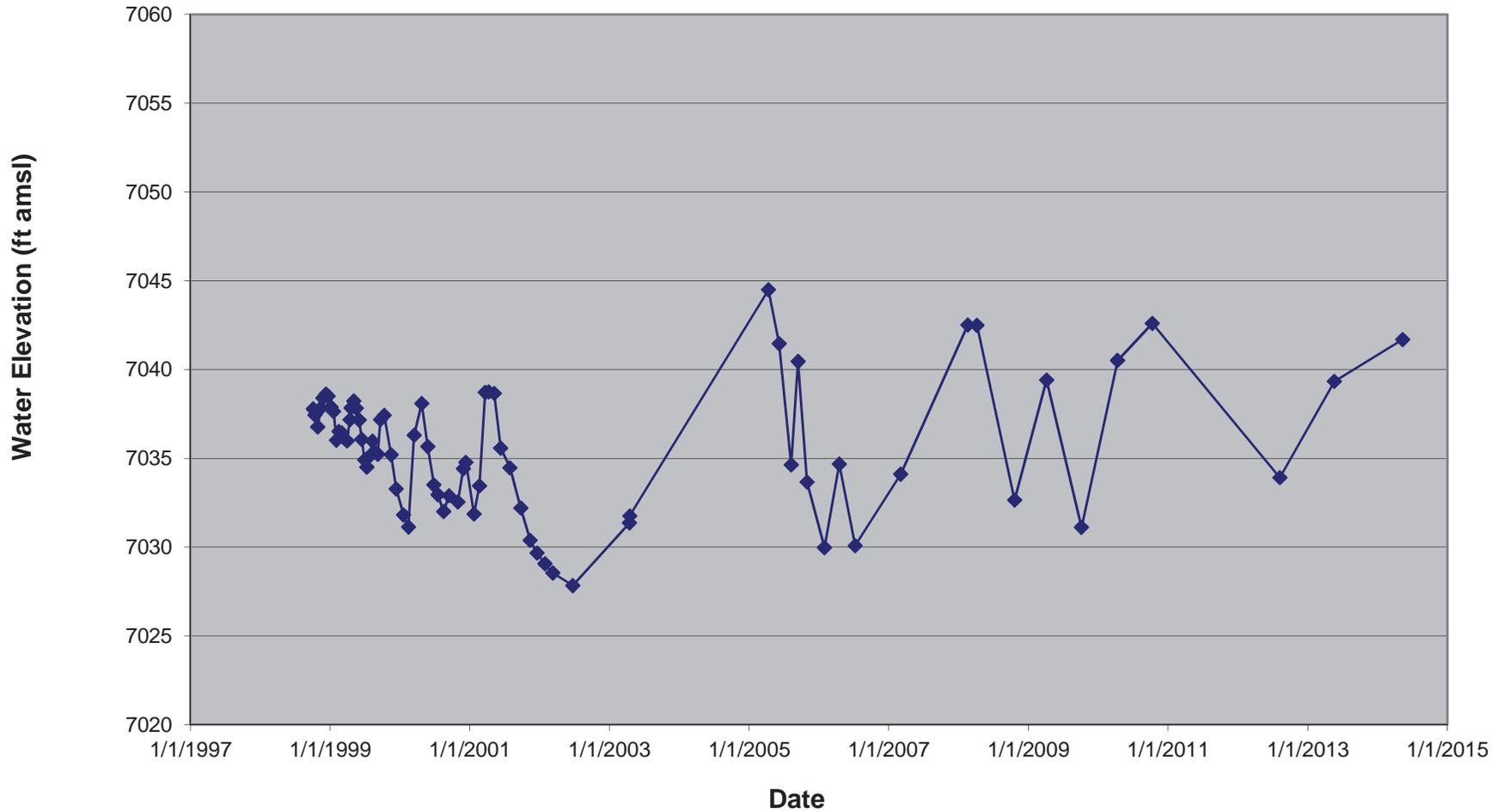
Historical Water Elevation for Monitoring Well 97-09



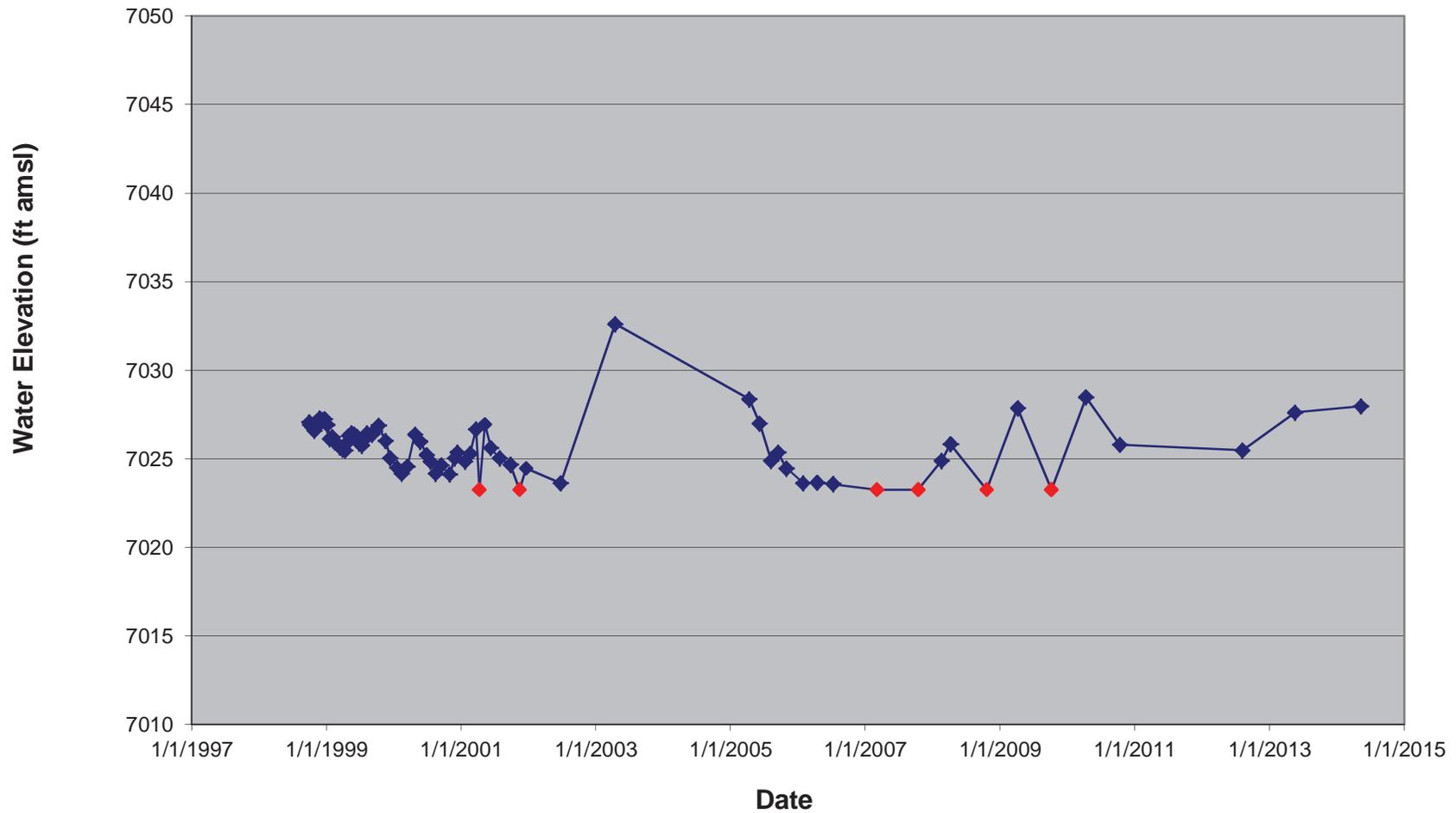
Historical Water Elevation for Monitoring Well 97-10



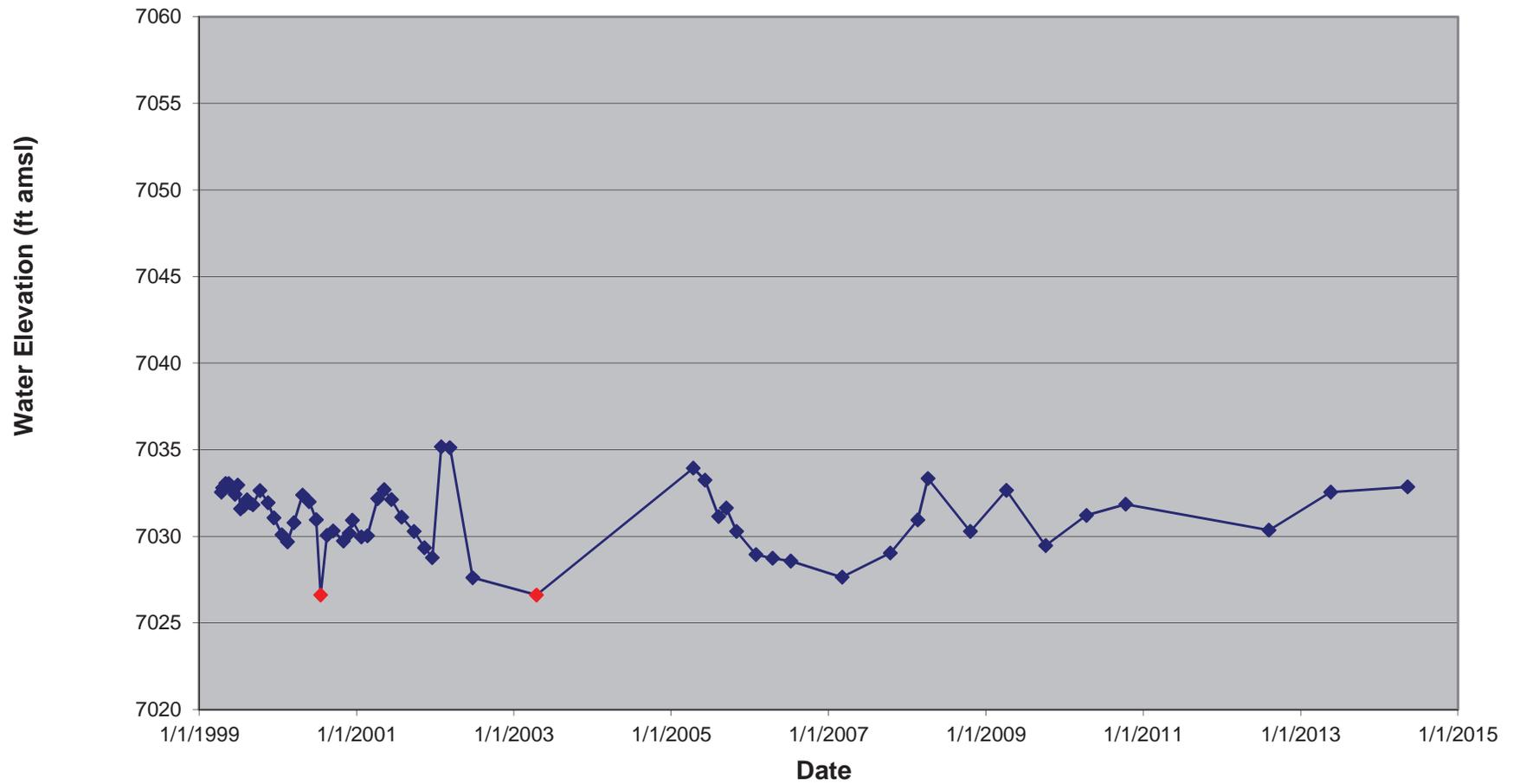
Historical Water Elevation for Monitoring Well 98-01



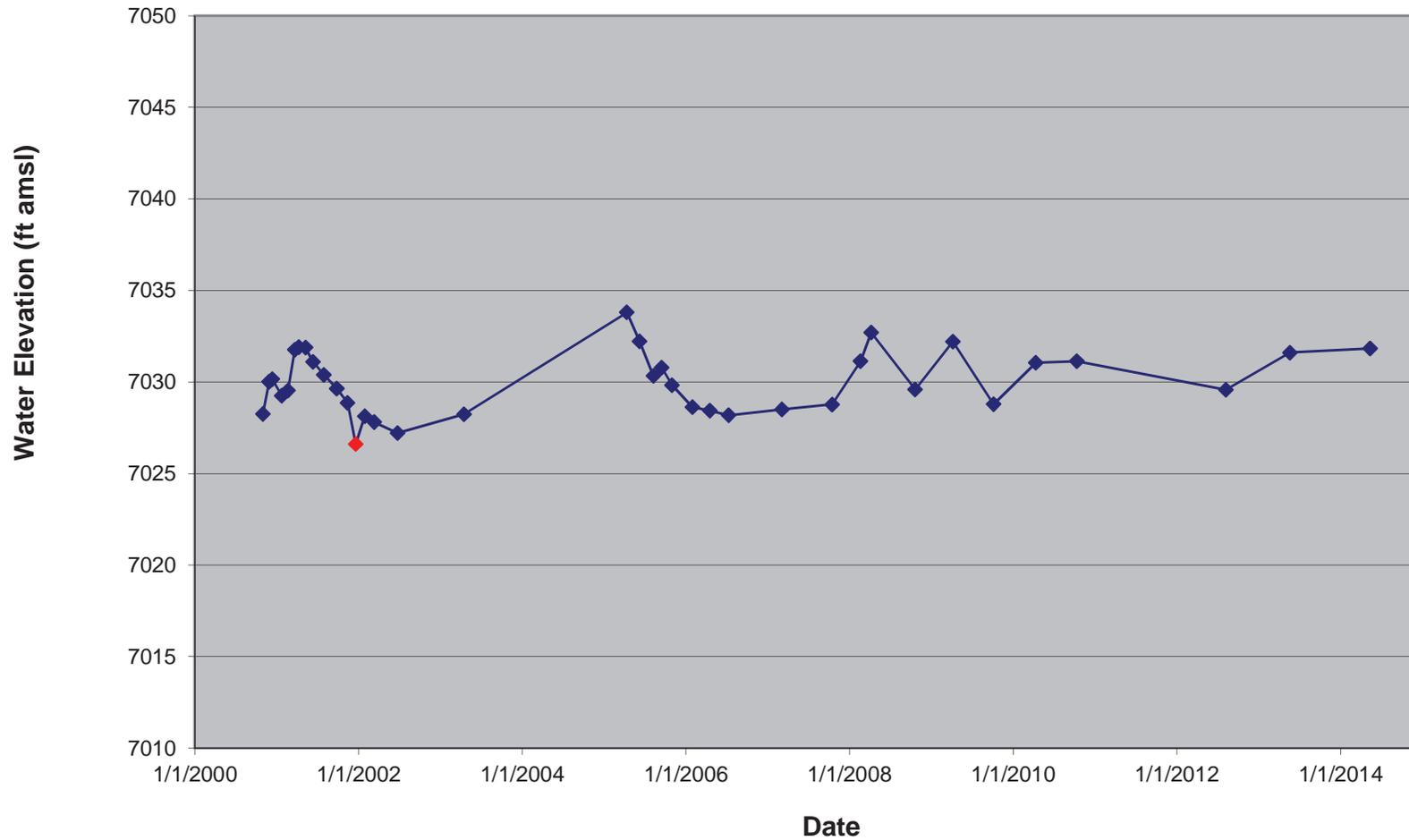
Historical Water Elevation for Monitoring Well 98-03



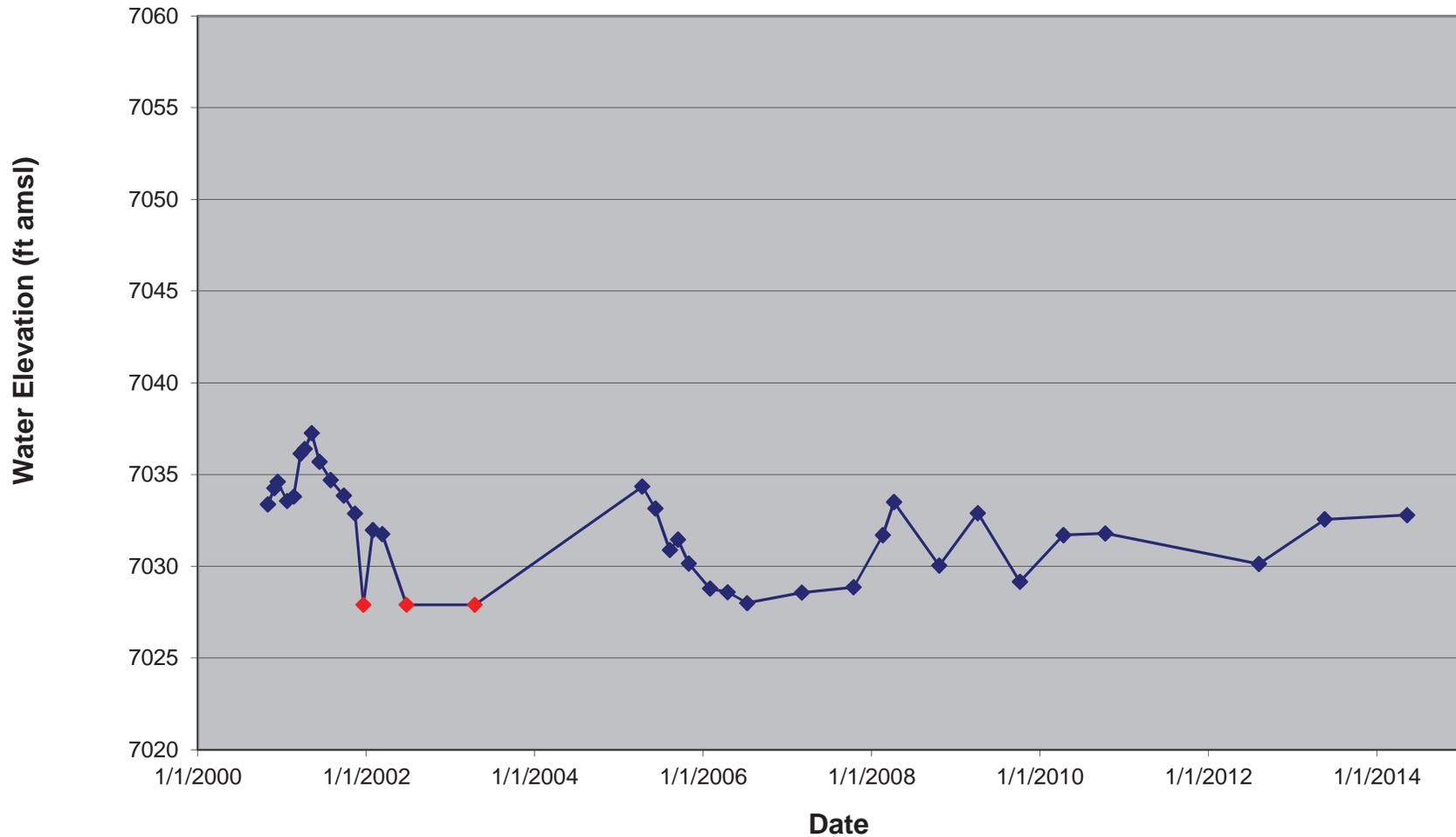
Historical Water Elevation for Monitoring Well 99-03



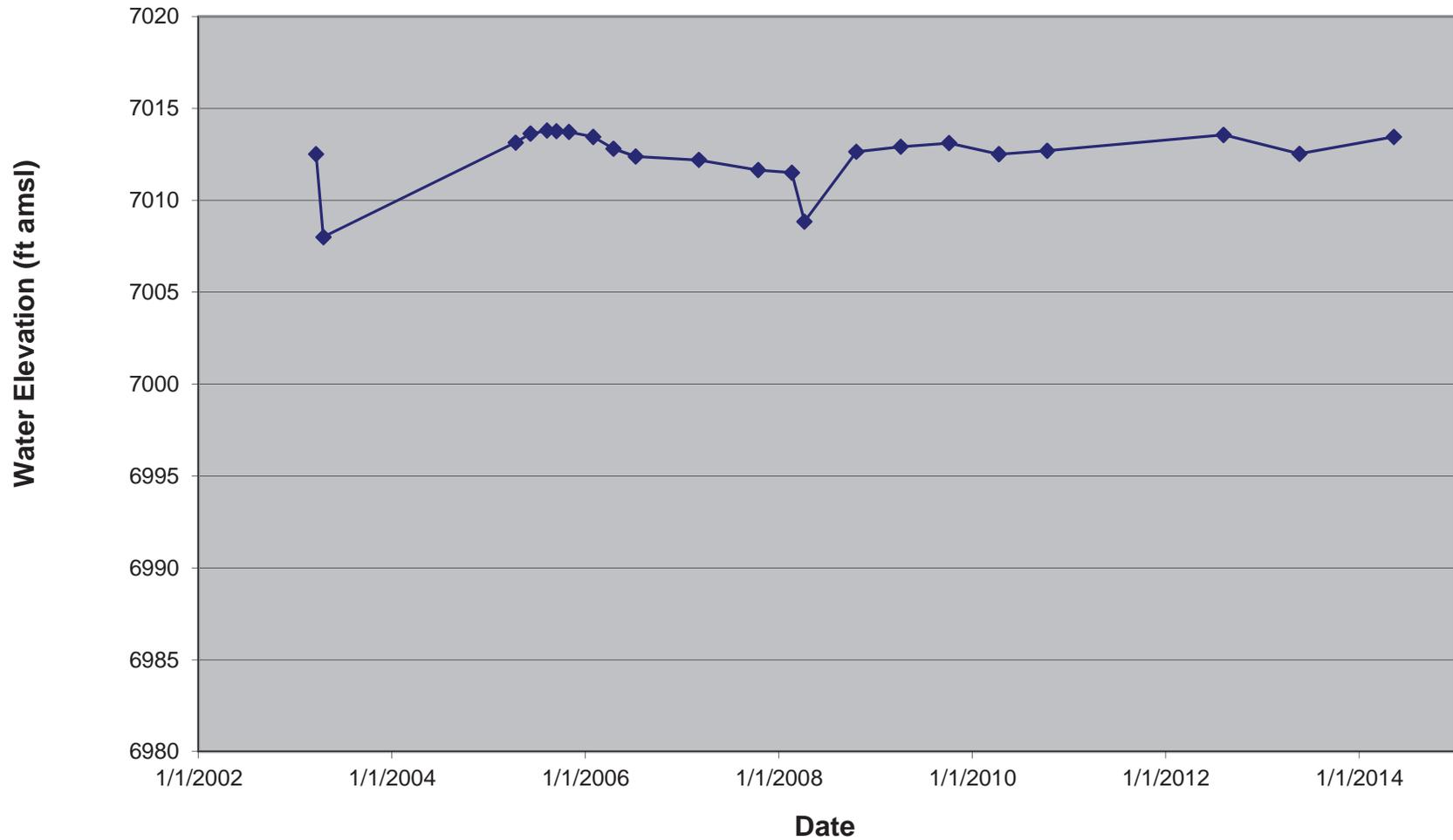
Historical Water Elevation for Monitoring Well 00-01



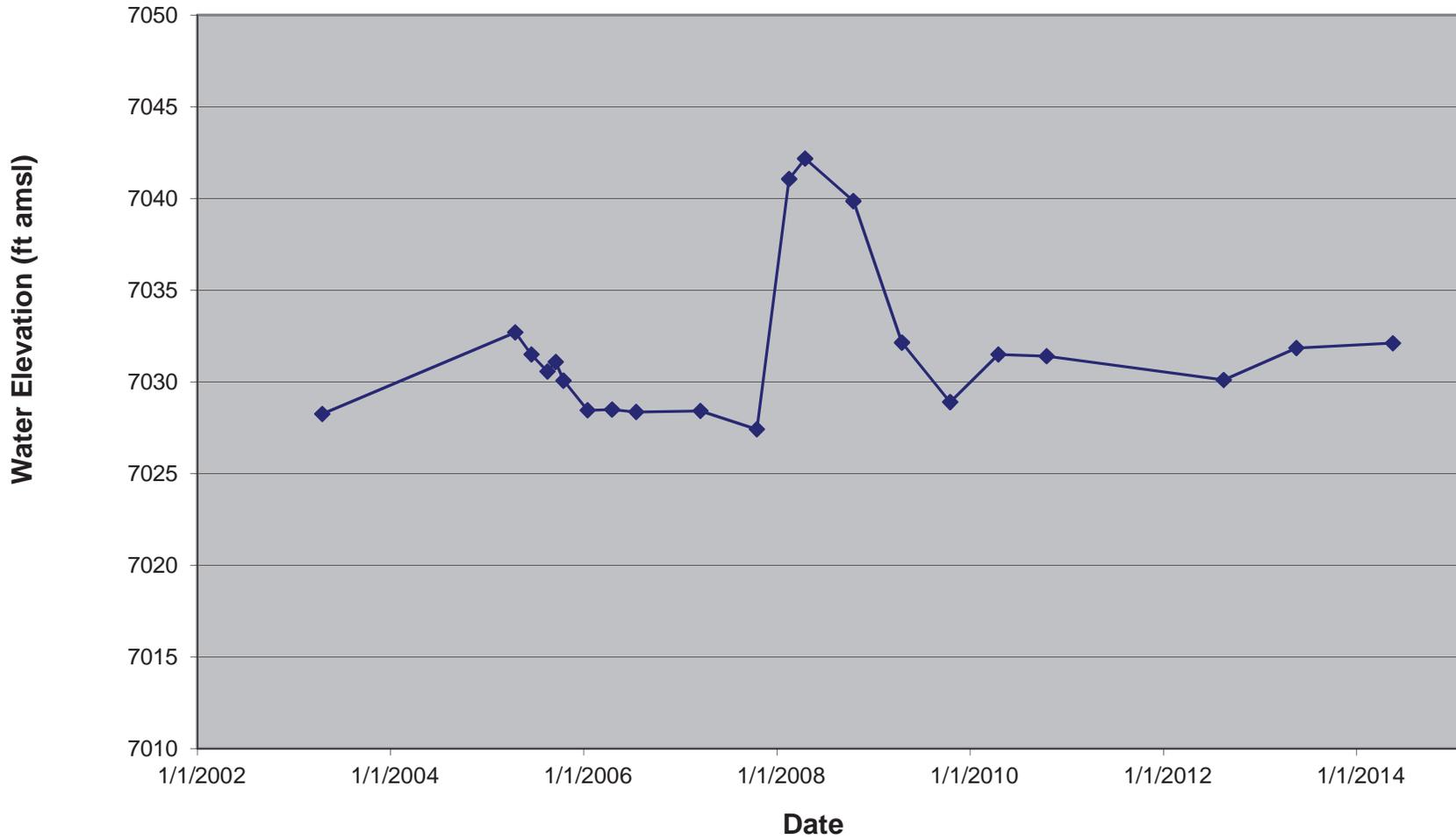
Historical Water Elevation for Monitoring Well 00-02



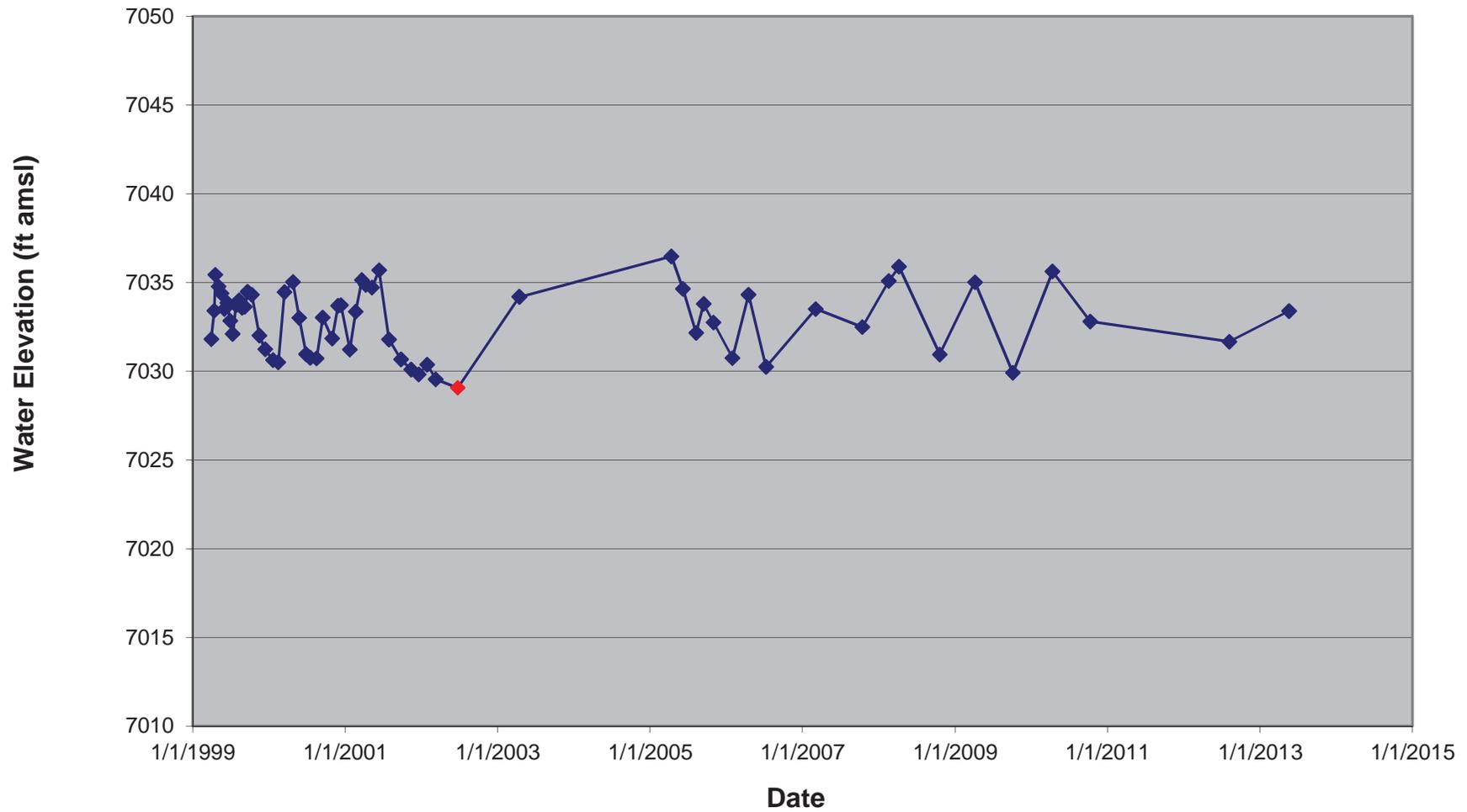
Historical Water Elevation for Monitoring Well MW02-01



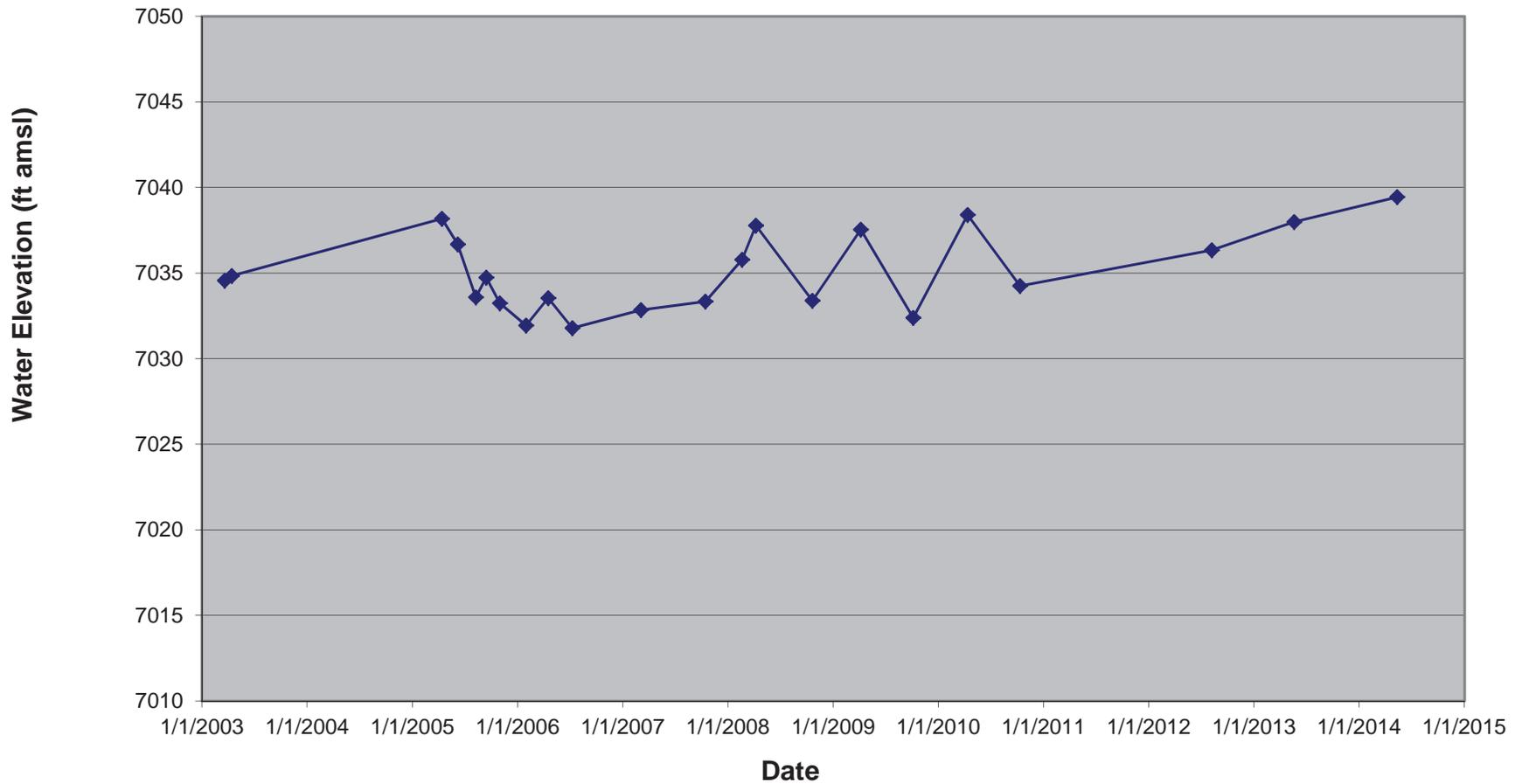
Historical Water Elevation for Monitoring Well MW02-02



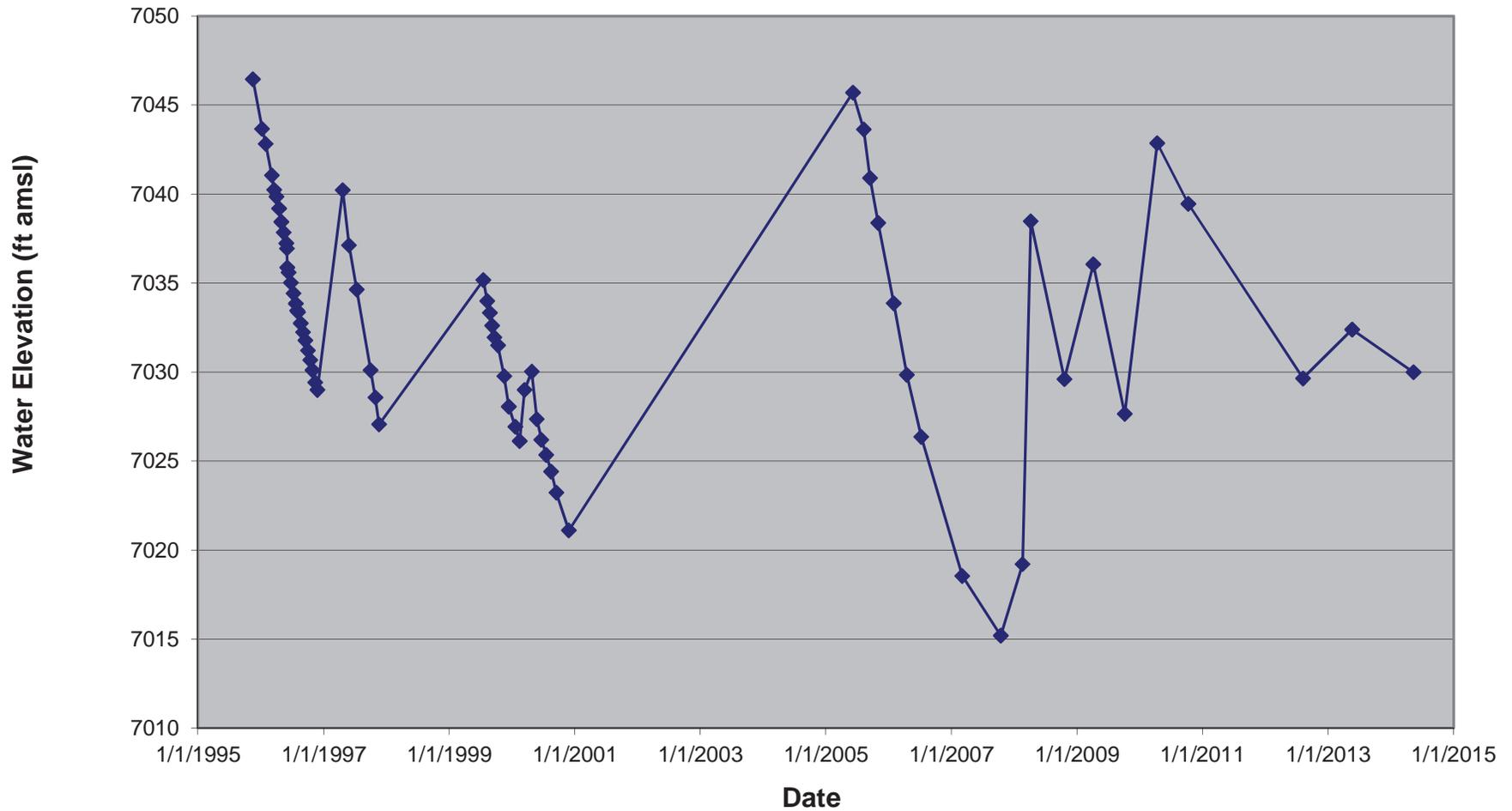
Historical Water Elevation for Monitoring Well 99-01



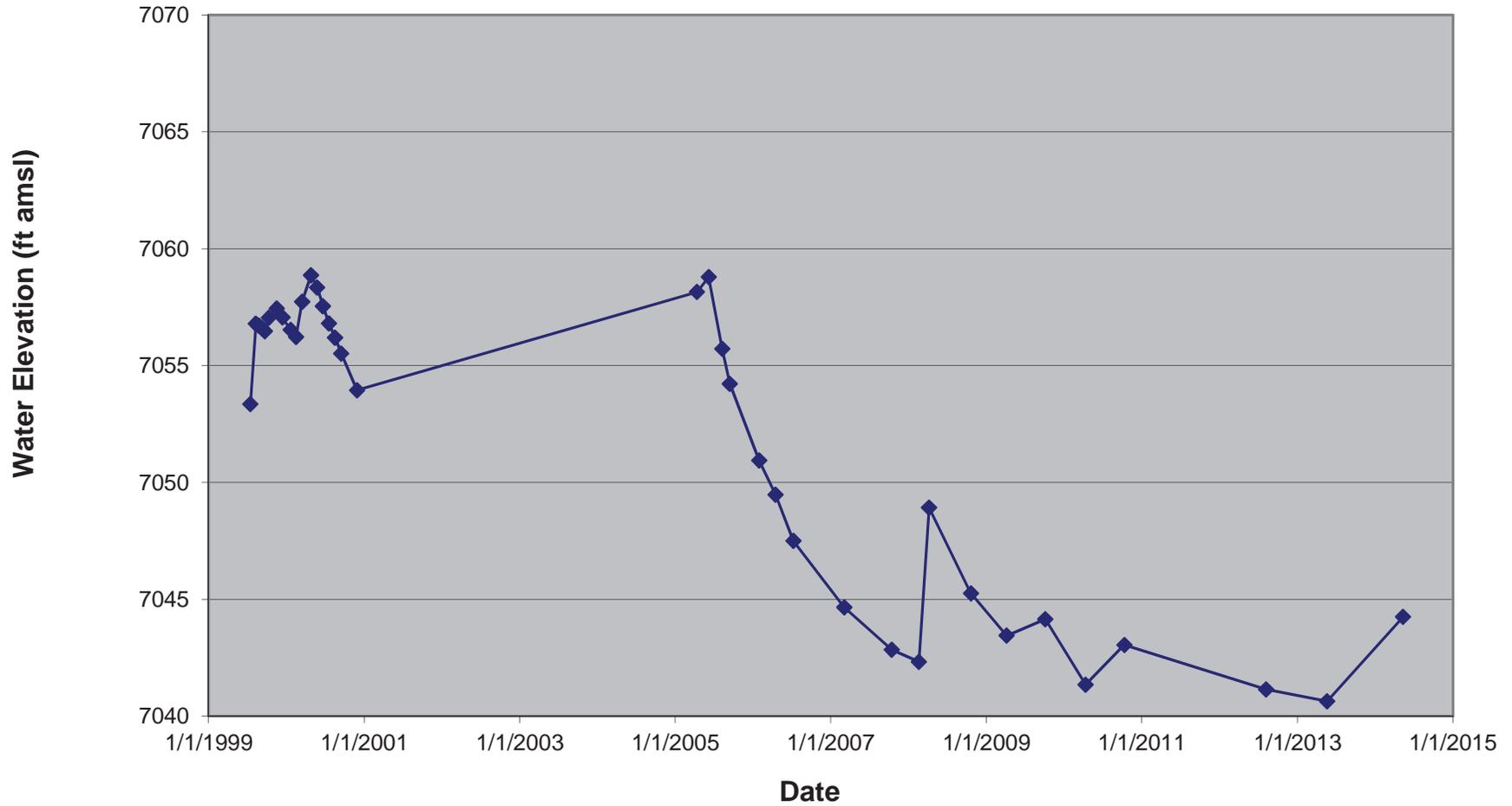
Historical Water Elevation for Monitoring Well MW02-04



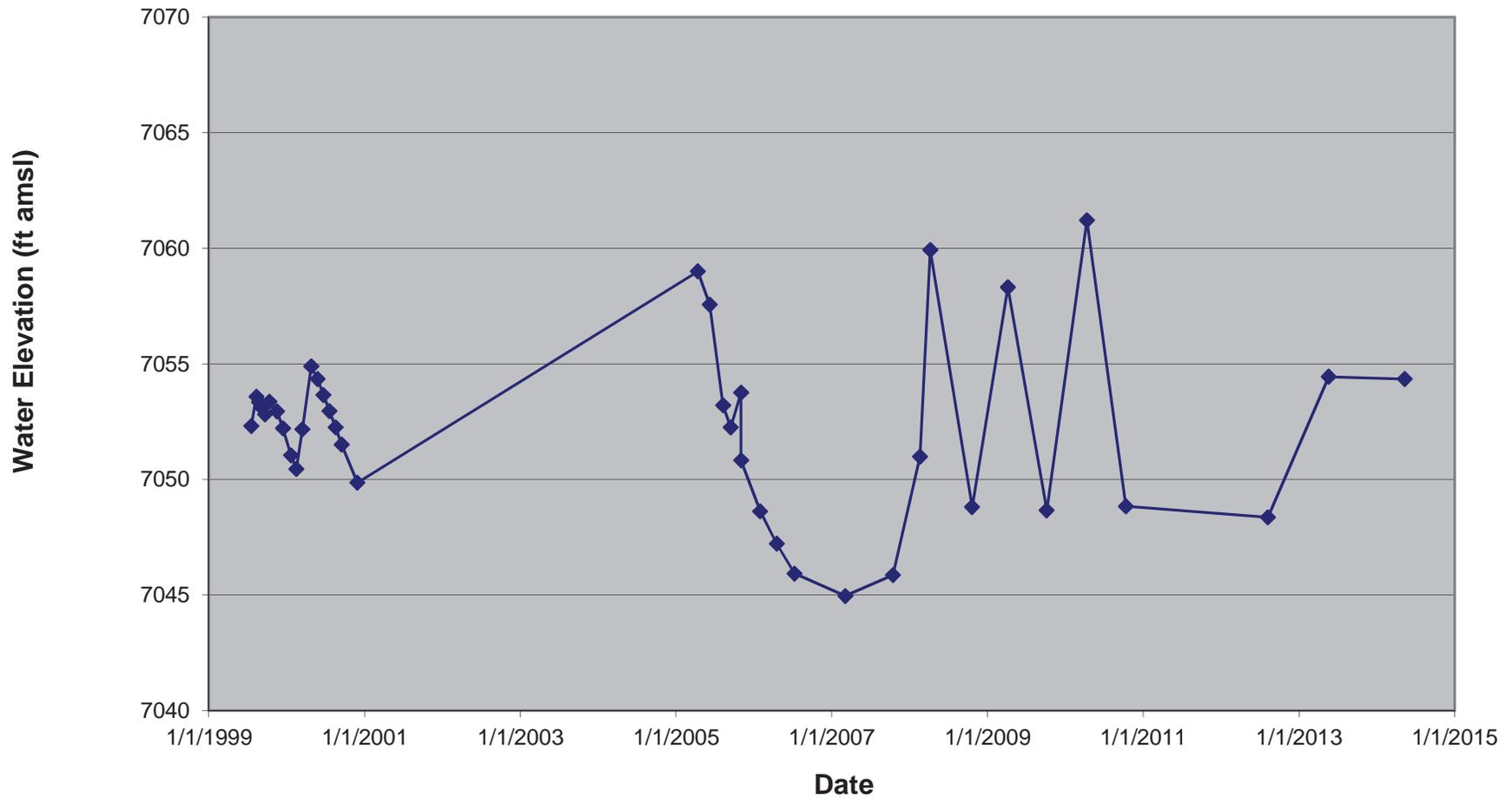
Historical Water Elevation for Monitoring Well FSL-5



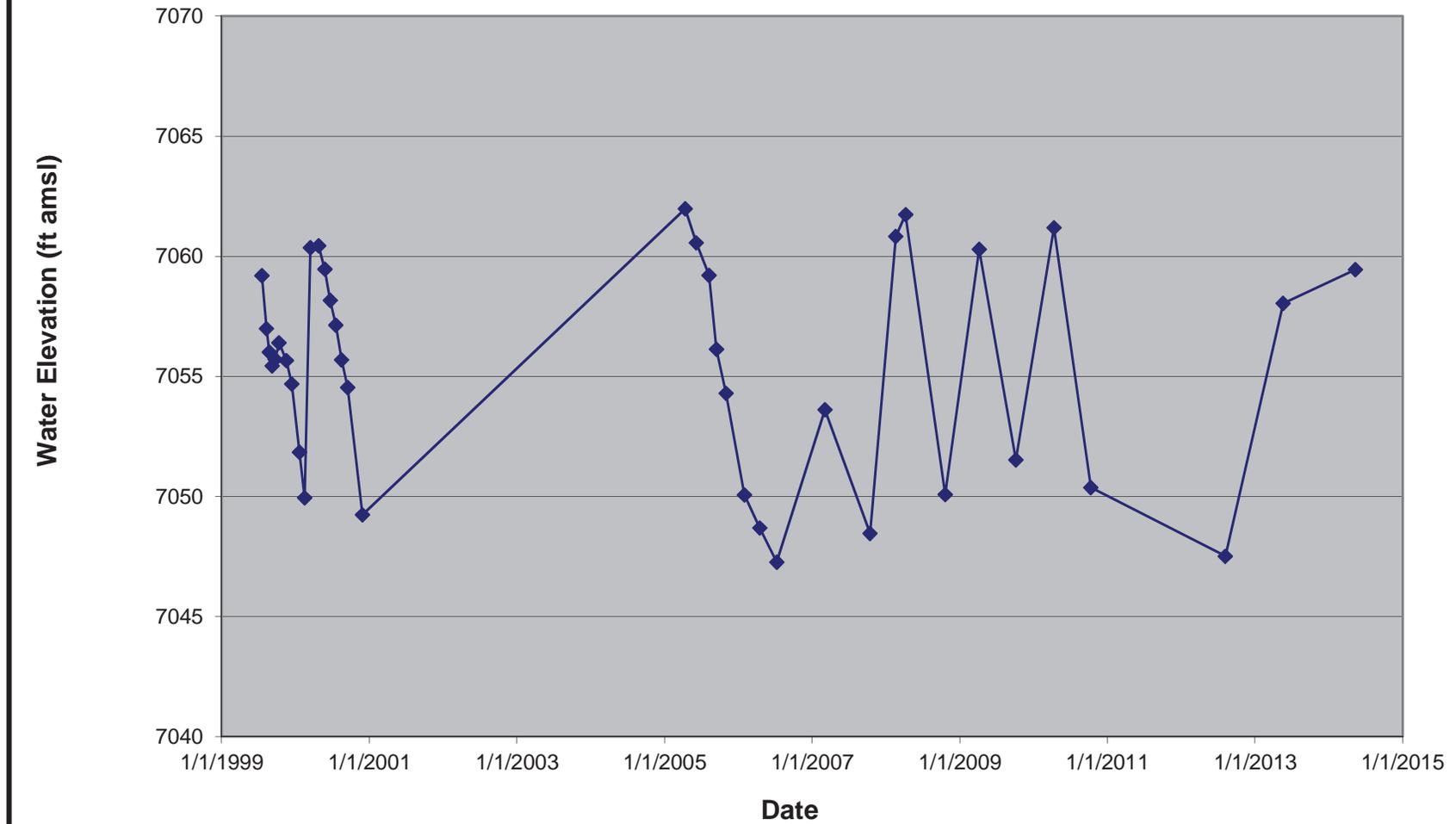
Historical Water Elevation for Monitoring Well PMW-1



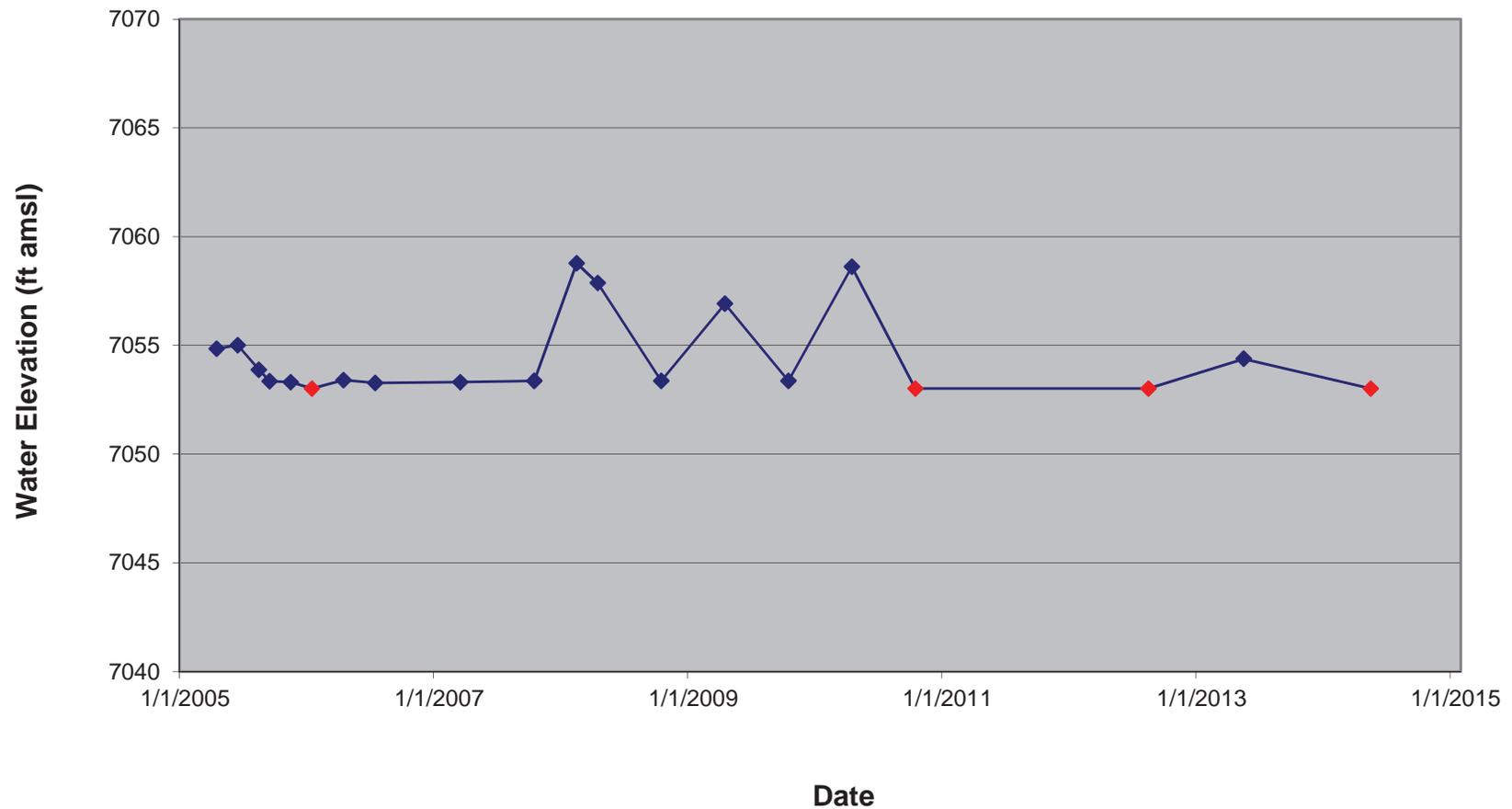
Historical Water Elevation for Monitoring Well PMW-2



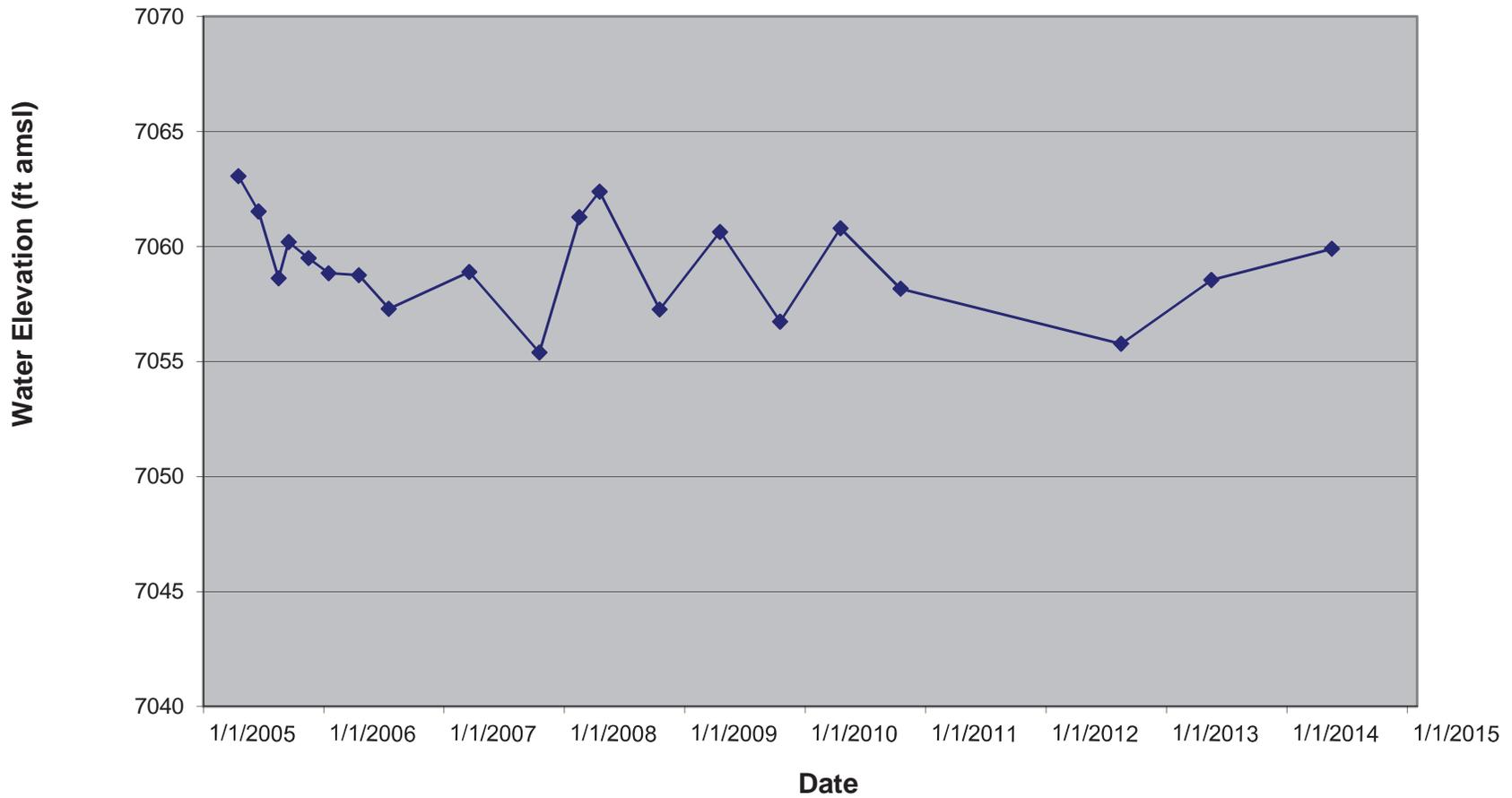
Historical Water Elevation for Monitoring Well PMW-3



Historical Water Elevation for Monitoring Well PMW-4



Historical Water Elevation for Monitoring Well PMW-5



**State of Wisconsin
Department of Natural Resources**

**Mann-Kendall Statistical Test
Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Site Name : Camp Navajo LTM/LTO NAAD 11B (LTM Data)			BRRTS No. =		Well Number = MW 00-01		
Compound ->		RDX					
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)					
1	18-Oct-07	14.00					
2	9-Apr-08	9.60					
3	21-Oct-08	110.00					
4	6-Apr-09	16.00					
5	5-Oct-09	20.00					
6	14-Apr-10	14.00					
7	13-Oct-10	62.00					
8	10-Aug-12	57.00					
9	20-May-13	47.00					
10	14-May-14	33.00					
Mann Kendall Statistic (S) =		12.0	0.0	0.0	0.0	0.0	0.0
Number of Rounds (n) =		10	0	0	0	0	0
Average =		38.26	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Standard Deviation =		31.610	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Coefficient of Variation(CV)=		0.826	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected			n<4	n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		INCREASING	n<4	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		No Trend	n<4	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		NA	n<4	n<4	n<4	n<4	n<4
Data Entry By = MC			Date = 19-Jun-14	Checked By =			

**State of Wisconsin
Department of Natural Resources**

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Site Name : Camp Navajo LTM/LTO NAAD 11B (LTM Data)			BRRTS No. =		Well Number = MW 00-02		
Compound ->		RDX					
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)					
1	18-Oct-07	130.00					
2	9-Apr-08	130.00					
3	21-Oct-08	160.00					
4	6-Apr-09	120.00					
5	6-Oct-09	120.00					
6	12-Apr-10	150.00					
7	13-Oct-10	120.00					
8	7-Aug-12	92.00					
9	20-May-13	130.00					
10	14-May-14	79.00					
Mann Kendall Statistic (S) =		-19.0	0.0	0.0	0.0	0.0	0.0
Number of Rounds (n) =		10	0	0	0	0	0
Average =		123.10	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Standard Deviation =		23.965	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Coefficient of Variation(CV)=		0.195	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected			n<4	n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		DECREASING	n<4	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		DECREASING	n<4	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		NA	n<4	n<4	n<4	n<4	n<4
Data Entry By = MC			Date = 19-Jun-14	Checked By =			

**State of Wisconsin
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Site Name : Camp Navajo LTM/LTO NAAD 11B (LTM Data)			BRRTS No. =		Well Number = 97-05		
Compound ->		RDX	2-a-4,6-DNT	4-a-2,6-DNT			
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)					
1	19-Oct-07	97.00	0.50	8.30			
2	9-Apr-08	160.00	2.90	19.00			
3	22-Oct-08	210.00	4.10	31.00			
4	8-Apr-09	66.00	0.50	2.80			
5	6-Oct-09	150.00	5.10	22.00			
6	12-Apr-10	160.00					
7	14-Oct-10	150.00	1.00	1.00			
8	10-Aug-12	140.00	3.60	17.00			
9	21-May-13	120.00	7.80	13.00			
10	13-May-14	140.00	1.90	16.00			
Mann Kendall Statistic (S) =		-8.0	11.0	-4.0	0.0	0.0	0.0
Number of Rounds (n) =		10	9	9	0	0	0
Average =		139.30	3.04	14.46	#DIV/0!	#DIV/0!	#DIV/0!
Standard Deviation =		38.902	2.417	9.467	#DIV/0!	#DIV/0!	#DIV/0!
Coefficient of Variation(CV)=		0.279	0.794	0.655	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected					n<4	n<4	n<4
Trend ≥ 80% Confidence Level		No Trend	INCREASING	No Trend	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		CV ≤ 1 STABLE	NA	CV ≤ 1 STABLE	n<4	n<4	n<4
Data Entry By = MC			Date = 19-Jun-14	Checked By =			

**State of Wisconsin
Department of Natural Resources**

**Mann-Kendall Statistical Test
Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name : Camp Navajo LTM/LTO NAAD 11B (LTM Data)			BRRTS No. =		Well Number = 97-06		
Compound ->		RDX					
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)					
1	18-Oct-07	1.00					
2	8-Apr-08	0.97					
3	22-Oct-08	0.94					
4	7-Apr-09	1.10					
5	6-Oct-09	1.10					
6	12-Apr-10	0.83					
7	12-Oct-10						
8	9-Aug-12	0.85					
9	21-May-13	1.00					
10	13-May-14	0.85					
Mann Kendall Statistic (S) =		-9.0	0.0	0.0	0.0	0.0	0.0
Number of Rounds (n) =		9	0	0	0	0	0
Average =		0.96	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Standard Deviation =		0.102	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Coefficient of Variation(CV)=		0.107	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected			n<4	n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level			No Trend	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level			No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level			CV ≤ 1 STABLE	n<4	n<4	n<4	n<4
Data Entry By = MC			Date = 19-Jun-14	Checked By =			

**State of Wisconsin
Department of Natural Resources**

**Mann-Kendall Statistical Test
Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name : Camp Navajo LTM/LTO NAAD 11B (LTM Data)			BRRTS No. =		Well Number = 97-08		
Compound ->		RDX					
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)					
1	18-Oct-07	63.00					
2	10-Apr-08	140.00					
3	22-Oct-08	110.00					
4	9-Apr-09	130.00					
5	5-Oct-09	59.00					
6	12-Apr-10	65.00					
7	13-Oct-10	68.00					
8	7-Aug-12	20.00					
9	21-May-13	56.00					
10	14-May-14	18.00					
Mann Kendall Statistic (S) =		-25.0	0.0	0.0	0.0	0.0	0.0
Number of Rounds (n) =		10	0	0	0	0	0
Average =		72.90	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Standard Deviation =		41.653	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Coefficient of Variation(CV)=		0.571	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected			n<4	n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		DECREASING	n<4	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		DECREASING	n<4	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		NA	n<4	n<4	n<4	n<4	n<4
Data Entry By = MC			Date = 19-Jun-14	Checked By =			

APPENDIX H

NAAD 40 GROUNDWATER ANALYSIS

Table 4-6
NAAD 40 Detected Results Summary

MW ID	Sample Number	Sample Date	Method	Analyte	Result	MDL	SL	Units
FSL5	FSL5	10/17/2007	6010B	Barium	3.2J	1	2000	µg/L
FSL5	FSL5	10/17/2007	353.2	Nitrate-Nitrite	0.92	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-2012-A	8/9/2012	6010B	Arsenic	0.47J	0.33	10	µg/L
PMW-1	ND40-WTRPMW-1-2014-A	5/13/2014	6020	Arsenic	0.5 J	0.33	10	µg/L
PMW-1	ND40-WTRPMW-1-4Q05-A	11/3/2005	6010B	Barium	37.8J	6.8	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q06-B	1/31/2006	6010B	Barium	40.7J	6	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q06-A	1/31/2006	6010B	Barium	37.4	6	2000	µg/L
PMW-1	ND40-WTRPMW-1-2Q06-B	4/19/2006	6010B	Barium	25.6J	4.9	2000	µg/L
PMW-1	ND40-WTRPMW-1-2Q06-A	4/19/2006	6010B	Barium	25.9J	4.9	2000	µg/L
PMW-1	ND40-WTRPMW-1-3Q06-A	7/12/2006	6010B	Barium	33J	1	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q07-B	3/7/2007	6010B	Barium	31	1	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q07-A	3/7/2007	6010B	Barium	33	1	2000	µg/L
PMW-1	ND40-WTRPMW-1-4Q07-A	10/16/2007	6010B	Barium	28	1	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q08-A	4/9/2008	6010B	Barium	49	1	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q09-A	4/8/2009	6010B	Barium	36	0.58	2000	µg/L
PMW-1	ND40-WTRPMW-1-1Q10-A	4/13/2010	6010B	Barium	32	0.58	2000	µg/L
PMW-1	ND40-WTRPMW-1-2012-A	8/9/2012	6010B	Barium	52	0.29	2000	µg/L
PMW-1	ND40-WTRPMW-1-2013-A	5/22/2013	6020	Barium	45	0.29	2000	µg/L
PMW-1	ND40-WTRPMW-1-2014-A	5/13/2014	6020	Barium	49	0.29	2000	µg/L
PMW-1	ND40-WTRPMW-1-4Q07-A	10/16/2007	8270C	Bis(2-Ethylhexyl) Phthalate	1.8J	0.56	6	µg/L
PMW-1	ND40-WTRPMW-1-1Q09-A	4/8/2009	8270C	Bis(2-Ethylhexyl) Phthalate	0.59J	0.56	6	µg/L
PMW-1	ND40-WTRPMW-1-3Q06-A	7/12/2006	6010B	Cadmium	0.48J	0.45	5	µg/L
PMW-1	ND40-WTRPMW-1-4Q07-A	10/16/2007	6010B	Cadmium	0.52J	0.45	5	µg/L
PMW-1	ND40-WTRPMW-1-1Q09-A	4/8/2009	6010B	Chromium	1.3J	0.66	100	µg/L
PMW-1	ND40-WTRPMW-1-2012-A	8/9/2012	6010B	Chromium	1.3J	0.5	100	µg/L
PMW-1	ND40-WTRPMW-1-2013-A	5/22/2013	6020	Chromium	1.2 J	0.50	100	µg/L
PMW-1	ND40-WTRPMW-1-2014-A	5/13/2014	6020	Chromium	1.2 J	0.50	100	µg/L
PMW-1	ND40-WTRPMW-1-2012-A	8/9/2012	6010B	Lead	0.31J	0.18	15	µg/L
PMW-1	ND40-WTRPMW-1-1Q06-A	1/31/2006	8260B	1,2-Dichloroethane	1.2J	0.45	5	µg/L
PMW-1	ND40-WTRPMW-1-1Q10-A	4/13/2010	8260B	Acetone	5.9 J	1.9	NA	µg/L
PMW-1	ND40-WTRPMW-1-4Q05-B	11/3/2005	353.2	Nitrate-Nitrite	0.77J	0.0087	10	mg/L
PMW-1	ND40-WTRPMW-1-4Q05-A	11/3/2005	353.2	Nitrate-Nitrite	0.77J	0.0087	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q06-B	1/31/2006	353.2	Nitrate-Nitrite	0.88J	0.0087	10	mg/L

**Table 4-6
NAAD 40 Detected Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result	MDL	SL	Units
PMW-1	ND40-WTRPMW-1-1Q06-A	1/31/2006	353.2	Nitrate-Nitrite	0.88J	0.0087	10	mg/L
PMW-1	ND40-WTRPMW-1-2Q06-B	4/19/2006	353.2	Nitrate-Nitrite	0.7J	0.0036	10	mg/L
PMW-1	ND40-WTRPMW-1-2Q06-A	4/19/2006	353.2	Nitrate-Nitrite	0.71J	0.0036	10	mg/L
PMW-1	ND40-WTRPMW-1-3Q06-A	7/12/2006	353.2	Nitrate-Nitrite	0.65J	0.1	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q07-B	3/7/2007	353.2	Nitrate-Nitrite	0.49	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q07-A	3/7/2007	353.2	Nitrate-Nitrite	0.48	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-4Q07-A	10/16/2007	353.2	Nitrate-Nitrite	0.51	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q08-A	4/9/2008	353.2	Nitrate-Nitrite	0.32	0.02	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q09-A	4/8/2009	353.2	Nitrate-Nitrite	0.62	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q10-A	4/13/2010	353.2	Nitrate-Nitrite	11	0.095	10	mg/L
PMW-1	ND40-WTRPMW-1-2012-A	8/8/2012	353.2	Nitrate-Nitrite	0.99	0.019	10	mg/L
PWM-1	ND40-WTRPMW-1-2013-A	5/22/2013	353.2	Nitrate-Nitrite	1.9	0.10	10	mg/L
PWM-1	ND40-WTRPMW-1-2014-A	5/13/2014	353.2	Nitrate-Nitrite	0.69	0.019	10	mg/L
PMW-1	ND40-WTRPMW-1-1Q09-A	4/8/2009	8270C	Fluorene	0.4J	0.31	NA	µg/L
PMW-2	ND40-WTRPMW-2-2012-A	8/8/2012	6010B	Arsenic	1.4J	0.33	10	µg/L
PMW-2	ND40-WTRPMW-2-2013-A	5/22/2013	6020	Arsenic	0.98 J	0.33	10	µg/L
PMW-2	ND40-WTRPMW-2-2014-A	5/13/2014	6020	Arsenic	1.2 J	0.33	10	µg/L
PMW-2	ND40-WTRPMW-2-2014-B	5/13/2014	6020	Arsenic	1.2 J	0.33	10	µg/L
PMW-2	ND40-WTRPMW-2-2Q06-A	4/19/2006	6010B	Barium	57.2J	4.9	2000	µg/L
PMW-2	ND40-WTRPMW-2-4Q05-A	11/4/2005	6010B	Barium	70.4J	6.8	2000	µg/L
PMW-2	ND40-WTRPMW-2-1Q06-A	1/31/2006	6010B	Barium	69.6	6	2000	µg/L
PMW-2	ND40-WTRPMW-2-3Q06-A	7/12/2006	6010B	Barium	63J	1	2000	µg/L
PMW-2	ND40-WTRPMW-2-1Q07-A	3/7/2007	6010B	Barium	60	1	2000	µg/L
PMW-2	ND40-WTRPMW-2-4Q07-A	10/16/2007	6010B	Barium	80	1	2000	µg/L
PMW-2	ND40-WTRPMW-2-1Q08-A	4/9/2008	6010B	Barium	39	1	2000	µg/L
PMW-2	ND40-WTRPMW-2-1Q09-A	4/8/2009	6010B	Barium	57	0.58	2000	µg/L
PMW-2	ND40-WTRPMW-2-1Q10-A	4/13/2010	6010B	Barium	31	0.58	2000	µg/L
PMW-2	ND40-WTRPMW-2-2012-A	8/8/2012	6010B	Barium	130	0.29	2000	µg/L
PWM-2	ND40-WTRPMW-2-2013-A	5/22/2013	6020	Barium	120 J	0.29	2000	µg/L
PWM-2	ND40-WTRPMW-2-2014-A	5/13/2014	6020	Barium	170	0.29	2000	µg/L
PWM-2	ND40-WTRPMW-2-2014-B	5/13/2014	6020	Barium	160	0.29	2000	µg/L
PMW-2	ND40-WTRPMW-2-2012-A	8/8/2012	6010B	Cadmium	0.11J	0.1	5	µg/L
PMW-2	ND40-WTRPMW-2-2012-A	8/8/2012	6010B	Lead	0.61J	0.18	15	µg/L
PMW-2	ND40-WTRPMW-2-4Q07-A	10/16/2007	8270C	Bis(2-Ethylhexyl) Phthalate	2.1J	0.56	6	µg/L
PMW-2	ND40-WTRPMW-2-1Q09-A	4/8/2009	8270C	Bis(2-Ethylhexyl) Phthalate	0.79J	0.56	6	µg/L
PMW-2	ND40-WTRPMW-2-2012-A	8/8/2012	8270C	Bis(2-Ethylhexyl) Phthalate	0.61J	0.54	6	µg/L
PWM-2	ND40-WTRPMW-2-2014-A	5/13/2014	8270C	4-Methyphenol	3.0 J	0.25	NE	µg/L
PWM-2	ND40-WTRPMW-2-2014-B	5/13/2014	8270C	4-Methyphenol	5.4 J	0.25	NE	µg/L
PMW-2	ND40-WTRPMW-2-4Q05-A	11/4/2005	353.2	Nitrate-Nitrite	0.057	0.0087	10	mg/L
PMW-2	ND40-WTRPMW-2-1Q06-A	1/31/2006	353.2	Nitrate-Nitrite	0.065J	0.0087	10	mg/L
PMW-2	ND40-WTRPMW-2-2Q06-A	4/19/2006	353.2	Nitrate-Nitrite	0.11J	0.0036	10	mg/L
PMW-2	ND40-WTRPMW-2-3Q06-A	7/12/2006	353.2	Nitrate-Nitrite	0.21J	0.019	10	mg/L
PMW-2	ND40-WTRPMW-2-1Q07-A	3/7/2007	353.2	Nitrate-Nitrite	0.27	0.019	10	mg/L
PMW-2	ND40-WTRPMW-2-4Q07-A	10/16/2007	353.2	Nitrate-Nitrite	0.24	0.019	10	mg/L
PMW-2	ND40-WTRPMW-2-2013-A	5/22/2013	353.2	Nitrate-Nitrite	0.052 J	0.019	10	mg/L

**Table 4-6
NAAD 40 Detected Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result	MDL	SL	Units
PMW-2	ND40-WTRPMW-2-1Q09-A	4/8/2009	8270C	Fluorene	0.35J	0.31	NA	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	6010B	Arsenic	0.4J	0.33	10	µg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	6010B	Arsenic	0.39J	0.33	10	µg/L
PMW-3	ND40-WTRPMW-3-2014-A	5/13/2014	6020	Arsenic	0.33 J	0.33	10	µg/L
PMW-3	ND40-WTRPMW-3-2Q06-A	4/19/2006	6010B	Barium	146J	4.9	2000	µg/L
PMW-3	ND40-WTRPMW-3-3Q06-A	7/12/2006	6010B	Barium	160J	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q07-A	3/7/2007	6010B	Barium	130	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-4Q07-B	10/16/2007	6010B	Barium	160	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-4Q07-A	10/16/2007	6010B	Barium	160	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q08-A	4/9/2008	6010B	Barium	43	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q08-B	4/9/2008	6010B	Barium	43	1	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q09-B	4/8/2009	6010B	Barium	58	0.58	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q10-A	4/13/2010	6010B	Barium	37	0.58	2000	µg/L
PMW-3	ND40-WTRPMW-3-1Q10-B	4/13/2010	6010B	Barium	36	0.58	2000	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	6010B	Barium	150	0.29	2000	µg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	6010B	Barium	140	0.29	2000	µg/L
PMW-3	ND40-WTRPMW-3-2013-A	5/22/2013	6020	Barium	74	0.29	2000	µg/L
PMW-3	ND40-WTRPMW-3-2013-B	5/22/2013	6020	Barium	74	0.29	2000	µg/L
PMW-3	ND40-WTRPMW-3-2014-A	5/13/2014	6020	Barium	67	0.29	2000	µg/L
PMW-3	ND40-WTRPMW-3-4Q07-A	10/16/2007	6010B	Cadmium	0.59J	0.45	5	µg/L
PMW-3	ND40-WTRPMW-3-1Q09-A	4/8/2009	6010B	Chromium	0.68J	0.66	100	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	6010B	Chromium	0.72	0.5	100	µg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	6010B	Chromium	0.6	0.5	100	µg/L
PMW-3	ND40-WTRPMW-3-2013-A	5/22/2013	6020	Chromium	0.60 J	0.50	100	µg/L
PMW-3	ND40-WTRPMW-3-2014-A	5/13/2014	6020	Chromium	0.72 J	0.50	100	µg/L
PMW-3	ND40-WTRPMW-3-1Q10-A	8/8/2012	6010B	Lead	0.77	0.18	15	µg/L
PMW-3	ND40-WTRPMW-3-1Q10-B	8/8/2012	6010B	Lead	0.76	0.18	15	µg/L
PMW-3	ND40-WTRPMW-3-4Q07-A	8/8/2012	8270C	Acenaphthene	0.41J	0.27	400	µg/L
PMW-3	ND40-WTRPMW-3-2013-B	5/22/2013	8270C	Benzyl Alcohol	0.22 UJ	0.22	NE	µg/L
PMW-3	ND40-WTRPMW-3-4Q07-A	10/16/2007	8270C	Bis(2-Ethylhexyl) Phthalate	1.8J	0.56	6	µg/L
PMW-3	ND40-WTRPMW-3-1Q09-A	4/8/2009	8270C	Bis(2-Ethylhexyl) Phthalate	0.62J	0.56	6	µg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	8270C	Bis(2-Ethylhexyl) Phthalate	0.75J	0.53	6	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	8270C	2-Chloro-naphthalene	1.7J	0.25	550	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	8270C	2-Methyl-naphthalene	3.8J	0.28	270	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	8270C	1,2,4-Trichloro-benzene	4.3J	0.27	70	µg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	8270C	Naphthalene	4.5J	0.28	1.4	µg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	8270C	Di-n-octyl phthalate	2.2J	0.33	NE	µg/L
PMW-3	ND40-WTRPMW-3-4Q05-A	11/4/2005	353.2	Nitrate-Nitrite	0.69J	0.0087	10	mg/L
PMW-3	ND40-WTRPMW-3-1Q06-A	1/31/2006	353.2	Nitrate-Nitrite	0.73J	0.0087	10	mg/L
PMW-3	ND40-WTRPMW-3-2Q06-A	4/19/2006	353.2	Nitrate-Nitrite	0.7J	0.0036	10	mg/L
PMW-3	ND40-WTRPMW-3-3Q06-A	7/12/2006	353.2	Nitrate-Nitrite	0.79J	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-1Q07-A	3/7/2007	353.2	Nitrate-Nitrite	0.56	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-4Q07-B	10/16/2007	353.2	Nitrate-Nitrite	0.9	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-4Q07-A	10/16/2007	353.2	Nitrate-Nitrite	0.98	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-1Q08-A	4/9/2008	353.2	Nitrate-Nitrite	0.092 J	0.02	10	mg/L

**Table 4-6
NAAD 40 Detected Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result	MDL	SL	Units
PMW-3	ND40-WTRPMW-3-1Q08-B	4/9/2008	353.2	Nitrate-Nitrite	0.1	0.02	10	mg/L
PMW-3	ND40-WTRPMW-3-1Q09-A	4/8/2009	353.2	Nitrate-Nitrite	0.11	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-1Q09-B	4/8/2009	353.2	Nitrate-Nitrite	0.11	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-2012-A	8/8/2012	353.2	Nitrate-Nitrite	1.1	0.019	10	mg/L
PMW-3	ND40-WTRPMW-3-2012-B	8/8/2012	353.2	Nitrate-Nitrite	1.1	0.019	10	mg/L
PMW-4	ND40-WTRPMW-4-1Q08-A	4/10/2008	6010B	Barium	52	1	2000	µg/L
PMW-4	ND40-WTRPMW-4-1Q09-A	4/8/2009	6010B	Barium	75	0.58	2000	µg/L
PMW-4	ND40-WTRPMW-4-1Q10-A	4/13/2010	6010B	Barium	66	0.58	2000	µg/L
PMW-4	ND40-WTRPMW-4-1Q08-A	4/10/2008	8260B	Carbon Disulfide	2.7	0.45	NA	µg/L
PMW-4	ND40-WTRPMW-4-1Q09-A	4/8/2009	6010B	Chromium	0.66J	0.66	2000	µg/L
PMW-4	ND40-WTRPMW-4-1Q10-A	4/13/2010	6010B	Chromium	0.66 J	0.66	100	µg/L
PMW-4	ND40-WTRPMW-4-1Q08-A	4/10/2008	353.2	Nitrate-Nitrite	0.41	0.02	10	mg/L
PMW-4	ND40-WTRPMW-4-1Q09-A	4/8/2009	353.2	Nitrate-Nitrite	0.3	0.019	10	mg/L
PMW-4	ND40-WTRPMW-4-1Q10-A	4/13/2010	353.2	Nitrate-Nitrite	0.38	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-4Q05-A	11/3/2005	6010B	Barium	111J	6.8	2000	µg/L
PMW-5	ND40-WTRPMW-5-1Q06-A	1/31/2006	6010B	Barium	122	6	2000	µg/L
PMW-5	ND40-WTRPMW-5-2Q06-A	4/19/2006	6010B	Barium	93.9J	4.9	2000	µg/L
PMW-5	ND40-WTRPMW-3-3Q06-B	7/12/2006	6010B	Barium	170J	1	2000	µg/L
PMW-5	ND40-WTRPMW-5-3Q06-A	7/12/2006	6010B	Barium	130J	1	2000	µg/L
PMW-5	ND40-WTRPMW-5-1Q07-A	3/7/2007	6010B	Barium	110	1	2000	µg/L
PMW-5	ND40-WTRPMW-5-1Q08-A	4/9/2008	6010B	Barium	72	1	2000	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	6010B	Barium	85	0.58	2000	µg/L
PMW-5	ND40-WTRPMW-5-1Q10-A	4/13/2010	6010B	Barium	93	0.58	2000	µg/L
PMW-5	ND40-WTRPMW-5-2012-A	8/8/2012	6010B	Barium	100	0.29	2000	µg/L
PMW-5	ND40-WTRPMW-5-2013-A	5/22/2013	6020	Barium	83	0.29	2000	µg/L
PMW-5	ND40-WTRPMW-5-2014-A	5/13/2014	6020	Barium	77	0.29	2000	µg/L
PMW-5	ND40-WTRPMW-5-2Q06-A	4/19/2006	6010B	Beryllium	0.21J	0.2	4	µg/L
PMW-5	ND40-WTRPMW-5-2013-A	5/22/2013	8270c	Benzyl Alcohol	0.28 UJ	0.22	NE	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	8270C	Bis(2-Ethylhexyl) Phthalate	0.72J	0.56	6	µg/L
PMW-5	ND40-WTRPMW-5-2012-A	8/8/2012	8270C	Bis(2-Ethylhexyl) Phthalate	0.82J	0.54	6	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	6010B	Chromium	1.6J	0.66	100	µg/L
PMW-5	ND40-WTRPMW-5-1Q10-A	4/13/2010	6010B	Chromium	0.81 J	0.66	100	µg/L
PMW-5	ND40-WTRPMW-5-2012-A	8/8/2012	6010B	Chromium	0.72 J	0.5	100	µg/L
PMW-5	ND40-WTRPMW-5-2014-A	5/13/2014	6020	Chromium	0.5 J	0.50	100	µg/L
PMW-5	ND40-WTRPMW-5-2Q06-A	4/19/2006	6010B	Lead	2.5J	2.4	50	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	8270C	Naphthalene	0.33J	0.29	NA	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	8270C	Phenol	130	2	NA	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	8270C	2,4-Dimethylphenol	1J	0.58	NA	µg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	8270C	4-Methylphenol	11J	0.025	NA	µg/L
PMW-5	ND40-WTRPMW-5-4Q05-A	11/3/2005	353.2	Nitrate-Nitrite	4.1J	0.087	10	mg/L
PMW-5	ND40-WTRPMW-5-1Q06-A	1/31/2006	353.2	Nitrate-Nitrite	6.2J	0.087	10	mg/L
PMW-5	ND40-WTRPMW-5-2Q06-A	4/19/2006	353.2	Nitrate-Nitrite	4.2J	0.036	10	mg/L
PMW-5	ND40-WTRPMW-3-3Q06-B	7/12/2006	353.2	Nitrate-Nitrite	0.85J	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-3Q06-A	7/12/2006	353.2	Nitrate-Nitrite	5.9J	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-1Q07-A	3/7/2007	353.2	Nitrate-Nitrite	3.2	0.019	10	mg/L

**Table 4-6
NAAD 40 Detected Results Summary**

MW ID	Sample Number	Sample Date	Method	Analyte	Result	MDL	SL	Units
PMW-5	ND40-WTRPMW-5-1Q10-A	4/13/2010	353.2	Nitrate-Nitrite	4.2	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-1Q08-A	4/9/2008	353.2	Nitrate-Nitrite	3	0.02	10	mg/L
PMW-5	ND40-WTRPMW-5-1Q09-A	4/8/2009	353.2	Nitrate-Nitrite	3.4	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-2012-A	8/8/2012	353.2	Nitrate-Nitrite	3	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-2013-A	5/22/2013	353.2	Nitrate-Nitrite	2.4	0.019	10	mg/L
PMW-5	ND40-WTRPMW-5-2014-A	5/13/2014	353.2	Nitrate Nitrite as N	3.3	0.019	10	mg/L

Highlighted results are greater than the SL

J – estimated value

MDL – method detection limit

mg/L – milligram per Liter

MW – monitoring well

NA – not applicable

SL – screening level

µg/L – micrograms per Liter

APPENDIX I

NAAD 01 AND NAAD 20 DECISION DOCUMENT PART 1 DECLARATION

Final

MRWA 01 and MRWA 20 MEC Decision Document Camp Navajo

Prepared for
**National Guard Bureau
Environmental Programs Division
Cleanup Branch
Camp Navajo
Bellemont, Arizona**

December 2009



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Acronyms and Abbreviations

ADEQ	Arizona Department of Environmental Quality
AP	anti-personnel
AREE	Area Requiring Environmental Evaluation
Army	Department of the Army
AZ ARNG	Arizona Army National Guard
B&C	Brown and Caldwell
bgs	below ground surface
CEHNC	U.S. Army Corps of Engineers Huntsville Engineering and Support Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DoD	Department of Defense
EBASCO	EBASCO Environmental
EE/CA	engineering evaluation/cost analysis
EOD	Explosive Ordnance Disposal
ESQD	Explosive Safety Quantity Distance
ESS	Explosive Safety Submission
HA	Hazard Assessment
HE	high explosive
ICRMP	Integrated Cultural Resource Management Plan
INRMP	Integrated Natural Resource Management Plan
IRP	Installation Restoration Program
LUC	land use control
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
MGFD	munition with the greatest fragmentation distance
mm	Millimeter
MRA	Munitions Response Area

MRS	Munitions Response Site
MRWA	Munitions Response Work Area
NA	not applicable
NAAD	Navajo Army Depot
NADA	Navajo Depot Activity
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No Department of Defense Action Indicated
NEW	Net Explosive Weight
NGB	National Guard Bureau
NGB-ARE	National Guard Bureau, Environmental Programs Division
NGB-ART	National Guard Bureau, Training Division
NPL	National Priorities List
NRHP	National Register of Historic Places
O&M	operations and maintenance
OB/OD	Open Burn/Open Detonation
ODP	open detonation pit
OMARNG	Operations and Maintenance, Army National Guard
ORNL	Oak Ridge National Laboratory
PSA	Primary Source Area
RAO	response action objective
RCRA	Resource Conservation Recovery Act
RRD	range-related debris
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedures
USACE	U.S. Army Corps of Engineers
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
WP	white phosphorus

MRWA 01 and MRWA 20 MEC Decision Document

PART 1

Declaration

This Declaration provides an abstract of the Decision Document (DD) for Munitions and Explosives of Concern (MEC) at Munitions Response Work Area (MRWA) 01 and MRWA 20, and includes the site names and locations, the statement of basis and purpose, an assessment of the site, a description of the selected remedies, the statutory determinations, and the authorizing signatures. Supporting information is provided in the Decision Summaries in Part 2, the Responsiveness Summary in Part 3, and the Works Cited in Part 4. Figures are located at the end of the document.

Site Names and Locations

Camp Navajo is a federally-owned, state operated, Arizona Army National Guard (AZ ARNG) installation. Camp Navajo is situated on 28,347 acres of forest and prairie lands located approximately 10 miles west of Flagstaff, Arizona, south of Interstate 40 at Exit 185 in Bellemont, Coconino County, Arizona (Figure 1-1). Camp Navajo overlaps Townships 20, 21, and 22 North, and Ranges 4, 5, and 6 East of Gila and Salt River Baseline and Meridian. The average elevation of Camp Navajo is approximately 7,100 feet above mean sea level datum.

Camp Navajo is subdivided into multiple areas with operations relating to storage, training, and administration, as follows:

- Administration Area
- Warehouse Area
- Limited Area
- Open Burn/Open Detonation (OB/OD) Area
- Buffer Areas

The Limited Area is a large, secured area of Camp Navajo specifically designated and set aside from other sectors of the installation for the primary purpose of processing, storing, and handling explosives and munitions. The former OB/OD Area, also known as the Demolition Area, is located in the southern portion of Camp Navajo (Figure 1-2). The buffer areas provide an explosive safety arc for the storage facilities as well as a natural setting for military training. Portions of the Railroad Tank Buffer Area and Metz Tank Buffer Area also provided explosive safety arcs for the former OB/OD operations. The two sites considered

in this DD are located in the Camp Navajo former OB/OD Area, within the Camp Navajo installation boundary (Figure 1-2).

MRWA 01 – Old EOD Demolition Area

MRWA 01 includes the Old Explosive Ordnance Disposal [EOD] Demolition Area and adjoining land area. The Old EOD Demolition Area footprint has also been referred to as Navajo Depot Activity (NADA) 05, Area Requiring Environmental Evaluation (AREE) 01, and Navajo Army Depot (NAAD) 01. MRWA 01 is characterized as an approximate 640-acre, circular parcel of land located in the south-central portion of Camp Navajo, located east of MRWA 02, the Open Detonation Area (Figure 1-2). The MRWA 01 boundary coincides with the distance associated with the munition with the greatest fragmentation distance (MGFD) known to have been tested or disposed, which was a 155-millimeter (mm) projectile (U.S. Army Toxic and Hazardous Materials Agency [USATHAMA], 1979). MRWA 01 is located entirely within the Camp Navajo boundary.

The central, rectangular-shaped 27-acre open prairie of MRWA 01 is the former operational footprint of the Old EOD Demolition Area, and is referred to as MRWA 01-01. The surrounding 614 acres of forested hills extending from the boundary of MRWA 01-01 out to the distance associated with the MGFD boundary is referred to as MRWA 01-02 (Figure 1-3).

MRWA 01-01 is accessed through a locked gate in the Limited Area fence (Camp Navajo Gate 13A). The southern portion of MRWA 01-02 can be accessed from the Limited Area via Camp Navajo Gate 14 or from the buffer area via road from the south. MRWA 01-01 and the southern portion of MRWA 01-02 are open to the buffer area. The northern portion of MRWA 01-02 can be accessed using one or more Limited Area primary and secondary roads.

A portion of MRWA 01 lies within the Explosive Safety Quantity Distance (ESQD) Arc established by Camp Navajo for the items stored in nearby storage magazines (Figure 1-3). The ESQD is the prescribed minimum distance between sites storing or handling hazard explosive material and specified exposures (i.e., inhabited buildings, public roads, public railways, other storage or handling facilities, etc.) to afford an acceptable degree of protection and safety to the specified exposure. The size of the ESQD arc is proportional to the Net Explosive Weight (NEW) present in the magazines.

MRWA 20 – Pyrotechnic Range

MRWA 20 has also been referred to as the Pyrotechnic Range and AREE 20, and is located along the southeastern Camp Navajo boundary, in the Metz Tank Buffer Area (Figure 1-2). MRWA 20 encompasses the approximate 40 acres of land within the former operational footprint of the Pyrotechnic Range and an additional 1-acre, arc-shaped parcel of land along the northern boundary (Figure 1-4).

MRWA 20 consists of a large, open, rectangular prairie surrounded on three sides by forested hillsides. The prairie is approximately 3,000 feet long and 600 feet wide. A locked gate (Camp Navajo Gate 15) accessed at the Limited Area Perimeter Road provides access to the site. A gravel road along the northern side of MRWA 20 connects to a road along the installation boundary fence on the southern side. A secondary unimproved road parallels

the southeast boundary. MRWA 20 is open to the buffer areas on the northern, eastern and western boundaries.

Statement of Basis and Purpose

This DD presents the selected response actions for MRWA 01 and MRWA 20, chosen in accordance with applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Camp Navajo is a Department of the Army (Army)-owned military installation and is not on the National Priorities List (NPL). The National Guard Bureau (NGB) is the Federal lead agency, and conducts the Installation Restoration Program (IRP) in accordance with CERCLA and the NCP. This DD has been prepared consistent with *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (U.S. Environmental Protection Agency [USEPA], 1999) and *Army Defense Environmental Restoration Program Management Guidance for Active Installations* (Army, 2004).

In accordance with CERCLA and the NCP, this DD describes the basis for the selected response action. The NGB, as the federal lead agency, makes this decision. The Arizona Department of Environmental Quality (ADEQ), as the state regulatory agency, concurs with this decision. This decision is based on information contained in the Administrative Record file.

Assessment of Site

MEC is suspected or has the potential to remain in the soil at MRWA 01 and MRWA 20. The response actions selected in this DD are necessary to protect the public from the explosive hazards of MEC.

Description of Selected Response Actions

The closure strategy for the OB/OD Area was first described in *Program Closure Strategy for the Open Burn/Open Detonation Closure Project, Camp Navajo* (NGB, 2004a), and further refined in subsequent meetings and correspondence with the ADEQ (ADEQ, 2004a; NGB, 2004b). The primary components of the OB/OD Area closure strategy are as follows:

- Use the CERCLA risk-based cleanup process to investigate, remediate, and close all of the OB/OD Area sites;
- Separately address chemical contamination and MEC contamination; and
- Focus and condition closure of the Resource Conservation and Recovery Act (RCRA) Interim Status on sites that were actually operated under Interim Status.

This DD addresses MEC and Munitions Constituents (MC) contained in remaining MEC at MRWA 01 and MRWA 20. Site-related chemical constituents within soil, sediment, surface water, and ground water at these sites are being addressed as separate operable units and

will be addressed by separate DDs. MRWA 01 and MRWA 20 were not operated under RCRA Interim Status.

In accordance with the CERCLA process, Engineering Evaluation/Cost Analyses (EE/CAs) were developed for MRWA 01 and MRWA 20 (CH2M HILL, 2009b; 2009a). The purpose of the EE/CAs was to develop and evaluate response action alternatives to address MEC and MC contained in remaining MEC at MRWA 01 and MRWA 20.

Response action objectives (RAOs) were addressed for each response action alternative to support the overall Camp Navajo objective of military use. The selected response actions for MEC at MRWA 01 and MRWA 20 consist of the implementation of land use controls along with the continuation of existing Camp Navajo/AZ ARNG actions and programs implemented in conformance with Army and DoD regulations required for range management and explosive safety and are described in detail in Part 2 of this DD.

These actions and programs include:

- Standards and procedures for the safe use and management of ranges in accordance with Army Range Safety regulation (Pamphlet 385-63) (Army, 2003).
- Maintenance and inspections of the Camp Navajo fences and posted signs. The installation fence surrounds the installation, delineates Camp Navajo property and encloses all of MRWA 01 and MRWA 20. The installation boundary fence also serves as the physical barrier to MRWA 01 and MRWA 20 from the east and south. The Limited Area perimeter fence encloses the Limited Area and prevents personnel who use the Camp Navajo buffer areas from entering the Limited Area. Specific authorization is required for access to the Limited Area given the nature of storage operations. However, this access authorization does not extend to the area outside of the Limited Area fence, to the buffer zones. MRWA 01-01, the southern portion of MRWA 01-02 and MRWA 20 are located outside of the Limited Area, in the buffer areas, and can be accessed by authorized personnel, using Gate 13A, Gate 14 and Gate 15, located along the Limited Area Perimeter Fence. A portion of MRWA 20 lies along the installation southeastern boundary.
- Documentation regarding site information, perimeter boundaries and any pertinent features at MRWA 01 and MRWA 20 in the Camp Navajo Real Property Master Plan. A copy of the updated Master Plan information relevant to MRWA 01 and MRWA 20 will be provided to ADEQ. The Camp Navajo Integrated Natural Resource Management Plan and Integrated Cultural Resource Management Plan will also be updated as needed.
- Implementation and enforcement of access restrictions by the Garrison Commander and Camp Navajo Security. Camp Navajo Security patrols monitor and have jurisdiction over MRWA 01 and MRWA 20. Additional information regarding implementation and enforcement of access restrictions by the Garrison Commander will be presented in a Land Use Control Implementation Plan. The Draft Implementation Plan will be submitted to ADEQ for approval.
- Distribution of site-specific MEC awareness training materials based on the most recent conditions of MRWA 01 and MRWA 20. These materials include pamphlets warning site

workers and incoming troops of the dangers associated with MEC, along with wallet cards with maps showing “no-go” areas. In addition, recreational users will be provided MEC awareness training and materials along with maps showing no-go areas.

- Development and submittal of an Explosives Safety Submission to the U.S. Army Technical Center for Explosives Safety on behalf of the Department of Defense Explosives Safety Board (DDESB) to document site conditions and identify management review requirements for residual risk at MRWA 01 and MRWA 20.

With the exception of signs placed around the perimeter of MRWA 01-01 to alert users of the increased hazard associated with subsurface MEC, signs to delineate the boundaries of MRWA 01-02 and MRWA 20 are currently not proposed. The installation of signs and fences along the perimeter boundary of MRWA 01-02 and MRWA 20, if required, will ultimately be determined by the Department of Defense Explosives Safety Board (DDESB) and their independent assessment of risk at these areas. The NGB, as the federal property owner, retains overall responsibility for MRWA 01 and MRWA 20. The AZ ARNG, as the operator, is responsible for implementing and maintaining the prescribed actions. CERCLA 121(c) five-year reviews will be used to monitor compliance with this DD and to monitor the continued effectiveness of the response. The duration of the response will be 30 years, unless it is determined during the recurring reviews or by amendment to this DD that it should be terminated or extended. Details regarding land use controls will be presented in a Land Use Control Implementation Plan. This plan will be provided to ADEQ for concurrence.

Statutory Determinations

The selected response actions are protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate to the response actions, and are cost-effective. The selected response actions do not satisfy the statutory preference for treatment as a principal element of the response actions. Previous MEC investigations and removal actions utilized open detonation to treat the consolidated MEC, which does satisfy the statutory preference. However, further consolidation for treatment of the remaining MEC was determined to not be cost-effective.

Because these response actions will result in suspected or potential MEC remaining on-site and do not allow for unlimited use and unrestricted exposure, a CERCLA 121(c) five-year review is required to ensure that the response actions remain protective of human health and the environment.

Decision Document Certification Checklist

This DD contains response action selection information required under the CERCLA decision making process and includes the following:

- Declaration
 - Site Name and Location
 - Statement of Basis and Purpose
 - Assessment of Site

- Description of Selected Response Action
- Statutory Determinations
- Authorizing Signatures
- Decision Summary
 - Site Name, Location, and Brief Description
 - Site History and Enforcement Activities
 - Community Participation
 - Site Characteristics
 - Current and Potential Future Land and Resources Use
 - Site Risks
 - Response Action Objectives
 - Description of Alternatives
 - Comparative Analysis of Alternatives
 - Principal-threat Wastes
 - Selected Response Action
 - Statutory Determinations
 - Documentation of Significant Changes from Preferred Alternative
- Responsiveness Summary
 - Stakeholder Issues and Lead Agency Responses
 - Technical and Legal Issues

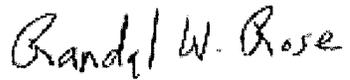
Appendix A provides a checklist that addresses these applicable elements for a DD for a munitions response site (MRS).

Authorizing Signatures

This declaration is based on the current understanding of site conditions and supporting evidence as contained in the Administrative Record file and summarized in this DD. If evidence is submitted in the future that either questions the accuracy of the documented nature and extent of MEC contamination, or questions the ability of the selected response action to protect human health and the environment, the site may be re-opened for additional investigation and, if necessary, response action by the lead agency in coordination with ADEQ. This DD may be modified or amended consistent with CERCLA, the NCP, and relevant Department of Defense (DoD) and ADEQ policy.

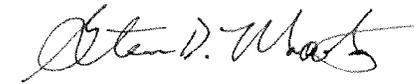
The NGB, as the Federal lead agency, makes this decision with ADEQ concurrence. The Camp Navajo Garrison Commander, NGB, is the appropriate approval authority based on estimated costs associated with the selected response actions (Army, 2004). The ADEQ, as the State regulatory agency, concurs with this decision. The authorizing signatures of these agencies are provided as follows:

Prepared by:



Randal W. Rose
Project Manager

Reviewed by:

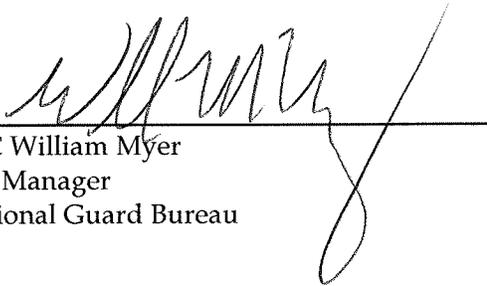


Steve Martz
Regional Quality Manager

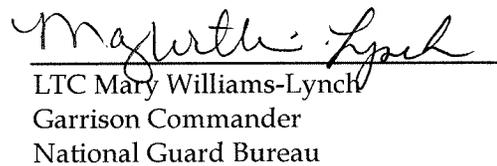


George DeMetropolis, PhD
Senior MR Consultant

Approved by:

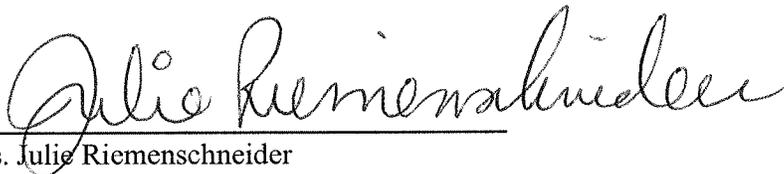


LTC William Myer
IRP Manager
National Guard Bureau



LTC Mary Williams-Lynch
Garrison Commander
National Guard Bureau

Concurred by:



Ms. Julie Riemenschneider
Remedial Projects Section Manager
Waste Programs Division
Arizona Department of Environmental Quality

APPENDIX J

NAAD 11B, NAAD 40 AND NAAD 43 DECISION DOCUMENT

PART 1 DECLARATION

FINAL

**DECISION DOCUMENT
FIVE LONG TERM MANAGEMENT SITES
NAAD 11B, 14D, 14G, 40, AND 43
CAMP NAVAJO
BELLEMONT, ARIZONA**

October 13, 2010

Prepared for:
National Guard Bureau
Environmental Programs Division
Camp Navajo
Bellemont, Arizona 86015

Prepared by:
Brown and Caldwell
201 East Washington Street, Suite 500
Phoenix, Arizona 85004

Brown and Caldwell Project Number 136187.002

LIST OF ACRONYMS

µg/dl	Micrograms per deciliter
µg/m ³	Micrograms per cubic meter
µg Pb/dl-blood	Micrograms of lead per deciliter of blood
A.A.C.	Arizona Administrative Code
ACM	Asbestos-containing material
ADD	Average Daily Dose
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ALWQS	Agricultural and Livestock Water Quality Standard
ANL	Argonne National Laboratory
AREE	Area Requiring Environmental Evaluation
Army	United States Department of the Army
A.R.S.	Arizona Revised Statute
ASTM	American Society for Testing and Materials
Atm-m ³ /mole	Atmospheres of Absolute Pressure in Cubic Meter per Mole
ATSDR	Agency for Toxic Substances Disease Registry
AWQS	Aquifer Water Quality Standard
AZ ARNG	Arizona Army National Guard
bgs	Below Ground Surface
BOD	Biological Oxygen Demand
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
COD	Chemical Oxygen Demand
COPC	Contaminant of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CSM	Conceptual Site Model
DD	Decision Document
dl	deciliter
DNB	Dinitrobenzene
DNT	2,4-Dinitrotoluene
DoD	Department of Defense

LIST OF ACRONYMS

DRO	Diesel-range organics
DSERTS	Defense Sites Environmental Restoration Tracking System
EBASCO	EBASCO Environmental
EcoRfD	Ecotoxicity Reference Dose
EDXRF	Energy Dispersive X-Ray Fluorescence
EE/CA	Engineering Evaluation/Cost Analysis
EM	Electromagnetic
EP	Extraction Procedure
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESA	Endangered Species Act
ESE	Environmental Science & Engineering, Inc.
FCDL	Former Construction Debris Landfill
FSL	Former Sanitary Landfill
FSP	Field Sampling Plan
FR	Federal Register
GAC	Granular Activated Carbon
g/mole	Grams per mole
GPL	Groundwater Protection Level
GRO	Gasoline Range Organics
HBGL	Health Based Guidance Level
HEAST	Health Effects Assessment Summary Tables
HEG	Harris Environmental Group, Inc.
HERA	Human Health and Ecological Risk Assessment
HI	Hazard Index
HMX	Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine
HQ	Hazard Quotient
HRA	Human Health Risk Assessment
HRO	Hydrocarbon-range organics
HRR	High-Resolution Resistivity
ILCR	Incremental Lifetime Cancer Risk
IRA	Interim Removal Action

LIST OF ACRONYMS

IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
ITC	IT Corporation
J&E	Johnson & Ettinger
LADD	Lifetime Average Daily Dose
LBP	Lead-Based Paint
LDC	Laboratory Data Consultants
LOAEL	Lowest Observable Adverse Effect Level
LTM	Long Term Management
LUC	Land Use Control
Malcolm Pirnie	Malcolm Pirnie, Inc.
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
MK	Morrison Knudsen
MRL	Minimum Risk Level
MSO	Mexican Spotted Owl
NAAD	Navajo Army Depot
NADA	Navajo Army Depot Activity
Neptune	Neptune and Company, Inc.
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NGB	National Guard Bureau
NOAEL	No Observable Adverse Effect Level
NPL	National Priority List
NR-SRL	Non-Residential Soil Remediation Level
OB/OD	Open Burn/Open Detonation
OC	Organochlorine
PA	Preliminary Assessment
PAC	Protected Activity Center
PAHs	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PEF	Particulate Emission Factor

LIST OF ACRONYMS

PPE	personal protective equipment
PRG	Preliminary Remediation Goal
PSG	Preliminary Screening Guidance
PVC	Polyvinyl Chloride
QA/QC	Quality assurance/quality control
QAPP	Quality Assurance Project Plan
QASAS	Quality Assurance Specialist, Ammunition Surveillance
QBD	Quality By Design
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RDA	Recommended Daily Allowance
RDX	1,3,5-Trinitro-1,3,5-Triazine
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
R-SRL	Residential Soil Remediation Level
SAG	Stakeholders Advisory Group
SARA	Superfund Amendments and Reauthorization Act
SF	Slope Factor
SI	Site Inspection
SRI	Supplemental Remedial Investigation
SRL	Soil Remediation Level
SSL	Soil Screening Level
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
SWQS	Surface Water Quality Standard
TCLP	Toxicity Characteristic Leaching Procedure
Tetra Tech	Tetra Tech, Inc.
TKN	Total Kjeldahl Nitrogen
TNB	Trinitrobenzene

LIST OF ACRONYMS

TNT	2,4,6-Trinitrotoluene
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRIES	Texas Regional Institute for Environmental Studies
TRPH	Total Recoverable Petroleum Hydrocarbons
UCL	Upper Confidence Limit
Uribe	Uribe and Associates
USACE	United States Army Corps of Engineers
USAEHA	United States Army Environmental Hygiene Agency
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WQARF	Water Quality Assurance Revolving Fund
XRF	X-ray fluorescence
yd ³	Cubic Yard

PART 1 – DECLARATION

This Declaration provides an abstract of the Decision Document (DD), including the site names and locations, a statement of basis and purpose, a description of the selected remedy, the statutory determinations, and the authorizing signatures. Supporting information is contained in the Decision Summary in Part 2 and the Responsiveness Summary in Part 3. Figures are located at the end of Part 1, and figures and tables are located at the end of each site summary in Part 2. References are provided at the end of the document.

1.0 Site Name and Location

The sites considered in this DD are located in the Ammunition Workshop Area, the eastern section of the Standard Magazine Area, and the northwestern section of the Buffer Area within Camp Navajo, which is situated approximately 10 miles west of Flagstaff, Arizona and south of Interstate 40 at Exit 185 in Bellemont, Coconino County, Arizona (Figure 1). Camp Navajo is a Federally-owned, State-operated, Arizona Army National Guard (AZ ARNG) installation. The five sites included in this DD are designated by Navajo Army Depot (NAAD) numbers. Former designations (site aliases) for all or some of the sites include Area Requiring Environmental Evaluation (AREE) numbers and Navajo Depot Activity (NADA) numbers. The following sites are included in this DD:

- NAAD 11B – Building 318/319 TNT Washout Facility (AREE 11/12; NADA 01);
- NAAD 14D – Building 322 Paint Operations (AREE 14);
- NAAD 14G – Building 327 Rust Removal (AREE 14);
- NAAD 40 – Former Sanitary Landfill (AREE 40, NADA 17); and
- NAAD 43 – Former Construction Debris Landfills #1 – 5 (AREE 43, NADA 27/32).

NAAD sites 11B, 14D, 14G, 40, and 43 are referred to herein as the *five Long Term Management (LTM) sites*. The locations of the five LTM sites are shown on Figure 2.

2.0 Statement of Basis and Purpose

This DD presents the selected remedy chosen for the five LTM sites in accordance with applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP). Camp Navajo is a Federally-owned facility and is not listed on the National Priorities List (NPL). The National Guard Bureau (NGB) is the Federal lead agency, and conducts the Installation Restoration Program (IRP) in accordance with CERCLA and the NCP. This DD has been prepared consistent with the United States Environmental Protection Agency (USEPA) guidance document entitled *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, EPA 540-R-98-031 (USEPA, 1999) and the *Army Defense Environmental Restoration Program Management Guidance for Active Installations* (United States Department of the Army [Army], 2004).

In accordance with CERCLA and the NCP, this DD describes the basis for the selected remedy. The NGB, as the Federal lead agency, makes this decision. The Arizona Department of Environmental Quality (ADEQ), as the State regulatory agency, concurs with this decision. This decision is based on information contained in the Administrative Record file.

3.0 Assessment of Sites

The NGB, in coordination with ADEQ, followed the CERCLA/NCP risk-based cleanup process to investigate, remediate, and evaluate closure for all sites. Consequently, the NGB has determined that the five sites in this DD pose a threat to public health, welfare, or the environment from actual or threatened releases of hazardous wastes, hazardous substances, pollutants, and contaminants to the environment.

4.0 Description of Selected Remedy

The NGB, in coordination with ADEQ, followed the CERCLA/NCP risk-based cleanup process to investigate, remediate, and evaluate closure for all sites. This DD addresses site-related chemical constituents associated with soil, surface water, and groundwater for the five LTM sites. This DD summarizes the site management decisions, and the supporting information for those decisions, that was current at the time the decisions were made. The decisions for NAAD 11B, 14D, and 14G were presented in the *Installation Restoration Program Buyout Closure Report, Camp Navajo, Bellemont, Arizona* (Brown and Caldwell, 2005); the decision for NAAD 40 was presented in an ADEQ letter dated March 21, 2002 (ADEQ, 2002a); and the decision for NAAD 43 was presented in an ADEQ letter dated August 31, 2004 (ADEQ, 2004b). The remedies were implemented in 2005 in accordance with the *Long-Term Management Work Plan for NAAD Sites 11B, 14D, 14G, 40 and 43, Camp Navajo, Arizona* (LTM Work Plan) (MKM, 2005). As recommended in the IRP Buyout Report and ADEQ letters, the LTM Work Plan compared the previous site data to regulatory standards and risk-based screening levels current at the time to determine the contaminants that warranted monitoring. A five-year review of the remedy is currently underway that reviews recent changes to regulatory standards and risk-based screening levels to ensure that the remedy remains protective of human health and the environment. The remedies as implemented by the LTM Work Plan consist of inspections, maintenance, Land Use Controls (LUCs), and/or performance (groundwater) monitoring requirement for the five LTM sites.

Although no unacceptable risks to human health or the environment associated with site-related chemical constituents in soil and surface water are present at NAAD sites 11B, 14D, and 14G, the potential impacts to groundwater by completed soil removal actions were not fully evaluated, and hazardous substances remain in groundwater at NAAD 11B at levels exceeding screening risk levels. Therefore, the selected LTM remedies consisting of groundwater monitoring and LUCs are appropriate to evaluate the effectiveness of completed remedies and to control groundwater use at these sites.

While the completed remedy at NAAD 40 is protective of human health and the environment for limited current and future use, hazardous substances remain in soils at levels exceeding residential exposure limits, which require LTM to monitor continued protectiveness. Therefore, the selected LTM remedies consisting of inspections, maintenance, groundwater monitoring, and LUCs are appropriate at NAAD 40 to maintain the integrity of the landfill cap, to monitor the long-term effectiveness of the completed remedy, and to control land and groundwater use at the site.

Landfills #1-4 at NAAD 43 are suitable for unrestricted current and potential future use because there are no unacceptable risks to human health and the environment associated with site-related chemical constituents. However, at the Landfill #5 portion of NAAD 43, the completed remedy is only protective of human health and the environment for limited current and future use because hazardous substances remain in soils at levels exceeding residential exposure limits, which preclude unrestricted use of the site. Therefore, the selected LTM remedies consisting of inspections, maintenance, and LUCs are appropriate at NAAD 43 Landfill #5 to maintain the integrity of the site and to control land use at the site.

The duration of LTM activities is different for each site. Generally, the duration of groundwater monitoring at each applicable site will be assessed in accordance with the ramp-down strategies presented in the LTM Work Plan (MKM, 2005), as summarized in the following decision matrices:

- Figure 3 - Performance Monitoring Well Ramp-Down Frequency Decision Matrix;
- Figure 4 - Performance Monitoring Ramp-Down Each Analytical Suite (By Well); and
- Figure 5 - Performance Monitoring Site Ramp-Down Frequency Decision Matrix.

The results of the first two years of groundwater monitoring (conducted quarterly the first year and semi-annually the second year) will be compared to the appropriate ramp down strategies and a determination of sites and wells that require continued (or discontinuation of) monitoring will be established for the subsequent monitoring programs. During subsequent groundwater monitoring events, the results will continually be evaluated with the ramp down strategies and appropriate modifications will be made to the program.

LUCs will be maintained at each site until it is demonstrated that a site can be designated for unrestricted current and potential future use because there are no unacceptable risks to human health and the environment associated with site-related contaminants of concern (COCs). The same conditions would apply for the duration of the inspection and maintenance activities associated with NAAD 40 and 43.

Any recommendations for changes, including reduction of effort, to the LTM program for a given site will be mutually agreed upon between NGB and ADEQ. The estimated cost in the implementation of the selected LTM remedies for the first five years is \$1,424,806. Based on the results of the first five-year review, additional LTM costs may be necessary.

5.0 Statutory Determinations

The CERCLA § 121 statutory requirements are applicable because LTM is being selected as the remedy for NAAD sites 11B, 14D, 14G, 40, and 43. Previous investigations, interim response actions, and risk assessment results indicate that LTM is appropriate for these sites. Conditions associated with site-related chemical constituents are protective of human health and the environment for current and future non-residential use.

A CERCLA 121(c) five-year review for site-related chemical constituents is required because concentrations of some site-related chemical constituents are not protective of human health and the environment for unlimited use and unrestricted exposure.

6.0 DD Data Certification Checklist

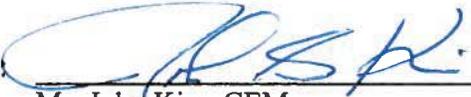
This DD contains certain remedy selection information that is required under the CERCLA decision-making process. Attachment A, which is provided immediately after this Part, contains a checklist that addresses all applicable elements contained within this Decision Document.

7.0 Authorizing Signatures

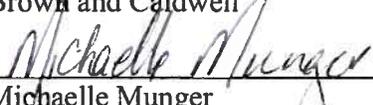
This declaration is based on the current understanding of site conditions and supporting evidence as contained in the Administrative Record file and summarized in this DD. If evidence is submitted in the future that either questions the accuracy of the documented nature and extent of site contamination, or questions the ability of the selected remedy to protect human health and the environment, the site may be re-opened for additional investigation and, if necessary, response action by the lead agency in coordination with ADEQ. This DD may be changed or amended consistent with CERCLA, the NCP, and relevant Department of Defense (DoD) and ADEQ policy.

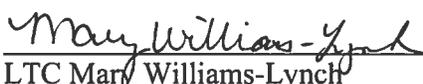
The NGB, as the Federal lead agency, makes this decision with ADEQ concurrence. In accordance with Army guidance (Army, 2004), and based on the estimated costs associated with the selected remedy at each site, the Camp Navajo Garrison Commander, NGB, is the appropriate approval authority.

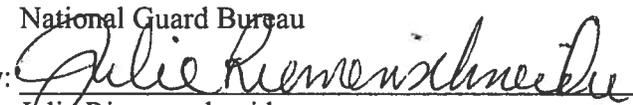
The authorizing signatures of these agencies are provided as follows:

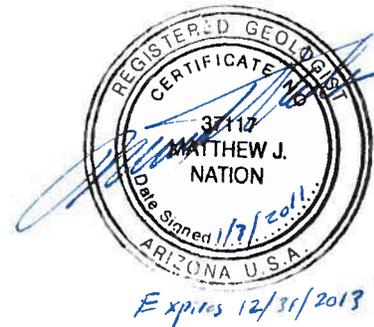
Prepared by:  Date: 12/30/10
Mr. John Kim, CEM
Program Manager
Brown and Caldwell

Reviewed by:  Date: 1/3/11
Mr. Matthew J. Nation, R.G.
Senior Geologist
Brown and Caldwell

Approved by:  Date: 1/31/11
Michaelle Munger
LTC, Army National Guard
Environmental Programs Division

Approved by:  Date: 1/24/11
LTC Mary Williams-Lynch
Garrison Commander
National Guard Bureau

Concurred by:  Date: 4/4/11
Julie Riemenschneider
Remedial Projects Section Manager
Waste Programs Division
Arizona Department of Environmental Quality



APPENDIX K

2010 FIVE-YEAR REVIEW

EXECUTIVE SUMMARY

RECOMMENDATIONS AND FOLLOW-UP

PROTECTIVENESS STATEMENT



**FIVE-YEAR REVIEW REPORT
FOR FIVE IRP SITES**

Final

**Five-Year Review Report
For Five IRP Sites
(NAAD 11B, 14D, 14G, 40, and 43)
at
Camp Navajo, Bellemont, Arizona**

**Guaranteed Fixed-Price Performance-Based Contract for
Environmental Remediation Services
at Camp Navajo, Arizona**

Prepared For:
National Guard Bureau
Camp Navajo
Bellemont, Arizona

Prepared By:
MKM Engineers, Inc.
5025 Arnold Avenue
McClellan, CA 95652

October 5, 2010



**First Five-Year Review Report for Five IRP Sites
(NAAD 11B, 14D, 14G, 40, and 43) at Camp Navajo, Bellemont, Arizona
October 5, 2010**

Approved by:

LTC D. Troy Fontenot

Environmental Programs Division, Army National Guard Directorate

Date:

14 APR 11

Approved by:

LTC Mary Williams-Lynch

Garrison Commander, Army National Guard Directorate

Date:

22 April 11

Arizona Registrant:



Randy Clouse, Ph.D., P.E..
PIKA International, Inc.

Approved by:

Srinivasa Neralla Ph.D.

Program Manager, MKM Engineers, Inc.

Date:

05 MAY 2011

Prepared by:

Kathleen Anthony

Senior Project Manager, MKM Engineers, Inc.

Date:

6 May 2011



FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name (from WasteLAN): Camp Navajo		
EPA ID (from WasteLAN): AZ7213820635		
Region: 9	State: AZ	City/County: Bellemont/Coconino
SITE STATUS		
NPL status: <input type="checkbox"/> Final <input type="checkbox"/> Deleted <input checked="" type="checkbox"/> Other (specify) Non-NPL Sites		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Construction completion date: <u>10 / 19 / 2001</u>
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: National Guard Bureau		
Lead Regulatory Agency: Arizona Department of Environmental Quality		
Author name: Kathleen Anthony		
Author title: Senior Project Manager		Author affiliation: MKM Engineers, Inc.
Review period:** <u>02 / 12 / 2010</u> to <u>08 / 31 / 2010</u>		
Date(s) of site inspection: <u>04 / 12 / 2010</u> & <u>04 / 13 / 2010</u>		
Type of review: <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input checked="" type="checkbox"/> (Regional Discretion)		
Review number: <input checked="" type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <input type="checkbox"/> Actual RA On-site Construction at OU #____ <input type="checkbox"/> Actual RA Start <input type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input checked="" type="checkbox"/> Other (Initiation of LTM Sampling Program)		
Triggering action date (from WasteLAN): <u>10 / 31 / 2005</u>		
Due date (five years after triggering action date): <u>10 / 31 / 2010</u>		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]



EXECUTIVE SUMMARY

This report provides the first Five-Year Review for five sites administered under the U.S. Army's Installation Restoration Program (IRP) at Camp Navajo, Arizona, where removal decisions have left contaminants at concentrations greater than unrestricted levels. The five IRP sites (identified by Navajo Army Depot [NAAD] site numbers) included in this review are NAAD 11B (Building 318/319 TNT Washout Facility), NAAD 14D (Building 322, Paint Operations), NAAD 14G (Building 327 Rust Removal), NAAD 40 (Former Sanitary Landfill), and a sub-site of NAAD 43 (the Former Construction Debris Landfill #5); all are referred to hereafter as NAAD Sites 11B, 14D, 14G, 40, and 43. The Five-Year Review was conducted in accordance with the *Comprehensive Five-Year Review Guidance* (540-R-01-007) (USEPA, 2001) issued by the United States Environmental Protection Agency (USEPA) to determine whether the remedies at the five IRP sites are functioning as designed and are protective of human health and the environment.

The trigger date for a Five-Year Review on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site is the start of remedy construction. However, interim remedial actions at the five IRP Long-Term Management (LTM) sites were initiated in the absence of decision documents and the potential affects of hazardous substances remaining on-site after the completed removal actions were not fully evaluated. The draft Decision Document (Brown & Caldwell [B&C], 2010) assessed potential impacts to human health and the environment associated with remaining site-related chemical constituents and selected groundwater monitoring and Land Use Controls (LUCs) to evaluate the effectiveness of completed remedies and control groundwater use. Given that the remedy selected in the Decision Document is LTM, the initiation of the LTM activities in October 2005 was selected as the trigger date for this Five-Year Review.

The historical data were reviewed to determine whether monitoring activities are adequate to determine the protectiveness and effectiveness of the remedy. The monitoring data included four rounds of quarterly sampling (fourth quarter 2005 [4Q05], first quarter 2006 [1Q06], second quarter 2006 [2Q06], and third quarter 2006 [3Q06]) and four rounds of semiannual sampling (Spring and Fall 2007 and 2008). The groundwater sampling program was reevaluated after the initial two-year period (Fall 2007), with the exception of perchlorate sampling, which was evaluated after four quarters of sampling as specified in the *Long-Term Management Work Plan for NAAD Sites 11B, 14D, 14G, 40, & 43, Camp Navajo, Arizona* (LTM WP) (MKM, 2005a).

The Final Long-Term Management Groundwater Monitoring Annual Report for NAAD Sites 11B, 14D, 14G, 40, and 43, Fall 2007 (MKM, 2007) recommended ramp-down of LTM monitoring activities by analyte, analytical suite, and by site based on the guidance presented in the LTM WP (MKM, 2005a). The Spring 2008, Fall 2008, and Fall 2009 reports provided additional recommendations for further ramp-down of LTM monitoring activities.



LTM Summary by Site:

NAAD 11B

Based on four years of groundwater data, the hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) plume at NAAD 11B appears to be relatively stable and does not appear to be migrating away from the source area. Changes in the plume appear to be influenced by the seasonal presence or absence of groundwater. Groundwater flow is toward the source area from both the northeast and the west, indicating that plume migration is unlikely to occur outside the source area.

Explosives have been detected at concentrations greater than their respective Preliminary Screening Guidance (PSG) or Aquifer Water Quality Standard (AWQS) in eight of the twelve monitoring wells at NAAD 11B. The highest RDX concentrations reported in the Fall 2009 event were 150 micrograms per liter ($\mu\text{g/L}$) in well 97-05, 120 $\mu\text{g/L}$ in well 00-02, and 59 $\mu\text{g/L}$ in well 97-08.

Perchlorate has been detected in five wells at NAAD 11B. However, all detected perchlorate results were less than the PSG of 11 $\mu\text{g/L}$. Metals have been detected in seven wells at NAAD 11B. However, only arsenic and barium were detected in two wells at concentrations greater than the PSG. Overall stable or decreasing trends of explosives, metals, and perchlorate at NAAD 11B indicate that the soil removal efforts were effective.

NAAD 14D

A review of the analytical data generated during three years of LTM at NAAD 14D found that only two elements - beryllium and cadmium - were detected at concentrations greater than the PSG in one sample from one well at NAAD 14D. Detected concentrations of these elements did not exceed the PSG in subsequent sampling events. All other detected concentrations (metals) were less than the PSG. Therefore, NAAD 14D was removed from the LTM sampling program in Fall 2008 because ramp-down requirements had been achieved.

NAAD 14G

A review of the analytical data generated during three years of LTM at NAAD 14G found that only three elements - arsenic, beryllium and cadmium - were detected at concentrations greater than the PSG in one sample from one well at NAAD 14G. These elements were not detected at concentrations greater than the PSG in subsequent sampling events. All other detected concentrations (metals) were less than the PSG. Therefore, NAAD 14G was removed from the LTM sampling program in Spring 2008 because ramp-down requirements had been achieved.



NAAD 40

Groundwater sampling has been conducted at NAAD 40 since October 2005. No contaminants have been detected at concentrations greater than the PSG in any NAAD 40 wells. Therefore, the frequency of the groundwater monitoring at NAAD 40 was reduced to annual sampling in 2008.

The NAAD 40 landfill cap was rehabilitated in May 2006, and annual inspections were conducted by an Arizona licensed professional engineer during the Fall 2006 and Fall 2007 groundwater monitoring events. Maintenance on the NAAD 40 landfill cap was performed in Fall 2008. Silt fences were repaired; water diversion structures were replaced; eroded areas were filled in with soil, covered with geo-net or rip-rap, and reseeded. The annual inspection was moved to Spring 2009 to assess the condition of the landfill repairs.

The results of the Spring 2009 site inspection indicated that the repaired landfill cap is providing adequate protection to the landfill contents based upon the visual inspection. However, it was recommended that the silt barriers be repaired or replaced and that minor erosion observed along the southern landfill cap be repaired.

The biennial survey of the landfill elevation points in Spring 2009 showed less than plus or minus 0.86 inches of elevation change in the 11 landfill elevation monitoring points (established in November 2005). The results of the survey indicate that little settling of landfill contents is occurring.

The landfill cap at NAAD 40 is in good condition and is functioning as designed. LUCs (including fencing, gates and signs) are in place and prevent unauthorized access and intrusive activities. On completion of the Decision Document for NAAD 40, the LUCs will be formally documented in an update of the Camp Navajo Real Property Development Plan (Colorado DataScapes, 2009), before the sites are transferred to the Arizona Army National Guard (AZARNG).

NAAD 43

The NAAD 43 landfill was designated by the Arizona Department of Environmental Quality (ADEQ) as a Construction Complete, No Further Action site and requires a less rigorous visual inspection than the inspections conducted at NAAD 40 (no biennial survey or annual inspections by a licensed professional engineer are required). The NAAD 43 landfill inspection is designed to identify erosion and exposed debris that would require cleanup. No groundwater monitoring is performed at this site.

MKM Engineers, Inc. (MKM) conducted semiannual inspections of the NAAD 43 landfill in 2007, 2008, and 2009. The Fall 2007 inspection identified several areas of erosion, and maintenance activities were conducted to repair the NAAD 43 landfill in Spring 2008. The maintenance



activities included replacing water diversion structures (straw bails and waddles) and repairing silt fencing.

The repair and replacement of water diversion structures at NAAD 43 were determined to be sufficient to minimize future erosion in these areas. The landfill at NAAD 43 is in good condition and is functioning as designed. LUCs (including gates and signs) are in place and prevent unauthorized access and intrusive activities. On completion of the Decision Document for NAAD 43, the LUCs will be formally documented in an update of the Camp Navajo Real Property Development Plan (Colorado DataScapes, 2009), before the sites are transferred to the AZARNG.

Five Year Review:

The assessment of this Five-Year Review found that the remedies at all five LTM sites are functioning as designed and are protective of human health and the environment. The threats at the five IRP sites have been addressed through:

- Removal actions at NAAD 11B, 14D, 14G, and 43;
- Stabilization and capping of the former sanitary landfill (FSL) at NAAD 40; and
- Installation of fencing and warning signs at NAAD 40 and 43.

The recommendations presented in this Five-Year Review are as follows:

- Reduce the current semiannual sampling frequency at NAAD 11B to annual sampling and initiate further ramp-down procedures as appropriate.
- Follow-up with formal documentation of LUCs for NAAD 11B in an update of the *Camp Navajo Real Property Development Plan* (Colorado DataScapes, 2009).
- Site closure and IRP status of Response Complete for NAAD 14D. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells. Evaluate opportunities to abandon wells that no longer serve a purpose at NAAD 14D or 11B.
- Site closure and IRP status of Response Complete for NAAD 14G. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells. Evaluate opportunities to abandon wells that no longer serve a purpose at NAAD 14G or 11B.
- Continue with the current annual sampling program at NAAD 40 and reducing the semiannual visual inspection frequency to annual inspections in 2011. The next annual inspection of NAAD 40 (by a registered professional engineer) will be performed in



Spring 2010 and the next biennial survey (by a registered licensed surveyor) is scheduled for Spring 2011.

- Reduce the frequency of annual inspections by a licensed engineer to biennial inspections to coincide with the biennial landfill elevation surveys.
- Reduce the frequency of semiannual landfill inspections at NAAD 43 to annual inspections in 2011.
- Remove the fence at NAAD 40 to allow for wildlife movement. The gates across the entrances and warning signs would remain.
- On completion of the Decision Documents for NAAD 40 and 43, update the LUCs for NAAD 40 and 43 in the Camp Navajo Real Property Development Plan (Colorado DataScapes, 2009), before the sites are transferred to the AZARNG.
- Adopt the updated PSGs listed in Table A-1 in Appendix A.
- Report non-detects to the Method Reporting Limit (MRL) instead of the Method Detection Limit (MDL).



9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations for NAAD Sites 11B, 14D, 14G, 40, and 43 are summarized in the following subsections.

9.1 LTM Groundwater Sampling

NAAD 11B

MKM recommends reducing the current semiannual sampling frequency at NAAD 11B to annual frequency and implementing further ramp-down procedures as appropriate. The semiannual sampling at NAAD 11B has shown little seasonal variation in the data. Therefore, annual sampling is appropriate for this site. It is further recommended that the annual sampling be conducted in the spring to increase the chances of water being present in site wells. It is also recommended that the revised PSGs be adopted for remedy evaluation and ramp-down criteria for the annual sampling.

On completion of the Decision Document for NAAD 11B, and before the sites are transferred to AZARNG, the NGB should follow up with formal documentation of LUCs in an update of the *Camp Navajo Real Property Development Plan* (Colorado DataScapes, 2009).

NAAD 14D

MKM Recommends site closure and IRP status of Response Complete for NAAD 14D. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells. Evaluate opportunities to abandon wells that no longer serve a purpose at NAAD 14D or 11B.

NAAD 14G

MKM recommends Site closure and IRP status of Response Complete for NAAD 14G. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells. Evaluate opportunities to abandon wells that no longer serve a purpose at NAAD 14G or 11B.

NAAD 40

MKM recommends that annual groundwater monitoring be continued and that the revised PSGs



be adopted. MKM recommends reducing the frequency of visual inspections from semiannual to annual, because the landfill cap is now well vegetated and erosion appears to be decreasing. It is further recommended that the annual inspections be conducted in the springtime in conjunction with the annual sampling event, because erosion is most likely to occur after the winter snow-melt run-off.

The most recent annual inspection of NAAD 40 by a registered engineer was performed in Spring 2010. The next biennial landfill elevation survey by a registered licensed surveyor will be performed in Spring 2011. MKM recommends reducing the frequency of inspections by a registered engineer from annual to biennial beginning in Spring 2011, to coincide with the biennial landfill elevation surveys, because the landfill cap appears to be stable.

The AZARNG biologist indicated that the fence surrounding NAAD 40 represents a threat of entanglement to elk and pronghorn antelope. This fence was installed to keep cattle from grazing on the exposed landfill, and was left in place after construction of the cap to allow the vegetation to stabilize. Given that the landfill cap is now well vegetated, and grazing permits are no longer issued by the installation, it is recommended that the fencing around NAAD 40 be removed. However, the gates across the road entrances and warning signs should remain. In addition, the plastic netting used for erosion control should be removed where it has become bunched and could become an entanglement threat to wildlife. Only natural fiber jute netting, similar to what has been used in the past and observed to degrade in a timely manner, should be used if future needs arise.

On completion of the Decision Document for NAAD 140, and before the sites are transferred to AZARNG, the NGB should follow up with formal documentation of LUCs in an update of the *Camp Navajo Real Property Development Plan* (Colorado DataScapes, 2009).

NAAD 43

MKM recommends reducing the frequency of visual inspections from semiannual to annual, because it has been observed that only minor quantities of waste have surfaced due to freeze-thaw and swelling-drying of the clay soil, and erosion appears to be decreasing. It is further recommended that the annual inspections be conducted in the springtime to coincide with the inspections at NAAD 40 because erosion is most likely to occur after the winter snow-melt run-off.

On completion of the Decision Document for NAAD 43, and before the sites are transferred to AZARNG, the NGB should follow up with formal documentation of LUCs in an update of the *Camp Navajo Real Property Development Plan* (Colorado DataScapes, 2009).



**Table 9-1
Recommendations and Follow-up Actions**

Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Reduce the current semiannual sampling frequency at NAAD 11B to annual frequency and implementing further ramp-down procedures as appropriate.	NGB	ADEQ	2011	N	N
Follow-up with formal documentation of LUCs for NAAD 11B in an update of the <i>Camp Navajo Real Property Development Plan</i> (Colorado DataScapes, 2009).	NGB	ADEQ	2012	N	N
Closure of NAAD 14D and IRP status of Response Complete.	NGB	ADEQ	2010	N	N
Closure of NAAD 14G and IRP status of Response Complete.	NGB	ADEQ	2010	N	N
Reduce the frequency of visual inspections from semiannual to annual at NAAD 40.	NGB	ADEQ	2011	N	N
Reduce the frequency of inspections by a registered engineer from annual to biennial at NAAD 40.	NGB	ADEQ	2011	N	N
Remove the fencing around NAAD 40 and the plastic netting used for erosion control.	NGB	ADEQ	2011	N	N
Follow-up with formal documentation of LUCs for NAAD 40 in an update of the <i>Camp Navajo Real Property Development Plan</i> (Colorado DataScapes, 2009).	NGB	ADEQ	2012	N	N
Reduce the frequency of visual inspections at NAAD 43 from semiannual to annual.	NGB	ADEQ	2011	N	N



**Table 9-1
Recommendations and Follow-up Actions (Continued)**

Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Follow-up with formal documentation of LUCs for NAAD 43 in an update of the <i>Camp Navajo Real Property Development Plan</i> (Colorado DataScapes, 2009).	NGB	ADEQ	2012	N	N
Adopt the updated PSGs listed in Table A-1 in Appendix A.	NGB	ADEQ	2011	N	Y
Adopt the revised Ramp down figures included in Appendix A (Figures A- through A-3)	NGB	ADEQ	2011	N	Y



10.0 PROTECTIVENESS STATEMENT

The remedy appears to be protective of human health and the environment. All threats at the site have been addressed through the removal actions at NAAD Sites 11B, 14D, 14G, and 43, through the stabilization and capping of the landfill at NAAD 40, and through the implementation of LUCs at all sites.

Long-term protectiveness of the removal actions will continue to be monitored by groundwater sampling during year five of the LTM program. Current data indicate that the remedies are functioning as intended at all sites.

APPENDIX L

2014 LONG TERM MANAGEMENT MONITORING REPORT SUMMARIES AND RECOMMENDATIONS

**Final
Long-Term Management Groundwater
Monitoring Report
For NAAD Sites 11B, 40, and 43
Camp Navajo, Arizona**

Prepared for:
**Army National Guard Directorate
111 South George Mason Drive
Arlington, VA 22204-1382**



Prepared by:
**PIKA International, Inc.
12723 Capricorn Drive, Suite 500
Stafford, Texas 77477**

October 2014

**Final
Long-Term Management Groundwater
Monitoring Report
For NAAD Sites 11B, 40, and 43
Camp Navajo, Arizona**

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October 2014

Final
Long-Term Management Groundwater Monitoring Report
For NAAD Sites 11B, 40, and 43
Camp Navajo, Arizona
2014 Annual Report
October 2014

Arizona Registrant:




Randy Clouse, PE
PIKA International, Inc.

7.0 ADDITIONS TO AND DEVIATIONS FROM THE WORK PLAN

One deviation from the Letter WP Addendum (PIKA, 2012) occurred during the 2014 annual sampling event: Water level measurements were not collected at Well 99-01 in error. The list of wells requiring water level measurements was prepared for field implementation by referring to Table 3-1 in the LTM WP Addendum (PIKA 2013a) where abandoned well 99-02 was listed as a water level only well instead of Well 99-01. No other additions to, or deviations from, the Letter WP Addendum (PIKA, 2012) were identified.

8.0 SUMMARIES AND RECOMMENDATIONS

The 2014 sampling event was the fifteenth sampling effort in the LTM groundwater sampling program. The 2014 sampling event was conducted following the recommendations in the 2013 LTM Report (PIKA, 2014a) and the 2010 Five-Year Review Report (MKM, 2010). Subsequent sampling events should be conducted according to the recommendations in this annual report.

Explosives and metals were detected in groundwater samples at NAAD 11B at concentrations greater than the MDL in eight of the eleven monitoring wells sampled in 2014. RDX was detected at concentrations greater than the SL of 0.61 µg/L in monitoring wells 97-04, 97-05, 97-06, 97-08, 00-01, and 00-02. RDX in well 99-03 and all detected concentrations of 4-A-2,6-DNT, 2-A-4,6-DNT, and 2,4,6-TNT were less than their respective SLs.

Target analytes were detected in groundwater samples at NAAD 40 at concentrations greater than the MDL in the four monitoring wells sampled in 2014. The detected concentrations of nitrate-nitrite, arsenic, barium, and chromium were less than their respective SLs.

During the 2014 monitoring event, concentrations of 4-methylphenol were detected in the primary and duplicate samples collected from well PMW-2. This compound was last detected above method detection limits in well PMW-5 (11 J µg/L) in April 2009. The five semivolatile organic compounds (SVOCs) (acenaphthene, 2-chloronaphthalene, 2-methylnaphthalene, 1,2,4-trichlorobenzene, and naphthalene) that were detected in only the PMW-3 primary sample during the 2012 sampling event were not detected above method detection limits during the 2013 nor 2014 sampling events. These SVOCs were not detected in any samples collected during the nine sampling events preceding 2012, therefore, the detections of these five SVOCs from 2012 and, 4-methylphenol from this event (2014), appear anomalous and not indicative of a release from NAAD 40. No phthalates were detected above laboratory reporting limits during this sampling event.

8.1 LTM Landfill Inspections

The biennial inspection at NAAD Site 40 and annual inspection at NAAD site 43 were conducted on May 13, 2014.

The results of the biennial inspection at NAAD 40 indicate that the landfill cap is providing adequate protection to the contents. Minor erosion and damage to erosion controls continue to occur, but at a rate that can be managed by annual maintenance and repairs, if required. The landfill cap is well vegetated and elevation changes have been minimal.

At NAAD 43, residual landfill materials including asbestos tile fragments, tar balls, coal, and asphalt chunks were observed in areas of the landfill usually submerged by ponded

water. On May 15, 2014, the entire surface area of the former landfill was traversed to collect these materials. Approximately four 5-gallon buckets of asphalt/tar balls, one 5-gallon bucket of asbestos tile fragments, and one 5-gallon bucket of asphalt and coal chunks were collected and relinquished to the Army for disposal. Only minor maintenance of erosion controls was required at this site. No erosional features require repair at this time.

8.2 Recommendations

The LTM groundwater sampling program has been conducted over a nine-year period and has included four rounds of quarterly sampling (4Q05, 1Q06, 2Q06, 3Q06), eight rounds of semiannual sampling (Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009, Fall 2009, Spring 2010, and Fall 2010), and three rounds of annual sampling (2012, 2013, and 2014). The data collected in 2014 at NAAD 11B and NAAD 40 were assessed according to the ramp-down strategies presented in Figure 4-1 (Performance Monitoring Ramp-Down Each Analytical Suite [By Well]), as specified in the Letter WP Addendum (PIKA, 2012). In addition, professional judgment was used to interpret the ramp-down decision logic and make recommendations for each site.

8.2.1 Recommendations for NAAD 11B

Groundwater monitoring at NAAD 11B will continue on an annual basis.

8.2.2 Recommendations for NAAD 40

Groundwater monitoring at NAAD 40 will continue on an annual basis.

No changes to the laboratory analyses are recommended. Table 8-1 provides a summary of analytes removed from the long-term monitoring program by site.

8.2.3 Recommendations for Landfill Inspections

Landfill inspections at NAAD Sites 40 and 43 will continue at an annual frequency and be conducted in the spring to evaluate possible erosion from winter storm events. The next biennial inspection of NAAD 40 by a registered professional engineer and the next biennial survey of NAAD 40 by a registered licensed surveyor should be performed in spring 2016.

**Table 8-1
Summary of Analytes Removed From the LTM Sampling Program by Site**

MW Number	Analyses																		Comment	
	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	1,3,5-TNB	2,4,6-TNT	RDX	1,3-DNB	4-A-2,6-DNT	2-A-4,6-DNT	Perchlorate	VOCs	SVOCs	TPH-DRO	PCBs		Nitrate/Nitrite
NAAD 11B																				
97-04	R (Fall 2010)		R (Fall 2010)		R (Fall 2010)			R (Fall 2010)	R (Fall 2010)	X		R (Fall 2010)	X	R (Fall 2009)						Met ramp down requirements in Figure 4-1
97-05	R (Spring 2008)		R (Spring 2008)		R (Spring 2008)			R (Spring 2008)	R (Spring 2008)	X		X	X	R (Fall 2007)						Spring 2008 results met Fall 2007 criteria
97-06	R (Fall 2008)		R (Fall 2008)		R (Fall 2008)			R (Fall 2007)	R (Fall 2007)	X		R (Fall 2008)	R (Fall 2008)	R (Fall 2007)						Fall 2008 metals results met Spring 2008 criteria
97-08	R (Fall 2007)		R (Fall 2007)		R (Fall 2007)			R (Fall 2007)	R (Fall 2007)	X		X	R (Fall 2008)	R (Fall 2007)						Met ramp down requirements in Figure 4-1
97-09	R (Fall 2007)		R (Fall 2007)		R (Fall 2007)			R (Fall 2007)	R (Fall 2007)	X		R (Fall 2008)	R (Fall 2008)	R (Fall 2007)						Met ramp down requirements in Figure 4-1
98-02	R (Fall 2007)		R (Fall 2007)		R (Fall 2007)			R (Fall 2007)	R (Fall 2007)	R (2012)		R (Fall 2008)	R (Fall 2008)	R (Fall 2007)						Met ramp down requirements in Figure 4-1
98-03	X		X		X			X	X	X		X	X	R (Fall 2010)						Met ramp down requirements in Figure 4-1
99-03	R (Fall 2010)		R (Fall 2010)		R (Fall 2010)			R (Fall 2010)	R (Fall 2010)	X		R (Fall 2010)	X	R (Fall 2009)						Met ramp down requirements in Figure 4-1
00-01	R (2012)		R (2012)		R (2012)			R (Fall 2008)	X	X		X	X	R (Fall 2007)						Met ramp down requirements in Figure 4-1
00-02	R (Fall 2008)		R (Fall 2008)		R (Fall 2008)			R (Fall 2008)	R (Fall 2008)	X		X	X	R (Fall 2007)						Met ramp down requirements in Figure 4-1
02-01	R (Fall 2007)		R (Fall 2007)		R (Fall 2007)			R (Fall 2007)	R (Fall 2007)	X		R (Fall 2008)	R (Fall 2008)	R (Fall 2007)						Met ramp down requirements in Figure 4-1
02-02	R (2012)		R (2012)		R (2012)			X	X	X		X	X	R (Fall 2010)						Met ramp down requirements in Figure 4-1
NAAD 40																				
PMW-1		A	A	A	A	A	A							R	A	R	R	A		VOCs, TPH-DRO, and PCBs removed in 2012.
PMW-2		A	A	A	A	A	A							R	A	R	R	A		VOCs, TPH-DRO, and PCBs removed in 2012.
PMW-3		A	A	A	A	A	A							R	A	R	R	A		VOCs, TPH-DRO, and PCBs removed in 2012.
PMW-4		A	A	A	A	A	A							R	A	R	R	A		VOCs, TPH-DRO, and PCBs removed in 2012.
PMW-5		A	A	A	A	A	A							R	A	R	R	A		VOCs, TPH-DRO, and PCBs removed in 2012.

A = Frequency reduced to annual sampling

R = Analyte removed from sample matrix per ADEQ approved ramp down criteria. The dates in parenthesis are the date of the report that documents no further sampling is required.

X = Analyte remains in the LTM sampling program

DNB = dinitrobenzene

DNT = dinitrotoluene

DRO = diesel range organics

ND = not detected

PCB = polychlorinated biphenyl

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

SVOCs = semi-volatile organic compounds

TPH = total petroleum hydrocarbons

TNB = trinitrobenzene

TNT=trinitrotoluene

VOCs = volatile organic compounds