

Camp Navajo  
Stakeholder Advisory Group

Thursday, June 10, 2010  
6:00 – 8:00 PM  
Camp Navajo Training Site  
Bellemont, AZ

**Summary**

**Members in attendance:**

Nicole Coronado, ADEQ  
Shaula Hedwall, USFWS  
Lee Luedeker, AGFD  
Matt Ryan, Community member  
Randy Wilkinson, NGB  
LTC Mary Williams Lynch, Camp Navajo  
Tina Williams, Coconino National Forest

**Interested Parties:**

Tom Burkhart, City of Flagstaff  
Diana Deming, ADEQ  
Gavin Fielding, ADEMA  
Harry Hendler, ADEQ  
Janet Lynn, ADEMA  
Wayne Miller, ADEQ  
Linda Murphy, Coconino National Forest

**Members absent:**

Tom Britt, Community member  
Karen Underhill, Community member  
Kurt Novy, City of Flagstaff  
Shannon Clark, Coconino National Forest

**Guests:**

Kathleen Anthony, MKM  
Larry Dannenfeldt, Coconino County  
Dana Downs-Heimes, CH2MHill  
Marty Rozelle, The Rozelle Group  
Mark Sachara, Ponderosa Fire Dept.  
Tom Scott, private citizen

The following acronyms may be used throughout this document

ACUB	Army Compatible Use Buffer
ADEMA	Arizona Department of Emergency and Military Affairs
ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game & Fish Department
AZARNG	Arizona Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
COPC	Contaminants of Potential Concern
DD	Decision Document
DoD	Department of Defense
EDMS	Electronic Data Management System
EE/CA	Engineering Evaluation/Cost Analysis
ERA	Ecological Risk Assessment
HHRA	Human Health Risk Assessment
IAP	Installation Action Plan
IRP	Installation Restoration Program
HERA	Human Health & Ecological Risk Assessment
LTM	Long Term Management
LUC	Land Use Controls
MAMMS	Multiple Award Military Munitions Services
MAP	Management Action Plan
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern

MPPEH	Munitions Potentially Presenting an Explosive Hazard
MRWA	Munitions Response Work Areas
MWP	Master Work Plan
NAAD	Navajo Army Depot
NAU	Northern Arizona University
NGB	National Guard Bureau
OB/OD	Open Burn/Open Detonation
PCP	Post Closure Plan
ppb	Parts Per Billion
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RC	Response Complete
RIP	Remedy in Place
ROD	Record of Decision
SAG	Stakeholder Advisory Group
SRL	Soil Remediation Level
TPP	Technical Project Planning
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance

## **1. Welcome, Announcements and Action Items from February 2010 SAG Meeting**

Lee Luedeker welcomed everyone to the meeting and introductions were made all around. Lee also thanked the members of the public for coming. While all SAG meetings are posted and open to the public, extra outreach efforts are made each June. This meeting also meets CERCLA requirements for public notice and comment on the Long Term Management Review which will be presented at this meeting.

This meeting summary and the PowerPoint presentations made at this SAG meeting are posted on the two project websites:

- <http://www.CampNavajoEnvironmental.org>
- <http://www.azdeq.gov/environ/waste/sps/state.html>

LTC Mary Williams Lynch added her welcome and reported some changes at Camp Navajo. The NGB has granted Camp Navajo a new training status, Collective Training Center and Maneuver Training Center Light. This is a big responsibility for Camp Navajo as there are only 12 such sites in the entire country. Three training sites in AZ fall under Camp Navajo: Florence, Papago, and Buckeye Training Areas. MAJ Chad Abts will become the new Deputy Garrison Commander on June 21, 2010 and will serve as the primary training contact for the state. The industrial mission has been split off from the training mission. A \$2.1 million Combat Pistol Qualification Range is under construction and expected to be finished in November 2010. Renovations of Building 1 are complete. Camp Navajo is working with ADOT to plan for the projected increase in growth beyond FY 2015. The OB/OD Area Closure Project has been a tremendous effort, and it is so gratifying to see it coming close to the end.

Janet Lynn provided an update on the AZ Preserves Initiative and ACUB. Camp Navajo desires to expand its training mission and wishes to develop an Army Compatible Use Buffer (ACUB) around the training areas. Concurrently, Coconino County is attempting the purchase of state land parcels around Rogers Lake for conservation and recreation under the Arizona Preserve Initiative (API). The Rogers Lake land parcels would provide additional buffer zones to the newly proposed range expansion in the existing Camp Navajo buffer zones. Coconino County is moving

forward with the submission of a Growing Smarter grant proposal which will provide matching funds for the acquisition. The appraisal results will be presented in executive session at a County Supervisors meeting in late June. The public auction for the Rogers Lake parcels is set for October 11, 2010.

## **2. MEC Field Work Update**

Dana Downs-Heimes updated the group on the

- Open Detonation Disposal of MEC
- Resumption of MD Management Project
- Resumption of Soil Stockpile Management
- MRWA 02 Vadose Zone Monitoring

Open detonation. An open detonation of the MEC which was recovered and stored since April 2009 was completed May 6 – 21, 2010 and included almost 6400 items. No more open detonations are expected, other than blow-in-place detonation of a few remaining items.

MD Management Project. Field activities were suspended until May 24, 2010 due to deep snow. To date, 735,800 pounds of munitions debris have been recovered. Following collection, all MD is transferred to central inspection and segregation area. Every piece of MD is inspected, re-inspected, certified, and segregated according to quality control/assurance requirements and placed in secured and sealed bins

Off-site treatment status as of December 22, 2009 includes:

- 59 tons of MDAS fragments plus shaped MDAS were shipped to California Metal X for shredding and smelting.
- Shredding of 31 tons of shaped MDAS operations completed January 11-15, 2010.
- Smelting operations of 59 tons of MDAS (shredded and fragments) completed by February 22, 2010.
- 212 tons of RRD were shipped to Page Steel for direct recycle
- Shipments will resume in June, 2010.

Soil Stockpile Management. On-site management of soil stockpiled at NAAD 09C and NAAD 02 includes:

- Soil sieving to remove MEC/MPPEH and MD 20 mm and larger and segregation and disposal of expended/non-expended smoke canisters (NAAD 09C)
- Collection of soil samples to confirm chemical constituents are below Arizona NR-SRLS
- Backfill 26 OD pits known to retain rainwater and snowmelt

Field operations were resumed in late May 2010, and backfill operations were completed June 2nd. Site restoration and re-seeding should be completed prior to monsoon rains.

The last task in June is to confirm soil sampling beneath the original stockpile footprint, former soil sieving areas, former soil batch staging areas, and metal segregation and consolidation areas. Samples will be analyzed for: TPH, VOCs, SVOCs, Pesticides, Explosives, Metals, Dioxins and Furans, PCBs, White Phosphorous, and Perchlorate. Analytical results from processed soil batches and samples taken from the soils beneath the former NAAD 02 stockpiles will be incorporated into the final NAAD 02 risk assessment. Risk assessment results will be used to support the NAAD 02 Decision Document for site-related chemical constituents.

MRWA 02 Vadose Zone Monitoring Project. Final comments from ADEQ on the Year 1 (2009) Vadose Zone Monitoring Report are expected in June 2010.

The Draft Year 2 Sampling Plan was submitted to ADEQ June 1 and includes two sampling periods: December – May to capture percolation from spring snowmelt; June – September to capture percolation from monsoon rain.

2010 Vadose Zone monitoring activities include:

- Install telemetry for automated water level monitoring in selected wells
- Install modified well caps
- Replace rain gauge damaged by lightning
- Complete well repairs

### 3. **OB/OD Area Program Update**

Randy Wilkinson, NGB, provided an OB/OD Area Program Update.

#### Site Closure Status

The following table summarizes the status of all sites as of June 1. There have been no changes since the February SAG meeting.

Site	Type	Contractor	Fieldwork	R1/RSE	HHRA	ERA	DD
01	CERCLA	MKM	Complete	Final	___	Final	Final
02	RCRA	B&C	Ongoing	Final	Future	Future	Future
03	CERCLA	B&C	Complete	Final	___	Final	Final
04	CERCLA	MKM	Complete	Final	___	Final	Final
05	RCRA	AMEC	Complete	Final	Final	Final	Final
06	RCRA	AMEC	Complete	Final	Final	Final	Final
07	CERCLA	MKM	Complete	Final	Final	Final	Final
08A	CERCLA	MKM	Complete	Final	___	Final	Final
08B	RCRA	AMEC	Complete	Final	Final	Final	Final
09A	CERCLA	MKM	Complete	Final	___	Final	Final
09C	RCRA	B&C	Ongoing	Final	___	___	Final
09D	RCRA	AMEC	Complete	Final	___	Final	Final
10	CERCLA	MKM	Complete	Final	___	Final	Final
13	RCRA	B&C	Complete	Final	Final	___	Final
20	CERCLA	B&C	Complete	Final	Final	___	Future
E76	CERCLA	MKM	Complete	Final	___	___	Final

MRWA	Type	Investigation	Removal	RI	EE/CA	PP	DD
01	CERCLA	Complete	Complete	Final	Final	Final	Final
02	RCRA	Complete	Complete	Final	Draft	---	Future
20	CERCLA	Complete	---	Final	Final	Final	Final

#### Decision Documents

Decision Documents have been completed for:

- NAAD 09C DD and ESD (B&C site)
- 7 OB/OD Area CERCLA Sites (MKM sites)
- NAAD 03 (B&C site)
- NAAD 13 (B&C site)
- 4 OB Sites (AMEC sites)
- MRWA 01 and 20 (CH2M HILL)

DDs undergoing ADEQ review:

- 5 IRP LTM Sites (B&C)

DDs undergoing NGB review:

- 28 IRP Buyout Sites (B&C)
- 18 IRP Non-Buyout Sites (B&C)

DDs will be prepared for:

- 7 IRP Ineligible Sites (B&C/CH2M HILL)
- NAAD 02 (B&C/CH2M HILL)
- MRWA 02 (CH2M HILL)

#### Program Schedule

**Winter/Spring 2010** - Reports undergoing ADEQ review:

- MRWA 02 EE/CA report
- Year 1 vadose zone monitoring report
- Year 2 vadose zone sampling plan addendum
- MRWA 02 surface MEC removal after action report

**Spring/Summer 2010** - Complete field work

- Soil management project
- MD management project
- Final open detonation event
- Spring vadose zone sampling event

**Summer/Fall 2010** - Prepare reports

- Soil management project after action report
- MD management project after action report
- Open Detonation event after action report
- NAAD 02 risk assessment
- NAAD 02 DD
- MRWA 02 DD
- Final Explosives Safety Submission
- RCRA post closure permit application

**Fall/Winter 2011** - CERCLA long term management

- New contract for IRP LTM (ER,A funds)
- NAADs 11B, 40, and 43
- MRWA 01

**RCRA post closure care**

- New contract for RCRA PCC (O&M funds)
- MRWA 02

Post closure area is proposed to be the ICM Waiver area at 693 acres. Approximately 4,300 acres will have been returned to use for the training mission.

#### **4. Long Term Management Review**

Kate Anthony of MKM Engineers, Inc. presented the results of the first Five-Year Review for five sites administered under the U.S. Army's Installation Restoration Program (IRP) at Camp Navajo. The purpose of the Five-Year 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 IRP was implemented in cooperation with ADEQ, and the USEPA. The Five-Year Review was conducted on behalf of the NGB and the AZARNG in accordance with the USEPA *Comprehensive Five-Year Review Guidance* (USEPA, 2001).

The five IRP sites included in this review are NAAD Site 11B (Building 318/319 TNT Washout Facility), NAAD Site 14D (Building 322, Paint Operations), NAAD Site 14G (Building 327 Rust Removal), NAAD Site 40 (Former Sanitary Landfill), and a sub-site of NAAD Site 43 (the Former Construction Debris Landfill #5). Camp Navajo is subdivided into six areas (Administration Area, Warehouse Area, Ammunition Workshop Area, Igloo and Standard Magazine Areas, Demolition Area, and Buffer Areas). The five IRP sites addressed in this Five Year Review are located in the Ammunition Workshop Area, the Standard Magazine Area, and the West Buffer Area.

Extensive data for each site can be reviewed in the attached PowerPoint presentation and at the public repository locations. Reported data for each site includes a description of the site's original land and resource use, a map, chronology of events beginning with the first investigation (often 30 years ago), and the final characterization which includes the contaminants of concern. Results are reported for the human health risk assessment, the groundwater protection screening, groundwater evaluation, and surface water evaluation, if appropriate. All remedial action objectives for all sites have been achieved.

MKM has made specific recommendations for each site, ranging from site closure and IRP status of Response Complete to less frequent water sampling and visual inspection.

MKM concludes the LTM review by saying, "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."

The next Five-Year Review is required by October 2015, five years from the date of this review.

#### **5. Call to the Public**

No one from the public asked questions or made comments.

#### **6. Next SAG meeting**

The next SAG meeting will be Thursday, October 14, 2010 from 10 a.m. to 12 noon.



*Five-Year Review for  
NAAD Sites 11B, 14D, 14G, 40, and 43  
Camp Navajo, Arizona*

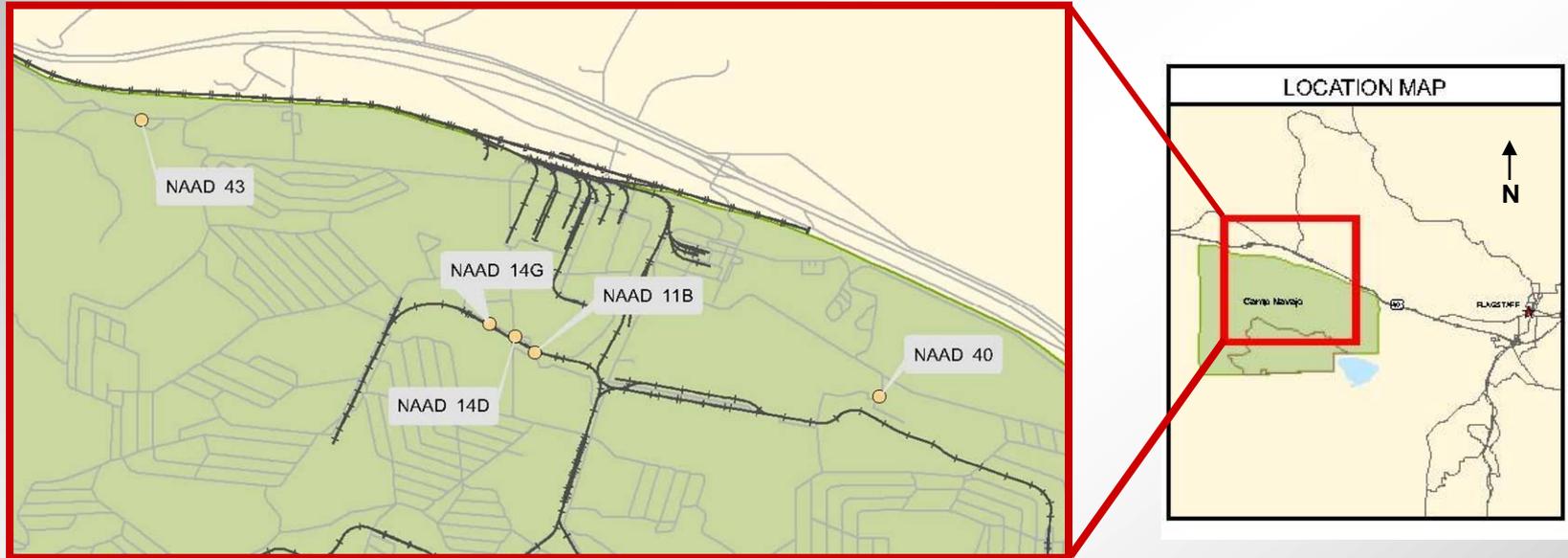


[www.ArizonaArmyGuard.com](http://www.ArizonaArmyGuard.com)

- MKM Engineers, Inc. (MKM) is conducting the first Five-Year Review for five sites administered under the U.S. Army's Installation Restoration Program (IRP) at Camp Navajo, Coconino County, Arizona.
- The IRP was implemented in cooperation with The Arizona Department of Environmental Quality (ADEQ), and the U.S. Environmental Protection Agency (USEPA).
- The Five-Year Review was conducted on behalf of the National Guard Bureau (NGB) and the Arizona Army National Guard (AZARNG) in accordance with the USEPA *Comprehensive Five-Year Review Guidance* (USEPA, 2001).
- The NGB is the lead agency for the Five-Year Review. ADEQ is the state regulatory agency.
- This purpose of the Five-Year 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.



# Five-Year Review for NAAD Sites 11B, 14D, 14G, 40, and 43 Camp Navajo, Arizona



- The five IRP sites included in this review are Navajo Army Depot (NAAD) Site 11B (Building 318/319 TNT Washout Facility), NAAD Site 14D (Building 322, Paint Operations), NAAD Site 14G (Building 327 Rust Removal), NAAD Site 40 (Former Sanitary Landfill), and a sub-site of NAAD Site 43 (the Former Construction Debris Landfill #5).



*Five-Year Review for  
NAAD Sites 11B, 14D, 14G, 40, and 43  
Camp Navajo, Arizona*



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## **Camp Navajo Site Background**

- Camp Navajo was originally named Navajo Ordnance Depot. When the installation was under control of the Department of the Army, Camp Navajo was known as the Navajo Army Depot and Navajo Depot Activity. On transfer to the AZARNG, it was renamed Camp Navajo.
- Camp Navajo is situated on 28,347 acres of forested and prairie lands located approximately 10 miles west of Flagstaff, Arizona, south of Interstate 40 at exit 185 in Bellemont, Coconino County.
- Camp Navajo is subdivided into six areas (Administration Area, Warehouse Area, Ammunition Workshop Area, Igloo and Standard Magazine Areas, Demolition Area, and Buffer Areas). The five IRP sites addressed in this Five Year Review are located in the Ammunition Workshop Area, the Standard Magazine Area, and the West Buffer Area.



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**NAAD 11B – Land and Resource Use**



Building 318/319 housed the former trinitrotoluene (TNT) washout and recovery operations. Activities Conducted at Building 318/319 included:

- Cleaning of explosives from ordnance and processing recaptured material for reuse;
- Discharging of wastewater generated during cleaning processes to surface impoundments, then to a closed system for transportation to other portions of the site.

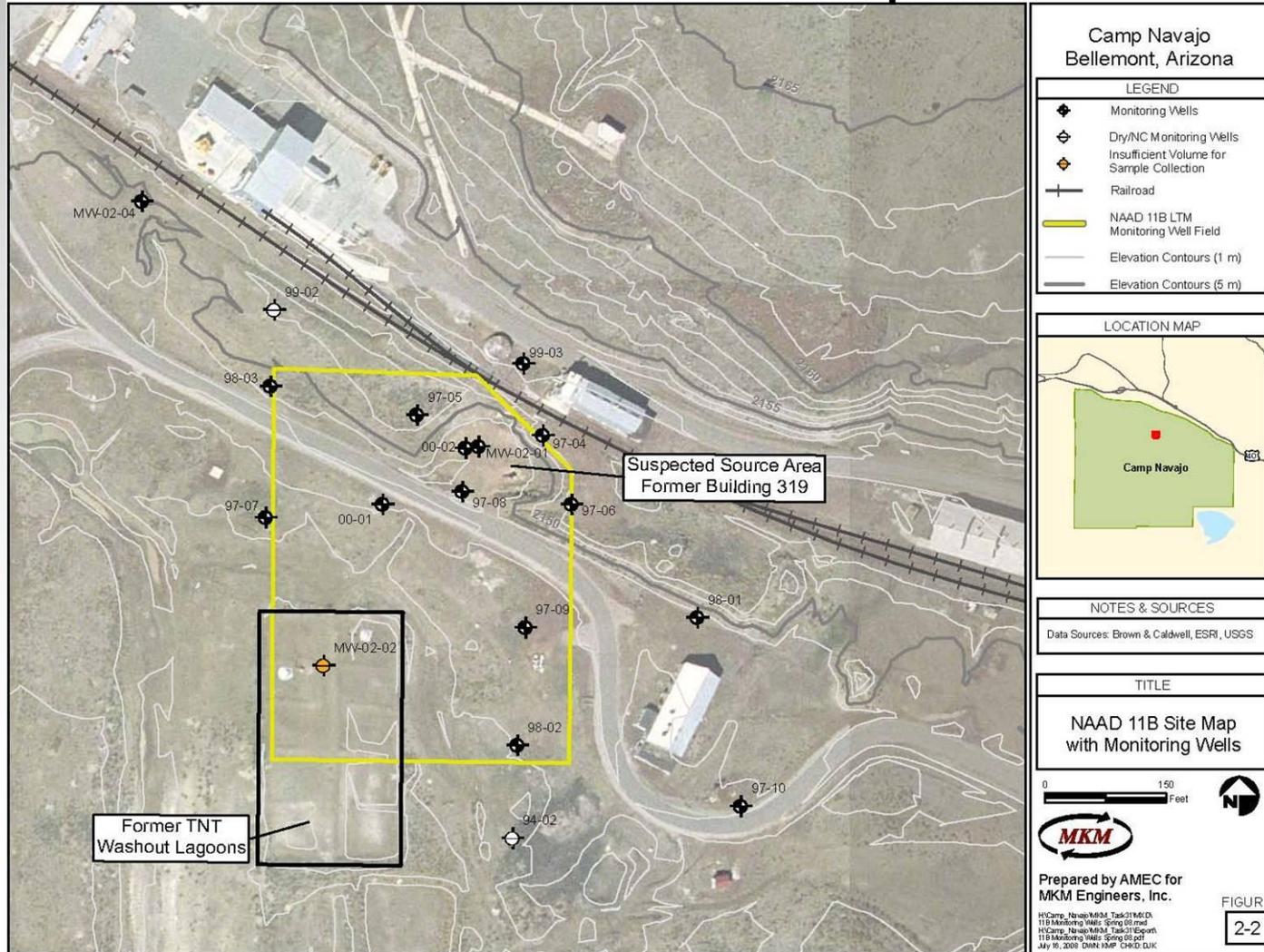
Washout operations were discontinued at Building 318/319 in 1972 when TNT cleaning equipment was removed from the site. Building 319 was demolished in 1999.



# Five-Year Review for NAAD Sites 11B, 14D, 14G, 40, and 43 Camp Navajo, Arizona



## NAAD 11B – Site Map



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NAAD Sites 11B, 14D, 14G, 40, and 43  
Camp Navajo, Arizona*



**NAAD 11B Chronology of Events**



- Investigations began at NAAD 11B in 1981. Activities included soil borings and soil sampling, monitoring well installation, and groundwater and surface water sampling.
- A remedial investigation/feasibility study (RI/FS) and a supplemental RI/FS were conducted from 1995 through 2001. Activities included a passive soil gas survey, surface and subsurface soil sampling, groundwater sampling, and geophysical surveys.
- Interim removal actions were conducted in 1996 and 1999. The removal actions included soil excavation and verification sampling.
- Long-term management (LTM) began in 2005 and included groundwater monitoring, well rehabilitation.
- Ramp-down of the groundwater monitoring program began in 2007.

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**NAAD 11B Final Characterization**



**NAAD 11B Final Characterization**

The data collected at NAAD 11B during final site characterization, combined With information generated from previous investigations, were used to identify the contaminants of concern (COCs) for NAAD 11B:

- Explosives – 1,3,5-Trinitrobenzene (1,3,5-TNB), 2,4,6-TNT, 2-amino-4,6-dinitrotoluene (2-A-4,6-DNT), 4-amino-2,6-dinitrotoluene (4-A-2,6-DNT), and 1,3,5-Trinitro-1,3,5-Triazine (RDX).
- Metals – arsenic, beryllium, chromium.



*Five-Year Review for  
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## **Human Health Risk Assessment**

Results of the Tier 1 human health risk assessment (HRA) indicated that all detected chemicals in soil at NAAD 11B passed the nonresidential soil remediation level (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 a Tier 1 and Tier 2 HRA indicated that there were **no significant potential risk or hazard from human exposures attributable to site-related chemical constituents in soil at NAAD 11B.**

## **Groundwater Protection Screening**

Metals detected in soil were screened in a Tier 1 leaching evaluation for groundwater protection level (GPL) exceedences. Two elements failed the Tier 1 assessment. Therefore, a Tier 2 evaluation was conducted that considered aqueous-phase migration and retardation. **None of the chemicals detected during characterization or IRA confirmation sampling posed a risk to groundwater quality.**

## **Groundwater Evaluation**

Analytical results for groundwater samples were generally non-detect, with the exception of explosive compounds and several metals. Several explosive compounds and metals have no established Aquifer Water Quality Standards (AWQSs). However, beryllium and chromium exceeded their respective AWQSs.

## **Surface Water Evaluation**

No surface water samples were collected at NAAD 11B.



## **NAAD 11B – Remedial Action Objectives**

The IRP status of NAAD 11B is considered remedy in place because no unacceptable risk is associated with chemical constituents in the soil at NAAD 11B. However, **explosive compounds continue to be detected in some of the wells at NAAD 11B. Therefore, groundwater monitoring and land use controls (LUCs) are appropriate to verify the effectiveness of the completed removal action.** The monitoring and LUC objectives for NAAD 11B are as follows:

- Monitor groundwater quality to ensure the effectiveness 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.



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**NAAD 14D – Land and Resource Use**



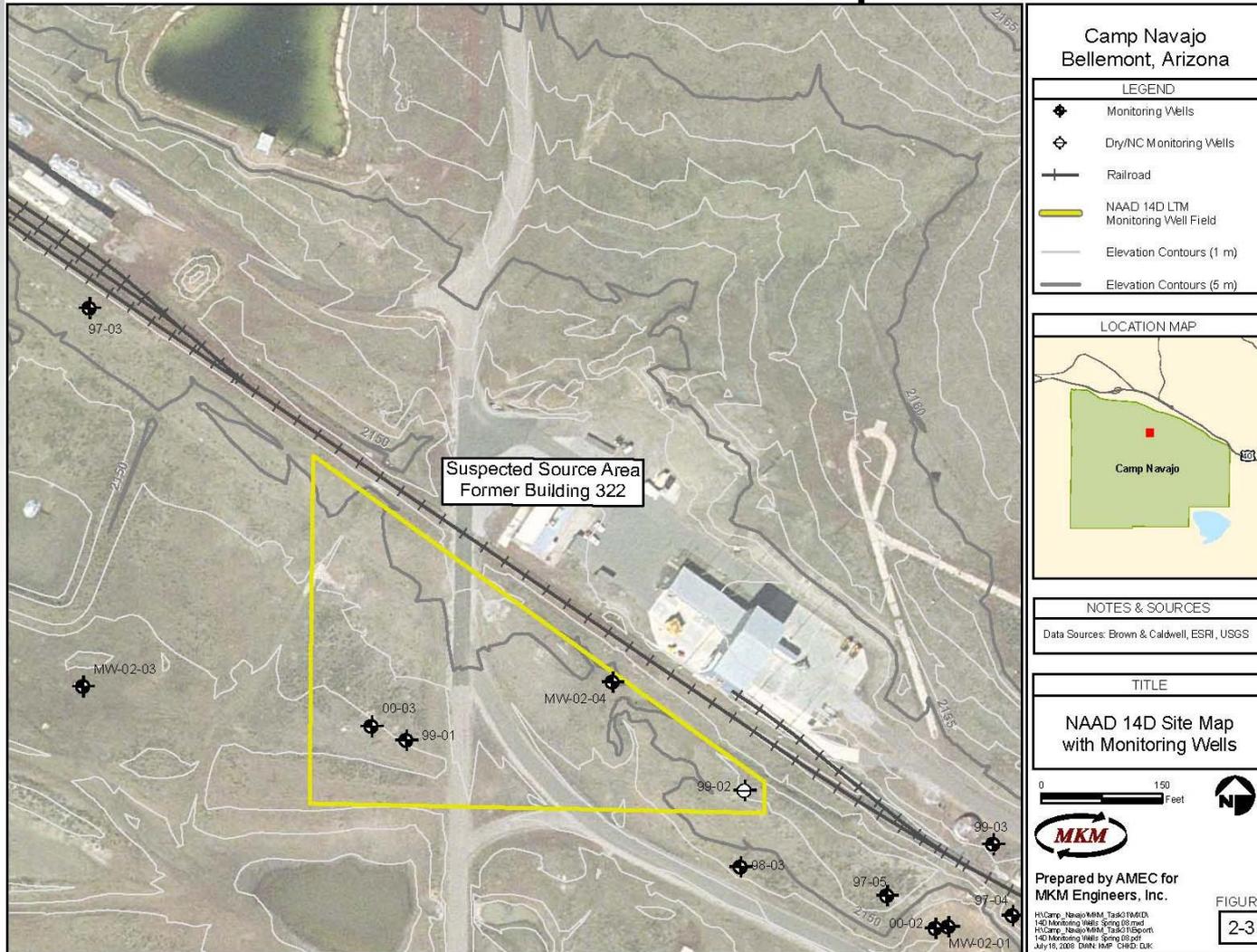
- Building 322 was a 4,840 square foot facility used for degreasing, cleaning, and spray painting ammunition in the Ammunition Workshop Area.
- Building 322 contained two paint booths and four acid stripping tanks.
- Release mechanisms included spills, washout from daily operations, and discharge piping.
- Approximately 20 percent of the northern end of the building was removed in 1998 to accommodate road construction and widening of the access area into Building 375.



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**NAAD 14D – Site Map**



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**NAAD 14D Chronology of Events**



- Investigations at NAAD 14D began in 1981.
- Remedial investigations of Building 322 were conducted in 1996 and 2001. Activities included a passive soil gas survey, surface and subsurface soil sampling, surface water sampling, and groundwater sampling.
- Decontamination and demolition of Building 322, soil excavation, and verification soil sampling was completed in 2004.
- LTM activities began in 2005 and included groundwater monitoring, well rehabilitation.
- Groundwater sampling was discontinued in 2008 when LTM ramp-down requirements were achieved.



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**NAAD 14 D Final Characterization**



Based on the review of analytical exceedances (regulatory action levels) from previous investigations for both soils and groundwater, the following COCs have been identified for NAAD 14D:

- Explosives – Dinitrobenzene (DNB) , 1,3,5-TNB, 2,4,6-TNT, 2-A-4,6-DNT, 4-A-2,6-DNT, and RDX;
- Metals – beryllium, cadmium, chromium, lead, and mercury;
- Perchlorate



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## **Human Health Risk Assessment**

### **Human Health Risk Assessment**

Results of the Tier 1 HRA indicated that all 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 were **no significant potential risk or hazard from human exposures attributable to site-related chemical constituents in soil at NAAD 14D.**

### **Groundwater Protection Screening**

Chemical constituents detected in soil were screened in a Tier 1 leaching evaluation for GPL exceedances. All detected constituents passed the Tier 1 leaching evaluation indicating that **none of the detected constituents pose a risk to groundwater quality.**

### **Groundwater Evaluation**

Detected chemical constituents in groundwater were less than their respective AWQs with the exception of a beryllium concentration in one sample. With that exception, no impact to groundwater is indicated, which is consistent with the findings of the leaching evaluation.

### **Surface Water Evaluation**

Detected chemical constituents in surface water were less than their respective numeric ALWQS. No impact to surface water is indicated.



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## **NAAD 14D – Remedial Action Objectives**

The IRP status of NAAD 14D is considered remedy in place because no unacceptable risk is associated with chemical constituents in the soil and surface water at NAAD 14D. However, final remedial actions were conducted at NAAD 14D after final groundwater characterization samples were collected. Therefore, groundwater monitoring and LUCs are appropriate to ensure the effectiveness of the completed removal action. The monitoring and LUC objectives for NAAD 14D are as follows:

- Monitor groundwater quality to ensure the effectiveness 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 14D until contaminant concentrations are determined to be acceptable.



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**NAAD 14G – Land and Resource Use**



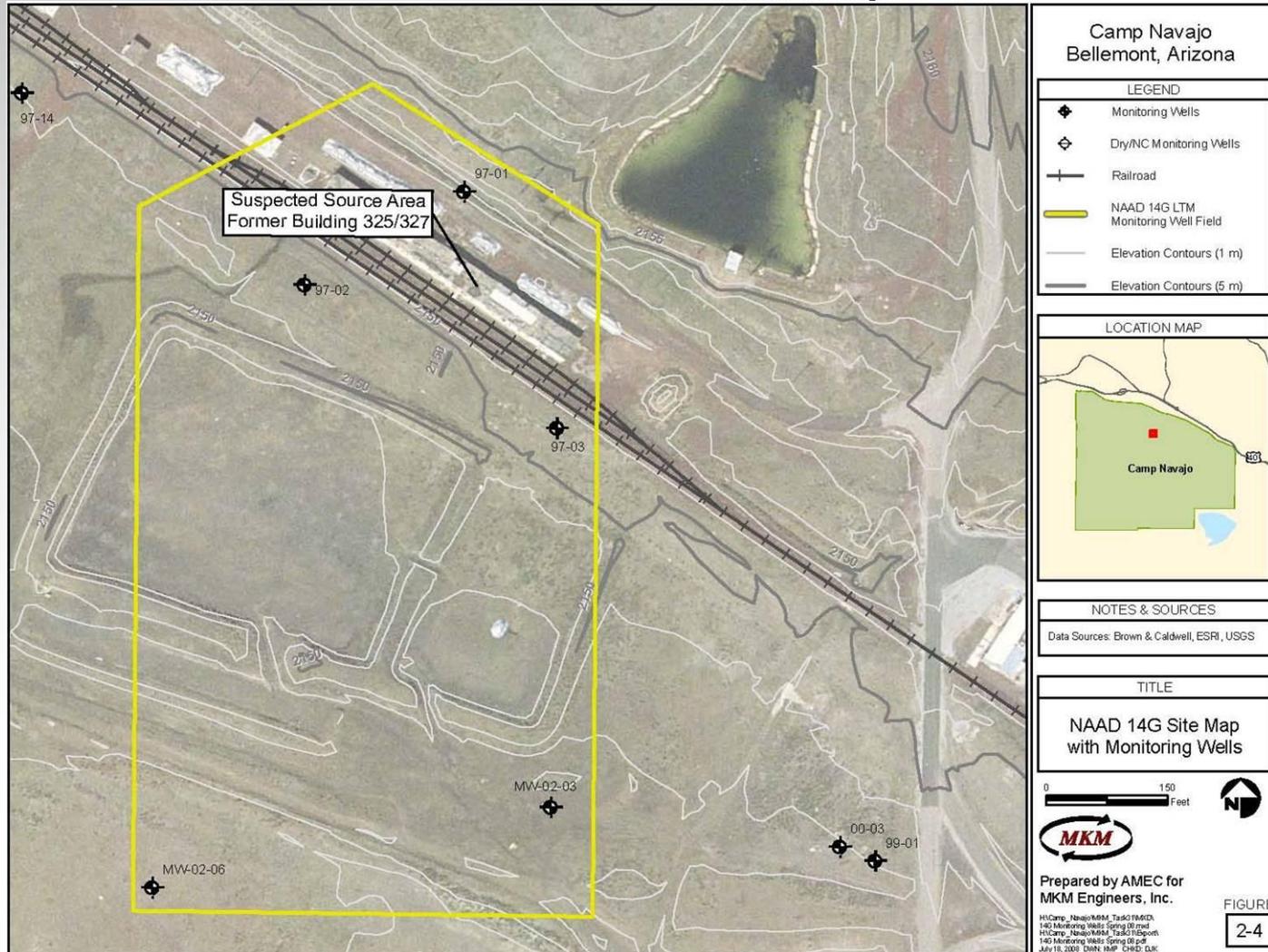
- Building 327 was used for ammunition repair and disposal. Specific tasks included repacking shells, disassembling boosters, spray painting, and small arms ammunition disposal.
- Release mechanisms included activities associated with ammunition repair and disposal conducted in building 327.
- Extensive soil, groundwater, and surface water investigations were conducted at this site.



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## NAAD 14G – Site Map



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## NAAD 14G Chronology of Events



- Investigations at NAAD 14G began in 1981.
- A RI/FS was conducted in 1995 through 1997, when Building 325 was demolished.
- Interim removal actions and final characterization of soil and groundwater were completed in 2003.
- Remedial actions taken in 2002 and 2003 removed approximately 2,780 tons of lead-impacted soil from the site.
- LTM activities began in 2005 and included groundwater monitoring, well rehabilitation.
- Groundwater sampling was discontinued in 2008 when LTM ramp-down requirements were achieved.



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**NAAD 14G Final Characterization**



Based on the review of analytical exceedances for both soils and groundwater, the following COCs have been identified for NAAD 14G:

- Explosives – 2,4,6-TNT, TNB, 2-A-4,6-DNT, 4-A-2,6-DNT, and RDX;
- Metals – arsenic, barium, beryllium, cadmium, lead, and mercury;
- Perchlorate.



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### **Human Health Risk Assessment**

Results of the Tier 1 HRA indicated that all detected chemicals in soil at NAAD14G passed the NR-SRL screen. A limited number of constituents with reporting limits that exceeded the SRL were carried into a Tier 2 HRA. The HRA concluded that there was no significant potential risk or hazard from human exposures attributable to site-related chemical constituents in soil at NAAD 14G.

### **Groundwater Protection Screening**

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 do not pose a risk to groundwater quality.

### **Groundwater Evaluation**

Detected chemical constituents in groundwater were less than their respective AWQs with the exception of a beryllium concentration in one sample. With that exception, no impact to groundwater is indicated, which is consistent with the findings of the leaching evaluation.

### **Surface Water Evaluation**

Detected chemical constituents in surface water were less than their respective numeric AWQs. No impact to surface water at NAAD 14G is indicated.



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## **NAAD 14G – Remedial Action Objectives**

The IRP status of NAAD 14G is considered remedy in place because no unacceptable risk is associated with chemical constituents in the soil and surface water at NAAD 14G. However, groundwater monitoring and LUCs are appropriate at NAAD 14G to verify the effectiveness of the completed removal action. The monitoring and LUC objectives for NAAD 14G are as follows:

- Monitor groundwater quality to ensure the effectiveness 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 14G until contaminant concentrations are determined to be acceptable.



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**NAAD 40 – Land and Resource Use**



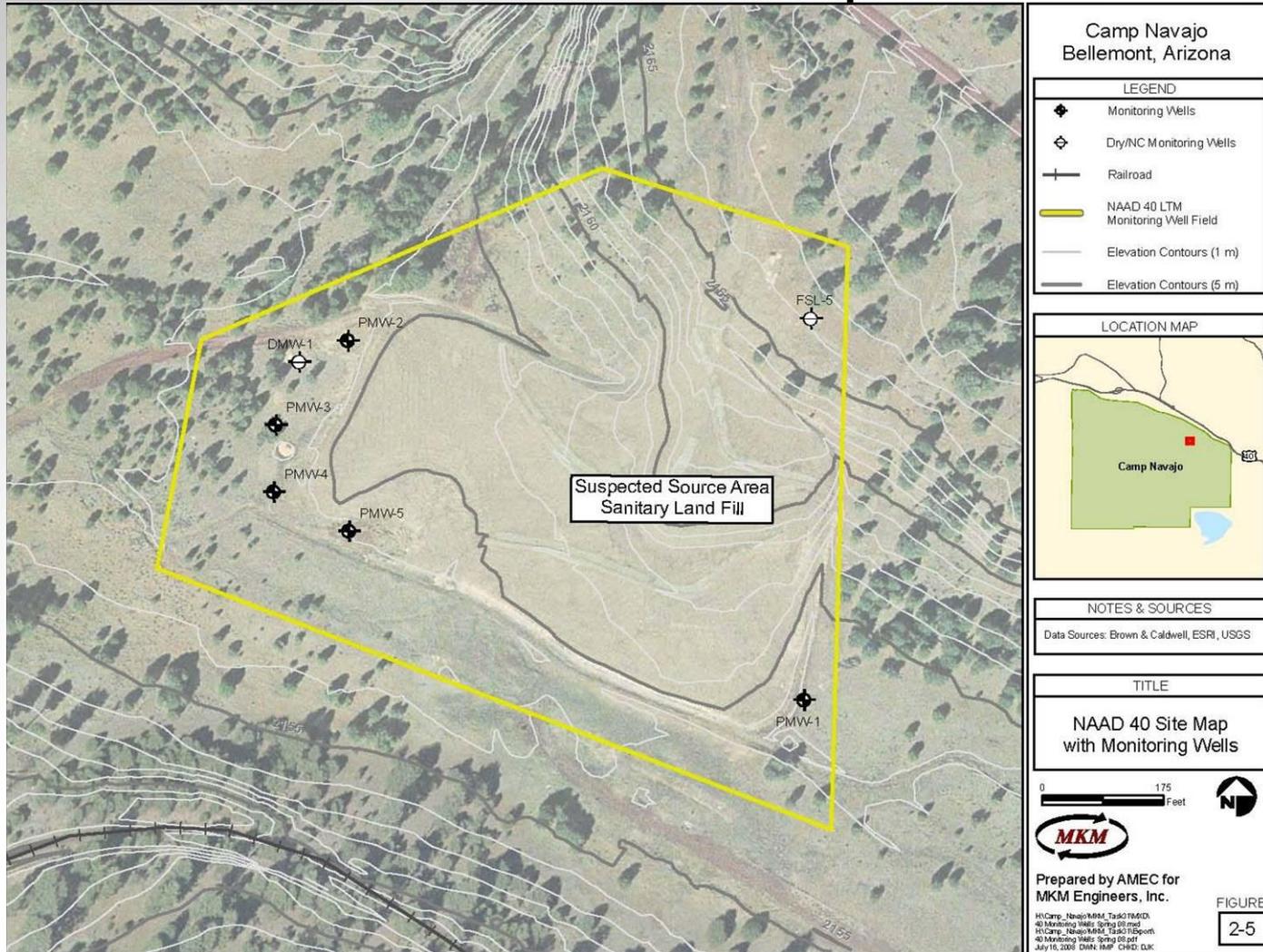
- The Former Sanitary landfill (FSL) NAAD 40 covers approximately six acres and is located in a shallow alluvial valley in the eastern standard magazine area of Camp Navajo.
- The FSL was in operation from the 1940s until 1966, receiving primarily household waste. The site received dried sewage sludge between 1966 and 1981 and has been inactive since 1981.
- The FSL was capped in 2001.
- ADEQ considers the status of this site to be “No Further Action (NFA)”. ADEQ also recommends groundwater monitoring and annual inspections.



# Five-Year Review for NAAD Sites 11B, 14D, 14G, 40, and 43 Camp Navajo, Arizona



## NAAD 40 – Site Map



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## NAAD 40 Chronology of Events



- Investigations at NAAD 40 began in 1981.
- An RI/FS and supplemental RI/FS were conducted from 1984 through 1999. Activities included a passive soil gas survey, excavation of test pits, waste sampling, surface and subsurface soil sampling, and groundwater sampling.
- An engineering evaluation and cost analysis (EE/CA) was performed the construction of the landfill cap was completed in 2001.
- LTM began in 2005 and included groundwater monitoring, well rehabilitation, and landfill cap repair.
- Ramp-down of the groundwater monitoring program began in 2007. Sampling frequency was reduced from semiannual to annual monitoring.



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**NAAD 40 Final Characterization**



A list of COCs was developed based on data from previous investigations that identified contaminant concentrations that exceeded Arizona's regulatory levels. The COCs identified in the EE/CA are as follows:

- Metals – arsenic, barium, beryllium, cadmium, chromium, and lead.
- Semivolatile Organic Compounds (SVOCs) - benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.
- Total recoverable petroleum hydrocarbons (TRPH).
- Nitrate
- Aroclor 1248

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## **Human Health Risk Assessment**

The Tetra Tech risk screening compared soil analytical results against Arizona Health-Based Guidance Level (HBGLs) and USEPA Region 9 Preliminary Remediation Goals (PRGs) assuming a non-residential land use scenario for NAAD 40. The HRA concluded that there was no significant potential risk or hazard from human exposures attributable to site-related chemical constituents in soil at NAAD 40.

## **Groundwater Protection Screening**

An evaluation of potential leaching of detected chemicals to groundwater was not performed. However, groundwater data collected to date does not indicate that analytes in the soil or landfill wastes have caused a degradation of groundwater quality.

## **Groundwater Evaluation**

Groundwater samples collected RI were evaluated as part of the risk screening process. The groundwater data were evaluated against Arizona HBGLs for drinking water sources and AWQs. Although, several metals were detected at concentrations exceeding HBGLs and AWQs, concentrations of detected compounds in shallow perched groundwater do not pose a potential risk to human health under a non-residential exposure scenario. Groundwater data collected subsequent to the risk screening supports this determination.

## **Surface Water Evaluation**

Surface water samples at locations upstream and downstream of the FSL as part of the Supplemental RI. All detected concentrations were less than their respective AWQs. Surface water does not appear to have been adversely impacted by waste disposed at NAAD 40 and is unlikely to pose an unacceptable risk to human health or ecological receptors.



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## **NAAD 40 – Remedial Action Objectives**

The IRP status of NAAD 40 is considered remedy in place because no unacceptable risk is associated with site-related chemical constituents in the soil, groundwater, and surface water at NAAD 40. However, hazardous substances that remain in site waste necessitate periodic inspections, maintenance, and LUCs to protect the integrity of the landfill cap. The monitoring and LUC objectives for NAAD 40 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 effectiveness of the landfill cap;
- Evaluate the reproducibility and accuracy of 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;
- 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.



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**NAAD 43 – Land and Resource Use**



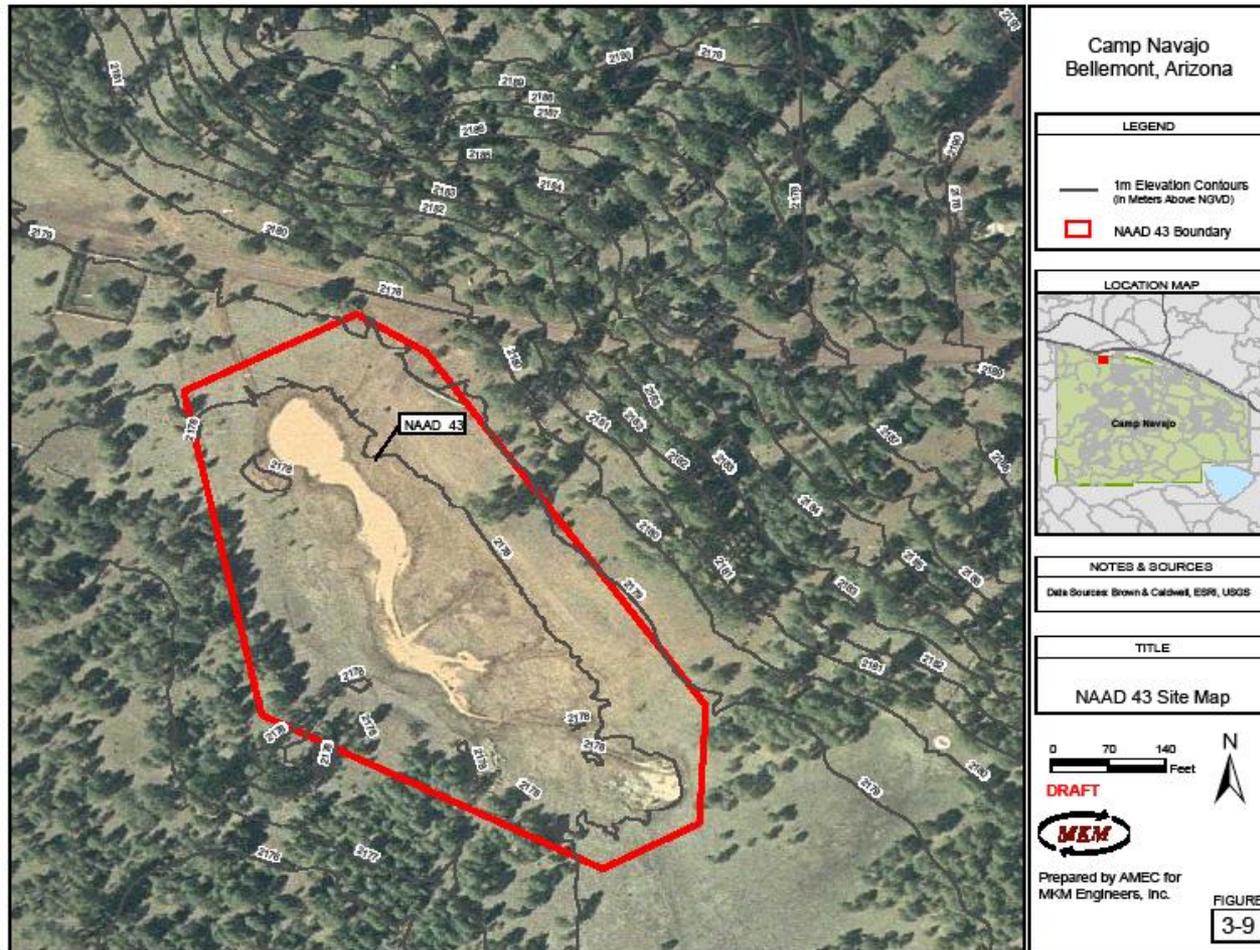
- NAAD 43 was also known as former construction debris landfill #5 (FDCL#5) and is approximately four acres in size.
- Wood, concrete, bricks, metal, glass, asphalt, roofing material, and ceramic tile from the destruction of “Indian Village” were placed in FCDL #5.
- The debris and contaminated soil were removed from this landfill and disposed at an appropriate waste management facility in 1998 and 2001.
- ADEQ has designated this site for Construction Complete, No Further Remedial Action. ADEQ also recommended LUCs, annual site inspections and maintenance, and preparation of an operation and maintenance (O&M) Plan.



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**NAAD 43 – Site Map**





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## NAAD 43 Chronology of Events



- A remedial investigation was conducted at NAAD 43 in 1995 and 1996. Activities included a geophysical survey, a passive soil gas survey, excavation of test pits, and surface and subsurface soil sampling.
- A removal action was conducted from 1998 to 2001 and included soil excavation and verification sampling.
- In 2004, ADEQ issued a letter designating this site as Construction Complete, No Further Remedial Action.
- An operation and maintenance plan and LUCs were implemented and semiannual site inspections began in 2005.
- Routine maintenance activities were conducted in 2008



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## NAAD 43 Final Characterization



A list of COCs was developed based on data from previous investigations that identified contaminant concentrations that exceeded regulatory levels. The COCs identified at NAAD 43 are as follows:

- Metals – arsenic, beryllium, and lead.
- SVOCs - benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene.
- TRPH.



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## **Human Health Risk Assessment**

A human-health risk screening was conducted for FCDL #5 as part of the Remedial Investigation. The HRA concluded that that polycyclic aromatic hydrocarbons (PAH) concentrations in soil may represent an unacceptable risk to human health under a non-residential exposure scenario. However, subsequent remedial actions mitigated the unacceptable risks associated with COCs in soil by excavating impacted soil and construction debris. Confirmation sample results indicated that residual COC soil concentrations were below regulatory limits, indicating that unacceptable risks to human health no longer remained.

## **Groundwater Protection Screening**

A leaching to groundwater evaluation was conducted before the remedial action. The default and site-specific GPLs were calculated for PAHs. Using the ADEQ leachability model, it was determined that potential impact to groundwater from PAHs was not likely.

## **Groundwater Evaluation**

Shallow groundwater was not identified at FCDL #5, so an evaluation of groundwater quality was not conducted .

## **Surface Water Evaluation**

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



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## **NAAD 43 – Remedial Action Objectives**

The IRP status of NAAD 43 is considered remedy in place because no unacceptable risk is associated with site-related chemical constituents in the soil, groundwater, and surface water at NAAD 43. Inspections, maintenance, and LUCs are appropriate to verify the effectiveness of the remedy to satisfy the Comprehensive Environmental Response, Compensation, and Liability Act/ National Contingency Plan (CERCLA/NCP) risk-based cleanup requirements. The monitoring and LUC objectives for NAAD 43 are as follows:

- 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 stormwater runoff; and
- Restrict activities that could impact the integrity of the land surface and drainage features.



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**Ammunition Workshop Area  
NAADs 11B, 14D and 14G**



**Former Sanitary Landfill  
NAAD 40**

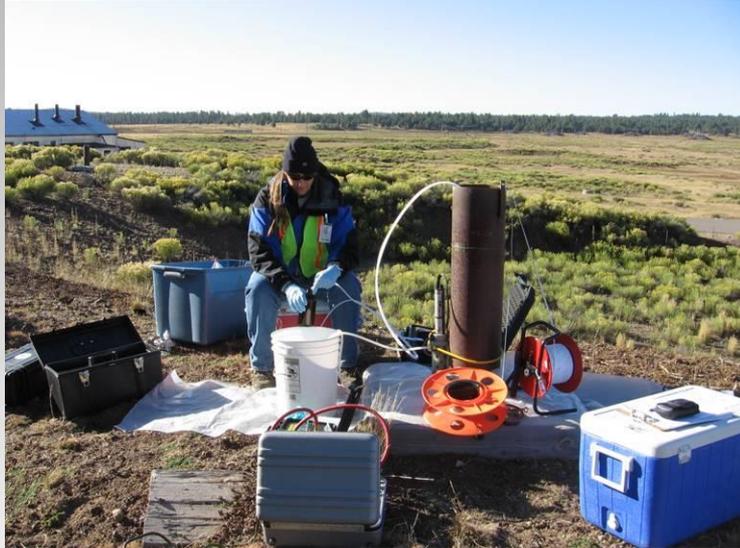


**Former Construction Debris Landfill  
NAAD 43**

- Remedial actions at the five IRP LTM sites were conducted from 1996 through 2001 following the CERCLA/NCP risk-based cleanup process.
- The trigger date for a Five-Year Review on a CERCLA site is the start of remedy construction and should have been the start of excavation in 1996.
- However, remedial actions at the five IRP 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.



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- The draft Decision Document (Brown & Caldwell, 2010) summarized potential impacts to human health and the environment associated with remaining site-related chemical constituents and selected groundwater monitoring and 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.

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## **CERCLA Five-Year Review Process**

### **Document Review**

Relevant documents, including work plans, construction and closure reports, and groundwater monitoring reports were reviewed. The following regulatory standards were reviewed to identify any changes that could affect the validity of the assumptions underlying the cleanup levels.

- Arizona Soil Remediation Standards Rule (Arizona Revised Statutes [A.R.S.] 49-151-152) and Arizona Administrative Code (A.A.C.) R18-7, Soil Remediation Levels;
- ADEQ Groundwater Protection Levels (September 1996 guidance, A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality);
- Arizona Aquifer Water Quality Standards (A.A.C., Title 18, Chapter 11, Article 4); and
- Agricultural and Livestock Water Quality Standards for Surface Waters (A.A.C. Title 18, Chapter 11, Article 1. Appendix A. Numeric Water Quality Criteria).



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## **CERCLA Five-Year Review Process (Continued)**

### **Data Review**

- Groundwater monitoring data and landfill inspection and survey data collected during the last five years of LTM were reviewed to assess the effectiveness of the remedy in meeting the remedial action objectives.

### **Interviews**

- The AZARNG Cleanup Manager, ADEQ Project Manager, Coconino County Supervisor, NGB Project Manager, and AZARNG Biologist were interviewed to identify successes or issues with remedy implementation and to develop a greater understanding of the status of the five IRP sites.

### **Site Inspection**

- An inspection of the five sites was conducted on April 15, 2010 to provide information about the sites status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area.

### **Community Involvement**

- Community involvement included notification to the community and interested parties via a newsletter, newspaper ad, news release, and a Camp Navajo Stakeholder Advisory Group (SAG) meeting.



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## **CERCLA Five-Year Review Findings**

### **Document Review Findings**

A review of the relevant documents was conducted and included the work plans, construction and closure reports, groundwater monitoring reports, and regulatory standards.

- A review of the Camp Navajo Real Property Development Plan (Colorado DataScapes, 2009) indicates that current and reasonably anticipated future land use has not deviated from the assumptions used during closure of the five LTM Sites, which was continued industrial use.
- Applicable regulatory limits used for soil and groundwater were reviewed. The USEPA Region IX Tap Water PRGs as listed in the LTM Work Plan were compared to their 2009 revision, the USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites.
- The 1992 AWQS were also compared to the 2009 revision of the Arizona Numeric Water Quality Criteria (NWQC) for drinking water.
- The 1997 Arizona residential and non-residential SRLs used in previous investigations at the LTM sites were compared to their 2007 revision.

Revised groundwater screening guidance concentrations were less than preliminary guidance concentrations for benzo(b)fluoranthene, benzo(a,h)anthracene, hexavalent chromium, and lead in groundwater. Hexavalent chromium is not an identified COC at any of the five IRP sites and none of the listed SVOCs or metals were detected in samples collected from NAAD 40 where groundwater samples were analyzed for metals and SVOCs.

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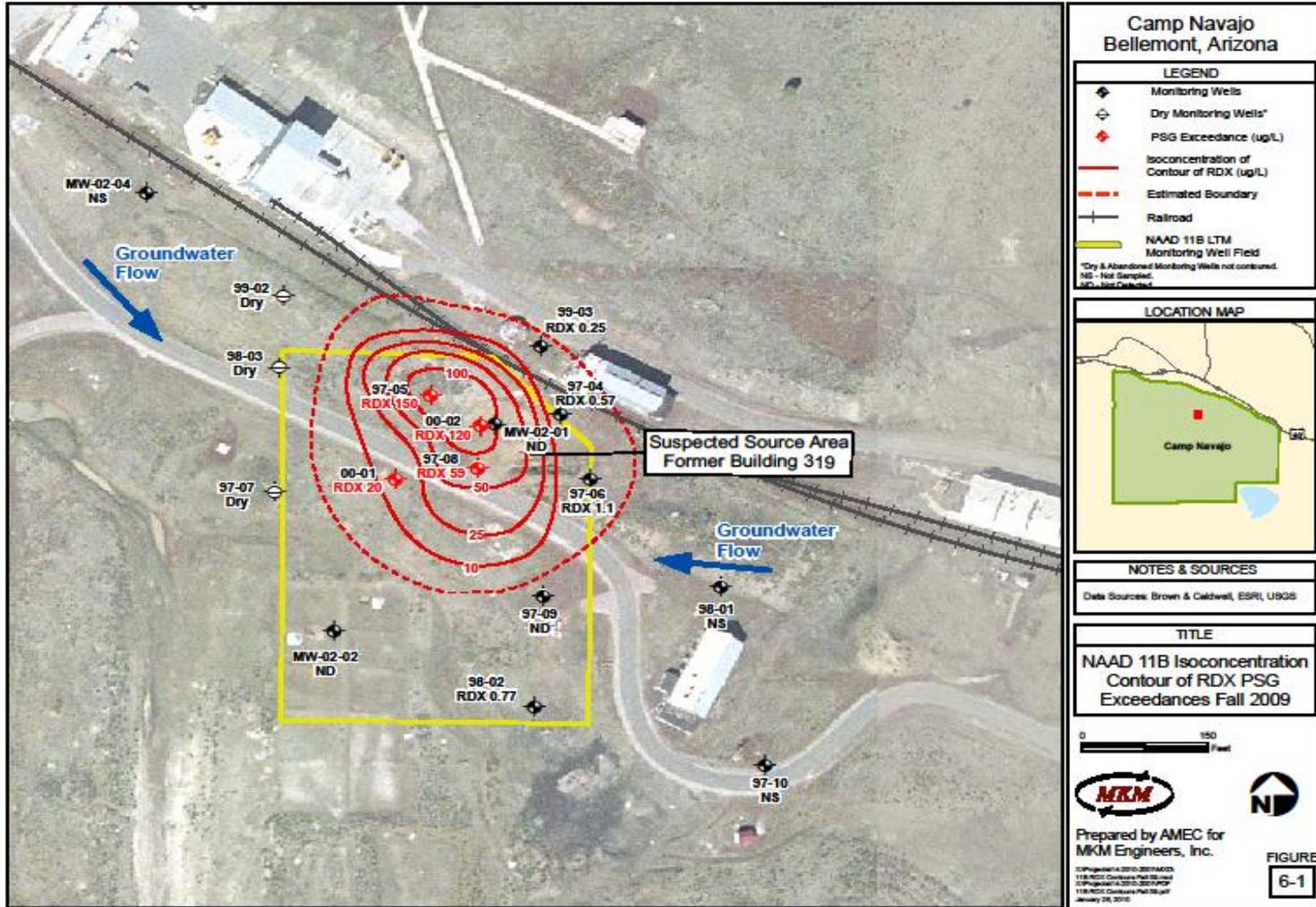
## **CERCLA Five-Year Review Findings**

### **Data Review Findings for NAAD 11B**

- Based on four years of groundwater data, the RDX plume appears to be relatively stable and does not appear to be migrating away from the source area.
- Explosives have been detected at concentrations greater than their respective preliminary screening guidance (PSG) or 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.



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## **CERCLA Five-Year Review Findings**

### **Data Review Findings for 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.
- NAAD 14D was removed from the LTM sampling program in Fall 2008 because LTM ramp-down requirements had been achieved.



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## **CERCLA Five-Year Review Findings**

### **Data Review Findings for 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. Detected concentrations of these elements did not exceed the PSG in subsequent sampling events.
- All other detected concentrations (metals) were less than the PSG.
- NAAD 14G was removed from the LTM sampling program in Spring 2008 because LTM ramp-down requirements had been achieved.



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## **CERCLA Five-Year Review Findings**

### **Data Review Findings for NAAD 40**

- No contaminants have been detected at concentrations greater than the PSG in any NAAD 40 wells since LTM groundwater sampling began in October 2005. 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 during the Fall 2006 and Fall 2007 groundwater monitoring events.
- Maintenance on the NAAD 40 landfill cap was performed in Fall 2008 and 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 landfill cap is providing adequate protection to the landfill contents.
- The biennial survey of the landfill elevation points 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 AZARNG.



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## **CERCLA Five-Year Review Findings**

### **Data Review Findings for NAAD 43**

- The NAAD 43 landfill was designated by 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 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 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 (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 AZARNG.



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## **CERCLA Five-Year Review Findings**

### **Interview Findings**

Interviews were conducted in March and April 2010 to identify successes or issues with remedy implementation with the following individuals:

- Nicole Coronado, Project Manager Federal Projects Unit, ADEQ;
- Gavin Fielding, Cleanup Manager, AZARNG;
- Matt Ryan, Coconino County Supervisor, District 3,
- Janet Lynn, Biologist, AZARNG; and
- Randy Wilkinson, Civilian Contractor, NGB.

The overall impression of all the participants was that the project was going smoothly. The only difficulty noted by the participants were the presence of dry wells at NAAD 11B. Matt Ryan noted a few trespassers at the site. However, the trespassers were actually found in the OB/OD Area. Participants made several recommendations including the removal of fences at NAAD 40. The NGB Project Manager recommended that the sampling at NAAD 11B and landfill inspections be reduced from semiannual to annual and conducted in the spring after the snow melt run-off when erosion is most likely to occur.

All of the participants felt that they were well informed of the progress at the sites and thought that the remedy was functioning as designed.

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## **CERCLA Five-Year Review Findings**

### **Site Inspection Findings**

As part of the five-year review process, a site inspection was conducted on April 15, 2010. The inspection team comprised of representatives from NGB (Mr. Randy Wilkinson), ADEQ (Ms. Nicole Coronado and Mr. Wayne Miller), and MKM (Ms. Kathleen Anthony and Mr. Thomas Hope). During the inspection, each of the five sites (NAAD 11B, 14D, 14G, 40, and 43) were visited and observations made by the team were documented.

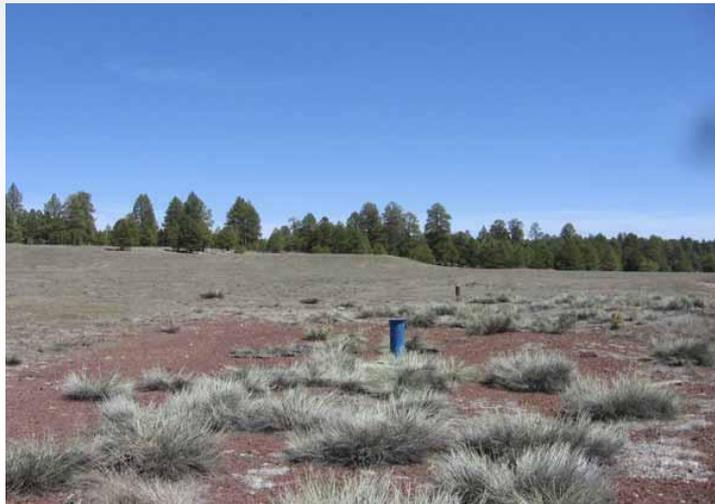
- The overall condition of all five sites and monitoring wells within each site was noted as being satisfactory.
- At the two landfill sites displacement of erosion control features caused by elk movement through the area was rectified.
- As a result of excess precipitation from winter storms and the recent thawing, surface water accumulation was observed within the drainage channels.
- The fencing and signage features were noted as being intact and adequate.
- No evidence of adverse land use was observed, indicated that LUCs are adequately enforced.
- No irregularities or findings were reported during the inspections at all five sites.



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**CERCLA Five-Year Review Findings**



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## **CERCLA Five-Year Review Technical Assessment**

### **Is the Remedy Functioning As Designed?**

#### **NAAD 11B**

Remedial action objectives have been achieved. The soil removal activities have achieved the objective of preventing further contamination of groundwater. The LTM data indicate 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 has been observed.

#### **NAAD 14D**

Remedial action objectives have been 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, have been achieved for all NAAD 14D wells. This site was removed from the LTM sampling program in Fall 2008. The implementation of LUCs has maintained the integrity of the monitoring well surface completions and no evidence of adverse land or resources use has been observed.

#### **NAAD 14G**

Remedial action objectives have been 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 have been achieved for all NAAD 14G wells. This site was removed from the LTM sampling program in Spring 2008. The implementation of LUCs has maintained the integrity of the monitoring well surface completions and no evidence of adverse land or resources use has been observed.



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## **CERCLA Five-Year Review Technical Assessment**

### **Is the Remedy Functioning As Designed?**

#### **NAAD 40**

Remedial action objectives have been achieved. The stabilization and capping of the landfill and the implementation of LUCs minimize the migration of contaminants to groundwater and surface water and prevent direct contact with the wastes. The implementation of LUCs has maintained the integrity of the monitoring well surface completions and landfill cap, and no evidence of adverse land or resources use has been observed. The LUCs include engineering controls (warning signs, locked gates, and a fence) and administrative controls (requirement for Garrison Commander authorization prior to entry). The warning signs caution personnel of subsurface hazardous conditions. A “wildlife friendly” fence was installed and maintained in areas where wildlife movement or migration had previously damaged the fence.

#### **NAAD 43**

Remedial action objectives have been achieved. The implementation of inspections, maintenance, and LUCs has maintained the integrity of the land surface and drainage features, and no evidence of adverse land use has been observed. The LUCs include engineering controls (warning signs) and administrative controls (requirement for Garrison Commander authorization prior to entry). The warning signs caution personnel of subsurface hazardous conditions.



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## **CERCLA Five-Year Review Technical Assessment**

### **ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOS) USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?**

Perchlorate was a potential contaminant that was not included as a potential contaminant in previous investigations or removal efforts at the five LTM Sites. Groundwater sampling for perchlorate was conducted as part of LTM at NAAD Sites 11B, 14D, and 14G in the Ammunition Workshop Area where explosives were COCs. Currently, all detected perchlorate concentrations are significantly less than the PSG (previously the Arizona health-based guidance level of 11 µg/L which has been revised to the USEPA HA of 15 µg/L).

Perchlorate sampling has ended at all wells that have met the ramp-down requirements specified in the LTM WP (MKM, 2005a). Perchlorate was not identified as a potential contaminant at NAAD 40. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes to exposure pathways, toxicity, and other contaminant characteristics.

### **HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?**

There is no new information that calls into question the protectiveness of the remedy at any of the five LTM Sites.



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## **CERCLA Five-Year Review Recommendations and Follow-Up Actions**

### **NAAD 11B**

- MKM recommends reducing the current semiannual sampling frequency at NAAD 11B to annual frequency and implementing further ramp-down procedures as appropriate. It is further recommended that the annual sampling be conducted in the spring to increase the chances of water being present in site wells.
- On completion of the Decision Document for NAAD 11B, NGB should follow up with formal documentation of LUCs in an update of the *Camp Navajo Real Property Development Plan* (Colorado DataScapes, 2009) before the sites are transferred to AZARNG.

### **NAAD 14D**

- MKM recommends site closure and IRP status of Response Complete. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells.
- MKM recommends abandoning well 99-02, because it has been dry during all four years of LTM sampling and does not provide any information that will be useful in the continuing monitoring of NAAD 11B.
- MKM also recommends abandoning well 00-03, because it is no longer being sampled, and the groundwater elevation data is not used in potentiometric maps for NAAD 11B because it is screened in a different sand interval than the NAAD 11B wells.
- MKM recommends retaining wells 99-01 and 02-04 for use in collecting groundwater elevation data.



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## **CERCLA Five-Year Review Recommendations and Follow-Up Actions**

### **NAAD 14G**

- MKM recommends site closure and IRP status of Response Complete. Closure would consist of the termination of LUCs and groundwater monitoring and abandonment of wells.
- MKM recommends abandoning all eight NAAD 14G wells because they are no longer being sampled and do not provide any information that will be useful in the continuing monitoring of NAAD 11B.

### **NAAD 40**

- MKM recommends reducing the frequency of visual inspections from semiannual to annual. 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.
- 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.
- It is recommended that the fencing around NAAD 40 be removed. The gates across the road entrances and warning signs should remain. The plastic netting used for erosion control should be removed where it has become bunched and could become an entanglement threat to wildlife.
- On completion of the Decision Document for NAAD 40, 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).



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## **CERCLA Five-Year Review Recommendations and Follow-Up Actions**

### **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).



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## **CERCLA Five-Year Review**

### **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.

### **Next Review**

The next Five-Year Review is required by October 2015, five years from the date of this review.



*Five-Year Review for  
NAAD Sites 11B, 14D, 14G, 40, and 43  
Camp Navajo, Arizona*



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**CERCLA Five-Year Review**

**Comments**

If you have comments on this presentation, a form for written comments is available at the back of the room. Please provide your name, address, phone number, and email address on the comment forms. Comments can be submitted this evening after the meeting or mailed to:

Randy Wilkinson  
NGB-ARE-I/ICI Services  
c/o Camp Navajo  
Hughes Avenue, Building 15  
P.O. Box 16123  
Bellemont, AZ 86015



# **Camp Navajo Environmental Cleanup Program**



## **OB/OD Area Program Update**

Mr. Randy Wilkinson  
NGB Restoration Project Manager

Stakeholders Advisory Group meeting  
June 10, 2010



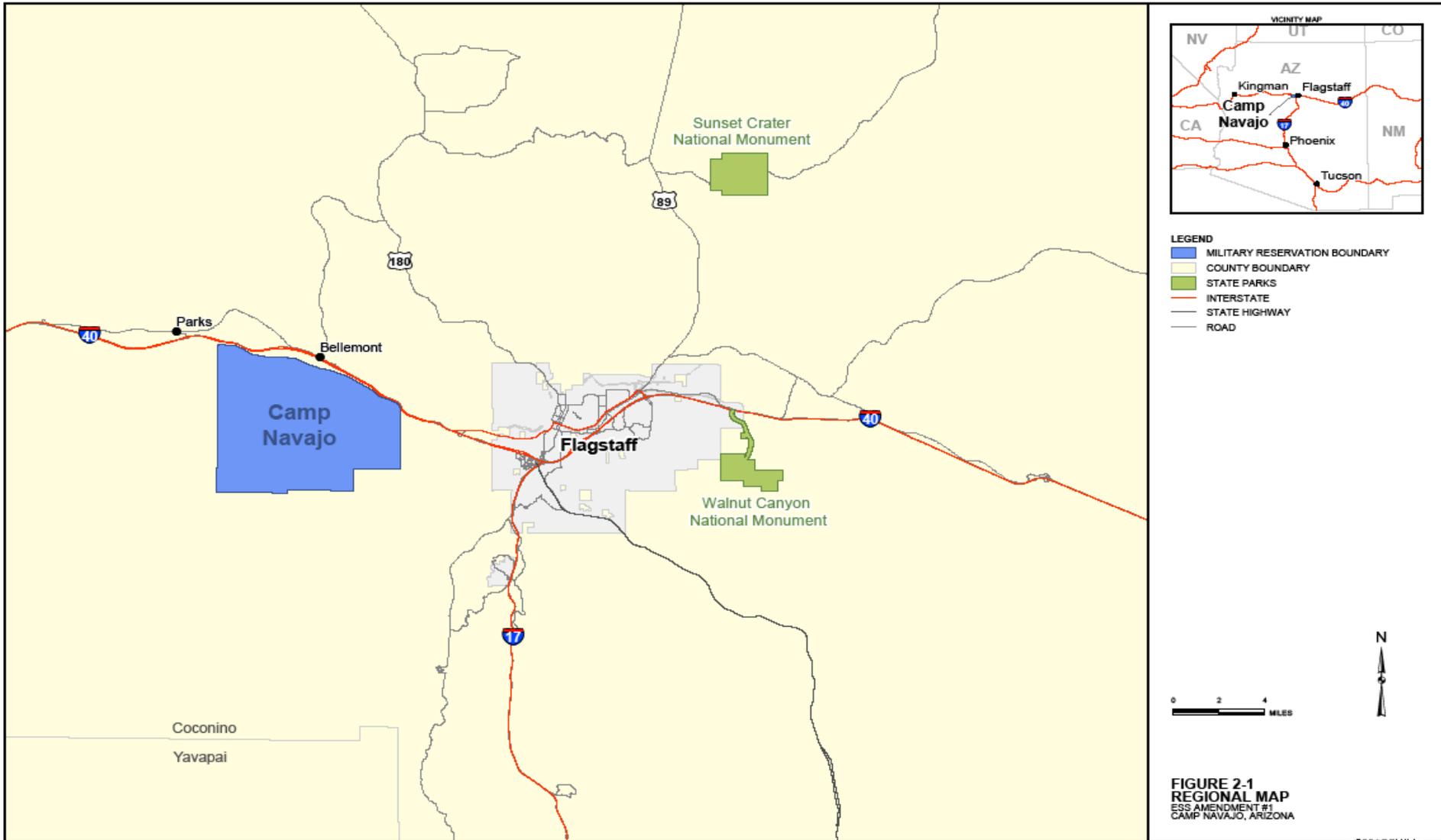
# SAG Briefing Agenda



- Closure Strategy
- NAAD and MRWA Closure Status
- DD Status
- Program Schedule

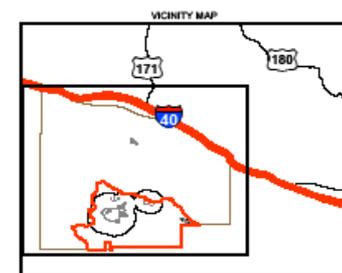
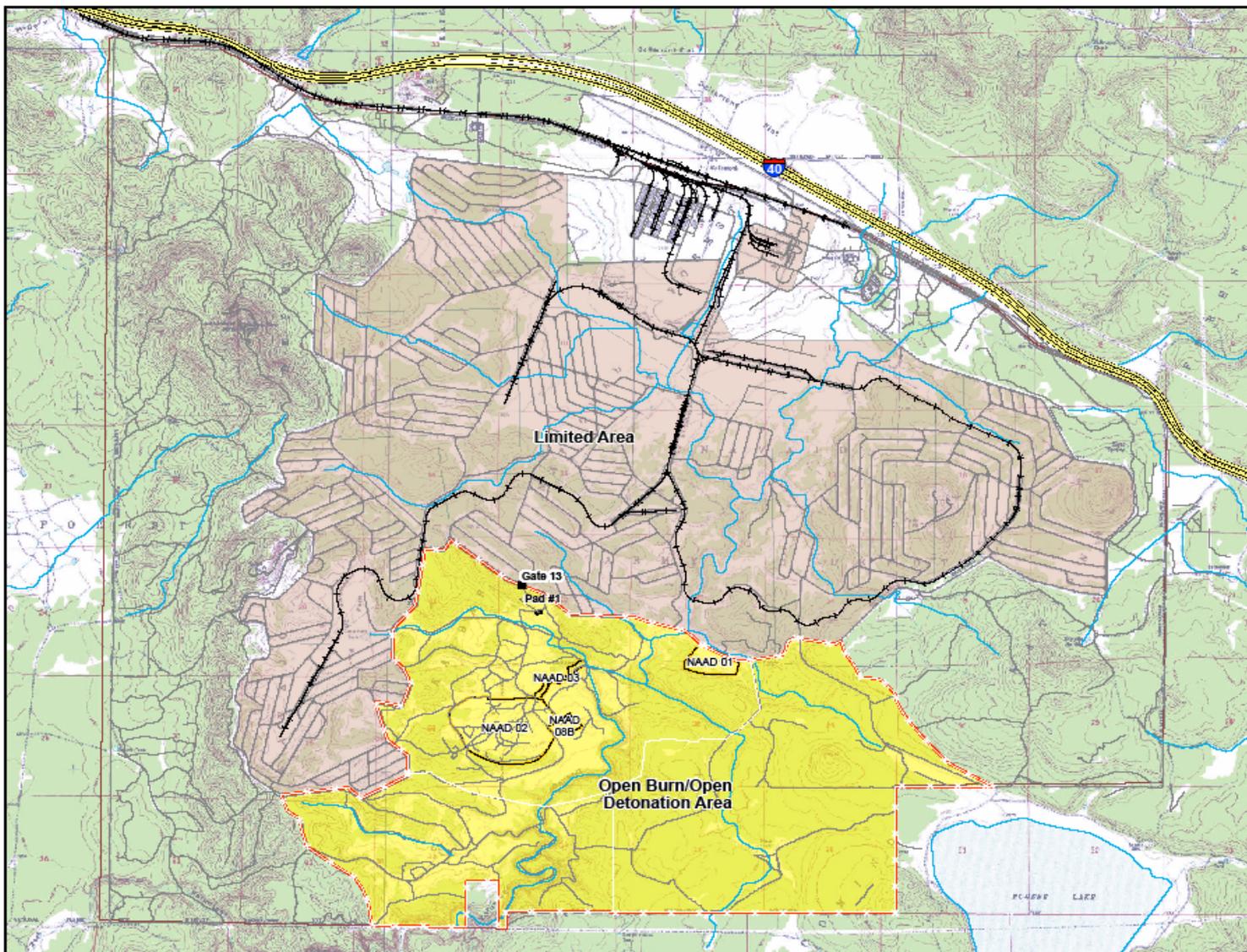


# Camp Navajo Location





# Camp Navajo OB/OD Area



- LEGEND**
- GATES
  - FENCE/BOUNDARY SYMBOLOGY**
  - OB/OD PERIMETER FENCE
  - OB/OD INNER FENCE
  - BOUNDARY SYMBOLOGY
  - BASE BOUNDARY
  - NAAD AREAS
  - OB/OD AREA
  - LIMITED AREA
  - OTHER SYMBOLOGY**
  - DRAINAGE
  - ROAD
  - RAILROAD
  - INTERSTATE



**FIGURE 2-2**  
**INSTALLATION LOCATION**  
ESS AMENDMENT #1  
CAMP NAVAJO, ARIZONA



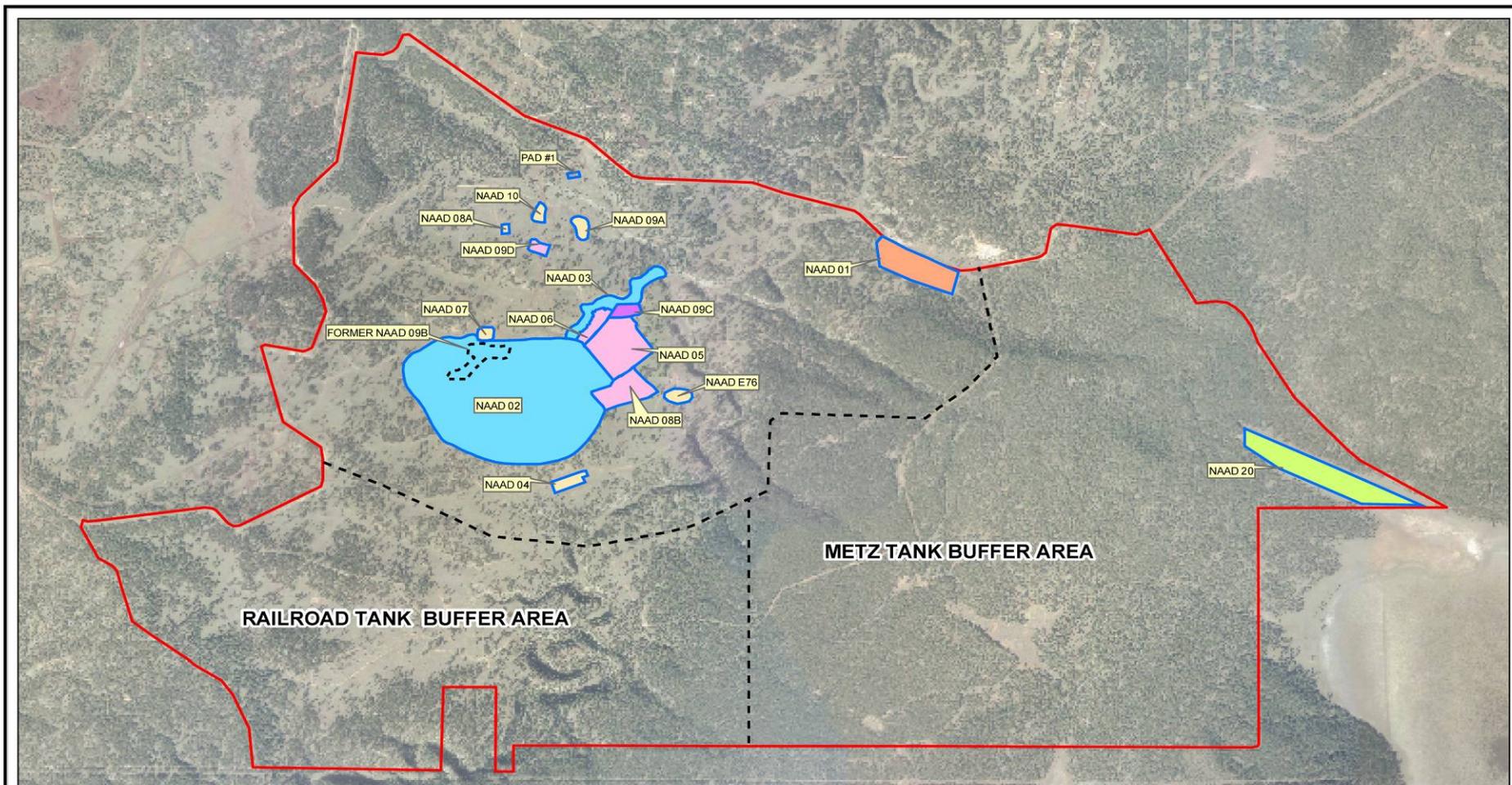
# Closure Strategy



1. Use the CERCLA risk-based cleanup process to investigate, remediate, and close out all OB/OD Area sites.
2. Separate the chemical contamination issue from the munitions and explosives of concern issue, and address MEC as separate operable units.
3. Focus closure of RCRA interim status permits on sites that were operated under interim status.
4. RCRA Post Closure.



# OB/OD Area NAAD Sites



SOURCE: AERIAL PHOTOGRAPHY BY SOUTHWEST MAPPING, OCTOBER 2002

## EXPLANATION

- |                   |            |             |
|-------------------|------------|-------------|
| OB/OD BOUNDARY    | AMEC       | CH2         |
| CURRENT NAAD SITE | BC         | MKM         |
| FORMER NAAD SITE  | BC AND CH2 | MKM AND CH2 |
| INNER FENCE       |            |             |

CONTRACTOR SITES WITHIN  
THE OB/OD AREA  
CAMP NAVAJO  
BELLEMONT, ARIZONA

0 1,000 2,000  
SCALE IN FEET



BROWN AND  
CALDWELL



# OB/OD Area NAAD Closure Status

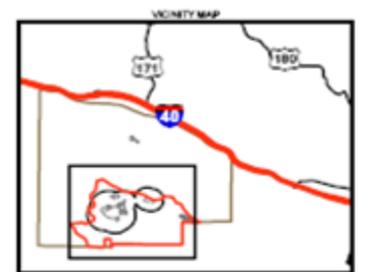
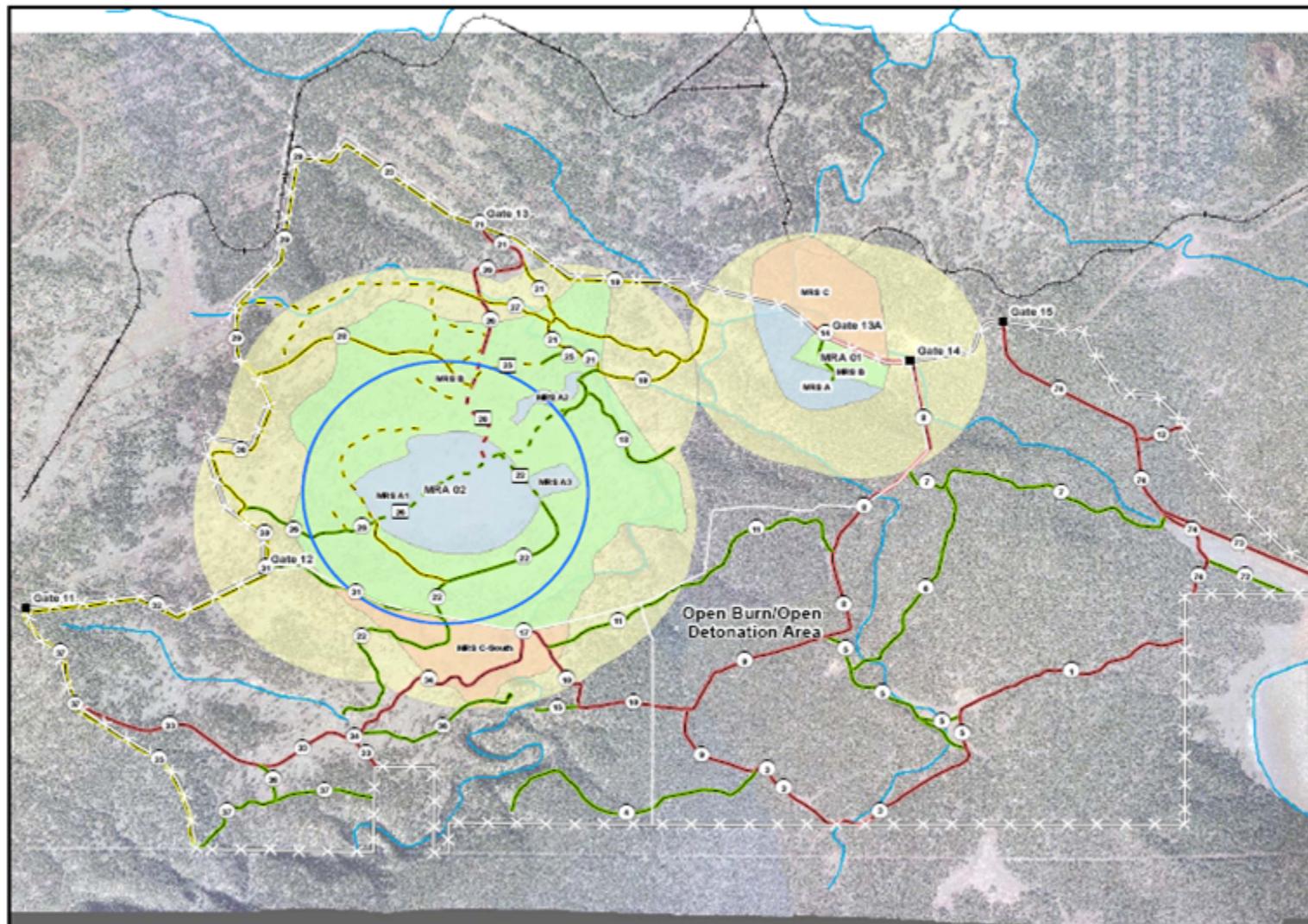


Site	Type	Contractor	Fieldwork	RI/RSE	HHRA	ERA	DD
1	CERCLA	MKM	Complete	Final	---	Final	Final
2	RCRA	B&C	Ongoing	Final	Future	Future	Future
3	CERCLA	B&C	Complete	Final	---	Final	Final
4	CERCLA	MKM	Complete	Final	---	Final	Final
5	RCRA	AMEC	Complete	Final	Final	Final	Final
6	RCRA	AMEC	Complete	Final	Final	Final	Final
7	CERCLA	MKM	Complete	Final	Final	Final	Final
08A	CERCLA	MKM	Complete	Final	---	Final	Final
08B	RCRA	AMEC	Complete	Final	Final	Final	Final
09A	CERCLA	MKM	Complete	Final	---	Final	Final
09C	RCRA	B&C	Ongoing	Final	---	---	Final
09D	RCRA	AMEC	Complete	Final	---	Final	Final
10	CERCLA	MKM	Complete	Final	---	Final	Final
13	RCRA	B&C	Complete	Final	Final	---	Final
20	CERCLA	B&C	Complete	Final	Final	---	Future
E76	CERCLA	MKM	Complete	Final	---	---	Final

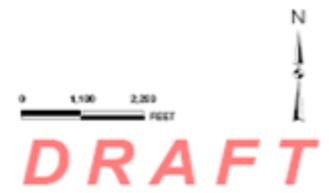


# MRWA 01, 02, & 20

## Munitions Response Work Areas



- LEGEND**
- Primary Road (FRCS Cleared Road ID)
  - Primary Road (NOT FRCS Cleared Road ID)
  - Secondary Road (FRCS Cleared Road ID)
  - Secondary Road (NOT FRCS Cleared Road ID)
  - Firebreak (FRCS Cleared Road ID)
  - Firebreak (NOT FRCS Cleared Road ID)
  - MRWA/MRS**
  - MUNITIONS RESPONSE AREA
  - MRS A
  - MRS B
  - MRS C
  - FENCE SYMBOLOGY**
  - CB/OD PERIMETER FENCE
  - CB/OD INNER FENCE
  - OTHER SYMBOLOGY**
  - DRAINAGE
  - RAILROAD
  - DA WAIVER BOUNDARY



**DRAFT**

OB/OD AREA ROAD REVIEW  
BCRA POST-CLOSURE PLAN  
CAMP NAVAJO, ARIZONA



# OB/OD Area MRWA Closure Status



MRWA	Type	Investigation	Removal	RI	EE/CA	PP	DD
01	CERCLA	Complete	Complete	Final	Final	Final	Final
02	RCRA	Complete	Complete	Final	Draft	---	Future
20	CERCLA	Complete	---	Final	Final	Final	Final



# Decision Documents



- **DDs completed:**
  - NAAD 09C DD and ESD (B&C site)
  - 7 OB/OD Area CERCLA Sites (MKM sites)
  - NAAD 03 (B&C site)
  - NAAD 13 (B&C site)
  - 4 OB Sites (AMEC sites)
  - MRWA 01 and 20 (CH2M HILL)
- **DDs undergoing ADEQ review:**
  - 5 IRP LTM Sites (B&C)
- **DDs undergoing NGB review:**
  - 28 IRP Buyout Sites (B&C)
  - 18 IRP Non-Buyout Sites (B&C)
- **DDs to be prepared:**
  - 7 IRP Ineligible Sites (B&C/CH2M HILL)
  - NAAD 02 (B&C/CH2M HILL)
  - MRWA 02 (CH2M HILL)



# Public Participation

**DDs are available for review at:**

NAU Cline Library Special Collections Area  
and

<http://www.CampNavajoEnvironmental.org>

**Notices are placed in:**

*Arizona Daily Sun and Williams-Grand Canyon News*

**Send comments to:**

Mr. Randy Wilkinson

Camp Navajo

P.O. Box 16123

Bellemont, AZ 86015



# Program Schedule



- **Winter - Spring 2010**
  - Reports undergoing ADEQ review:
    - MRWA 02 EE/CA report
    - Year 1 vadose zone monitoring report
    - Year 2 vadose zone sampling plan addendum
    - MRWA 02 surface MEC removal after action report
- **Spring - Summer 2010**
  - Complete field work
    - Soil management project
    - MD management project
    - Final open detonation event
    - Spring vadose zone sampling event



# Program Schedule



- **Summer - Fall 2010**

- Prepare reports

- Soil management project after action report
- MD management project after action report
- Open Detonation event after action report
- NAAD 02 risk assessment
- NAAD 02 DD
- MRWA 02 DD
- Final Explosives Safety Submission
- RCRA post closure permit application



# Program Schedule



- **Fall - Winter 2010**

- CERCLA long term management

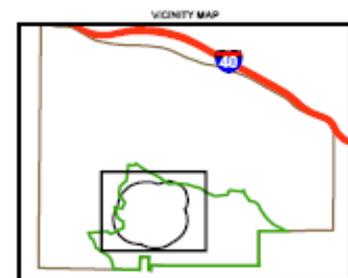
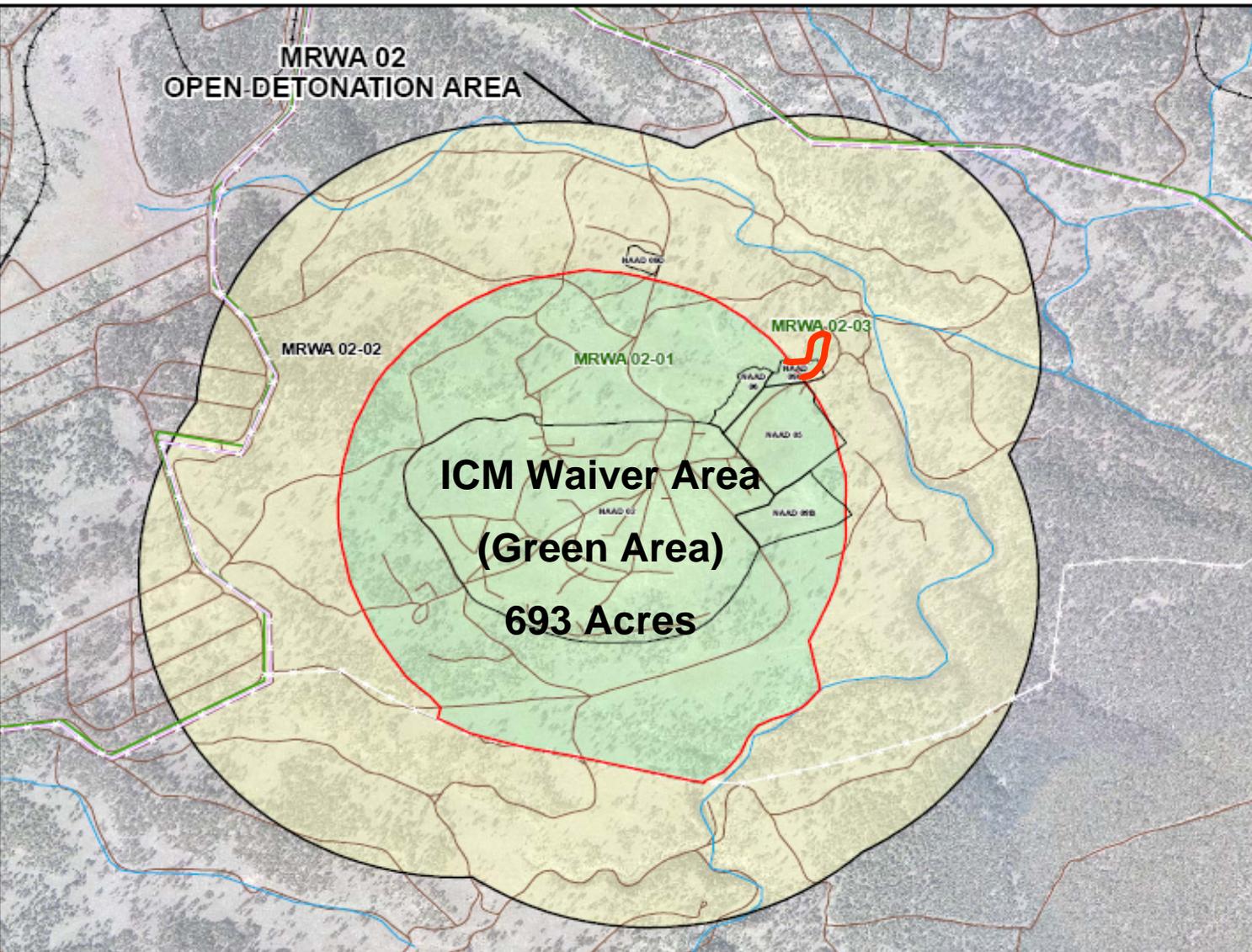
- New contract for IRP LTM (ER,A funds)
- NAADs 11B, 40, and 43
- MRWA 01

- RCRA post closure care

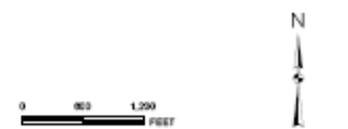
- New contract for RCRA PCC (O&M funds)
- MRWA 02



# Post Closure Area



- LEGEND**
- BOUNDARY SYMBOLOGY**
    - MRWA BOUNDARY
    - NAAD AREA
    - PROPOSED RCRA POST-CLOSURE AREA
    - MRWA 02-02
    - DEPARTMENT OF THE ARMY (DA) WAIVER BOUNDARY
    - FORMER OBOD AREA BOUNDARY
    - LIMITED AREA PERIMETER FENCE
    - OBOD AREA INNER FENCE
  - OTHER SYMBOLOGY**
    - DRAINAGE
    - ROAD
    - RAILROAD



**PROPOSED RCRA POST-CLOSURE AREA**  
 PREPARED BY CH2MHILL ON BEHALF OF THE NATIONAL GUARD BUREAU CAMP NAVALAJ, ARIZONA



# Camp Navajo Environmental Cleanup Program POCs



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National Guard Bureau  
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Mr. Randy Wilkinson  
Restoration Project Manager  
928-773-3208  
Randall.Wilkinson1@us.army.mil

# OB/OD Closure Project



**Camp Navajo  
OB/OD Area**

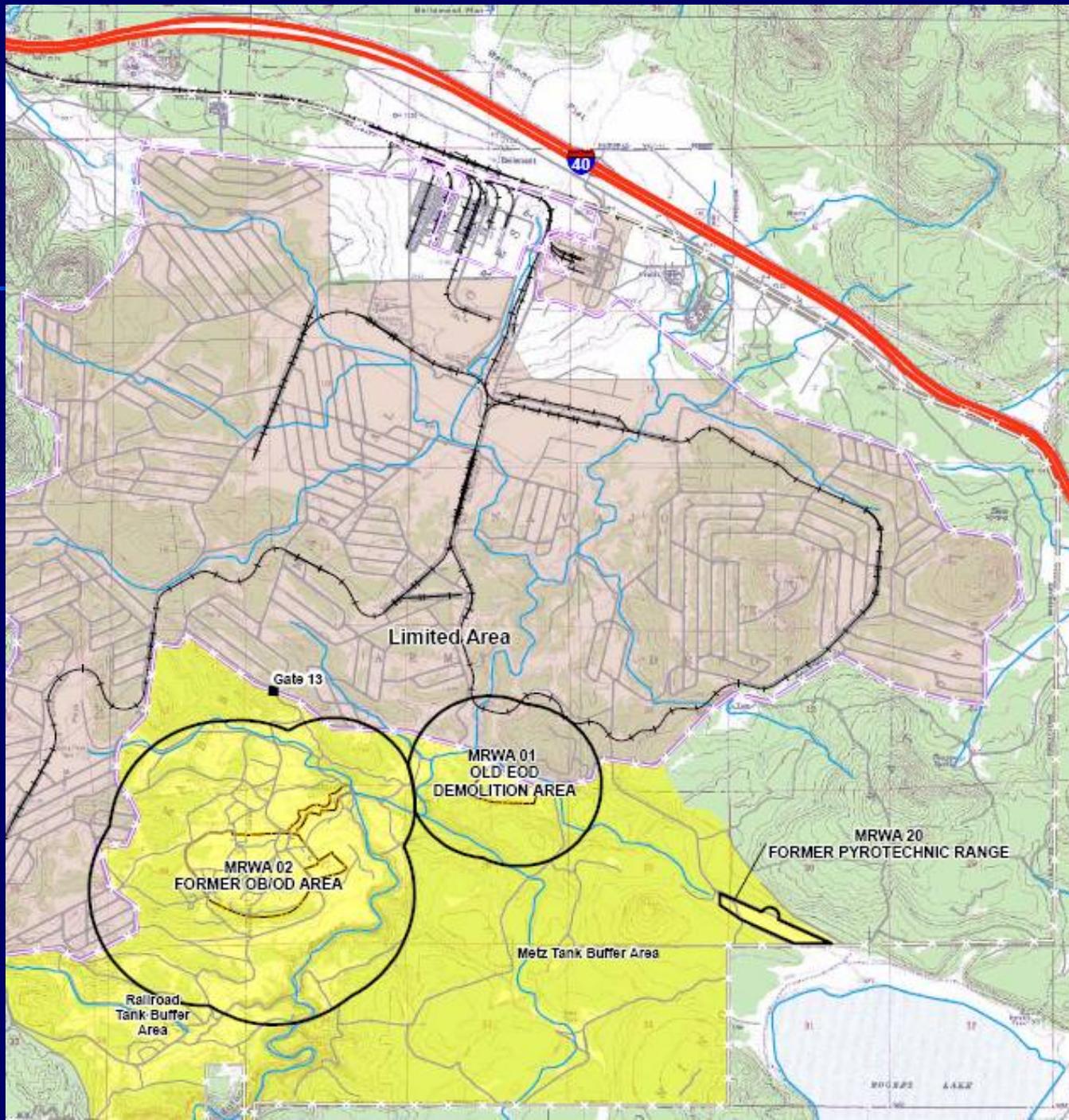
**Field Projects Update**



# OB/OD Closure Project

## Field Operations Summary:

- Open Detonation Disposal of MEC
- Resumption of MD Management Project
- Resumption of Soil Stockpile Management
- MRWA 02 Vadose Zone Monitoring



Limited Area

Gate 13

MRWA 02  
FORMER OB/OD AREA

MRWA 01  
OLD EOD  
DEMOLITION AREA

MRWA 20  
FORMER PYROTECHNIC RANGE

Railroad  
Tank Buffer  
Area

Metz Tank Buffer Area

ROCKS LAKE

# Open Detonation Disposal of MEC

- MEC recovered and stored since April 2009:
  - 155 - WP MEC -magazine #C-303
  - 15 - Illumination (HC) MEC – magazine #C-307
  - 6,263 – HE MEC/MPPEH – magazine #C-421
  - 31 - Safe-to-move but unsafe-to store (fuzed) MEC – central consolidation area in ICM Waiver Area.
- Activities completed May 6-21, 2010

# Open Detonation Disposal of MEC

OD operations considerations:

- Notifications to public
- Air space closure schedule
- Wind speeds in excess of 10 mph
- Potential for wildfire
- MSO survey schedule

# Open Detonation Disposal of MEC

- Public notifications mailed on 4/27; hand-out brochures ready on 4/30.
- Daily notifications to Security and Fire Department
- Modified work practices to complete OD activity in wind speeds > 10 mph
  - Tamped HE and HC MEC with soil
  - Conducted WP detonations on less windy days
  - Use of water truck to dampen surrounding vegetation
  - Fire Department on stand-by during WP detonations
- Detection of MSO pair!





# MD Management Project

Collection, segregation, inspection, re-inspection, verification and recycling of Munitions Debris which has been consolidated throughout OB/OD Area work areas:

- Grid cells investigated or cleared
- ODPs/PSAs investigated
- Removal action areas
- Geophysical prove-out areas
- Former QC seeds & miscellaneous areas



# MD Management

- Field Activities Nov 2 – Dec 22, 2009
- Suspended due to deep snow
- Resumed field activities on 5/24
  - To date, MD recovered from:
    - 1,257/1,279 grid cells (~228,000 lbs)
    - 24/24 ODP/PSAs (~53,980)
    - NAAD 07 Removal Action Area (~3,150 lbs)
    - NAAD 09C Removal Action Area (~442,170 lbs)
    - QC Seed Consolidation Area (~500 lbs)
    - 10/10 Misc Consolidation Areas (~18,000 lbs)
- Includes MD Management at NAAD 09C

# MD Management

Following collection, all MD is transferred to central inspection and segregation area. Every piece of MD:

- Inspected, re-inspected and certified by subcontractor UXOQCS/SUXOS
- Verified by CH2M HILL UXOQCS/SUXOS

MD Segregated into:

- MD fragments
- MD that retains shape
- Range-related debris (RRD)

All segregated, inspected, certified and verified MD placed in secured and sealed bins

# MD Management



# MD Management

## Off Site Treatment Status as of 12/22/09:

- 59 tons of MDAS fragments plus shaped MDAS were shipped to California Metal X for shredding and smelting.
- Shredding of 31 tons of shaped MDAS operations completed January 11-15, 2010.
- Smelting operations of 59 tons of MDAS (shredded and fragments) completed by February 22, 2010.
- 212 tons of RRD were shipped to Page Steel for direct recycle
- Shipments will resume in June, 2010.

# Soil Stockpile Management

On-site management of soil stockpiled at NAAD 09C and NAAD 02 includes:

- Soil sieving to remove MEC/MPPEH and MD 20 mm and larger
- Segregation and disposal of expended/non-expended smoke canisters (NAAD 09C)
- Collection of soil samples to confirm chemical constituents are below Arizona NR-SRLS
- Backfill OD pits known to retain rainwater and snowmelt

# Soil Stockpile Management

- NAAD 09C
  - ~10,000 cubic yards soil generated from 2005 removal action
- NAAD 02
  - ~2,300 cubic yards soil generated from 2007 removal action (transferred to NAAD 09C for processing)



# Soil Stockpile Management

Field activities completed in 3 intervals:

- May - July 2009

  - Suspended due to exhaustion of contract funds

- Nov - Dec 2009

  - Suspended due to deep snow accumulations

- May 2010

  - CH2M HILL and subcontractor remobilized on 5/24

  - Pre-Construction/Kickoff meeting on 5/25

  - Resumed field operations on 5/26

# Soil Stockpile Management

## Field Operations Status:

- Soil sieving operations completed Nov 17, 2009
- Laboratory analysis indicates soil chemical constituents in all sieved soil batches below AZ NR-SRLS
- Total 26 ODPs backfilled
- NAAD 09B removal action area backfilled
- ODP-127 backfilled (former disposal pit)

Backfill operations completed 6/2. Site restoration and re-seeding to be completed prior to monsoon rains.

# Soil Stockpile Management

## Confirmation Soil Sampling

- Beneath original stockpile footprint
- Beneath former areas of soil sieving
- Beneath former soil batch staging areas
- Beneath metal segregation and consolidation areas

Samples will be analyzed for: TPH, VOCs, SVOCs, Pesticides, Explosives, Metals, Dioxins and Furans, PCBs, White Phosphorous, and Perchlorate.





# Soil Stockpile Management

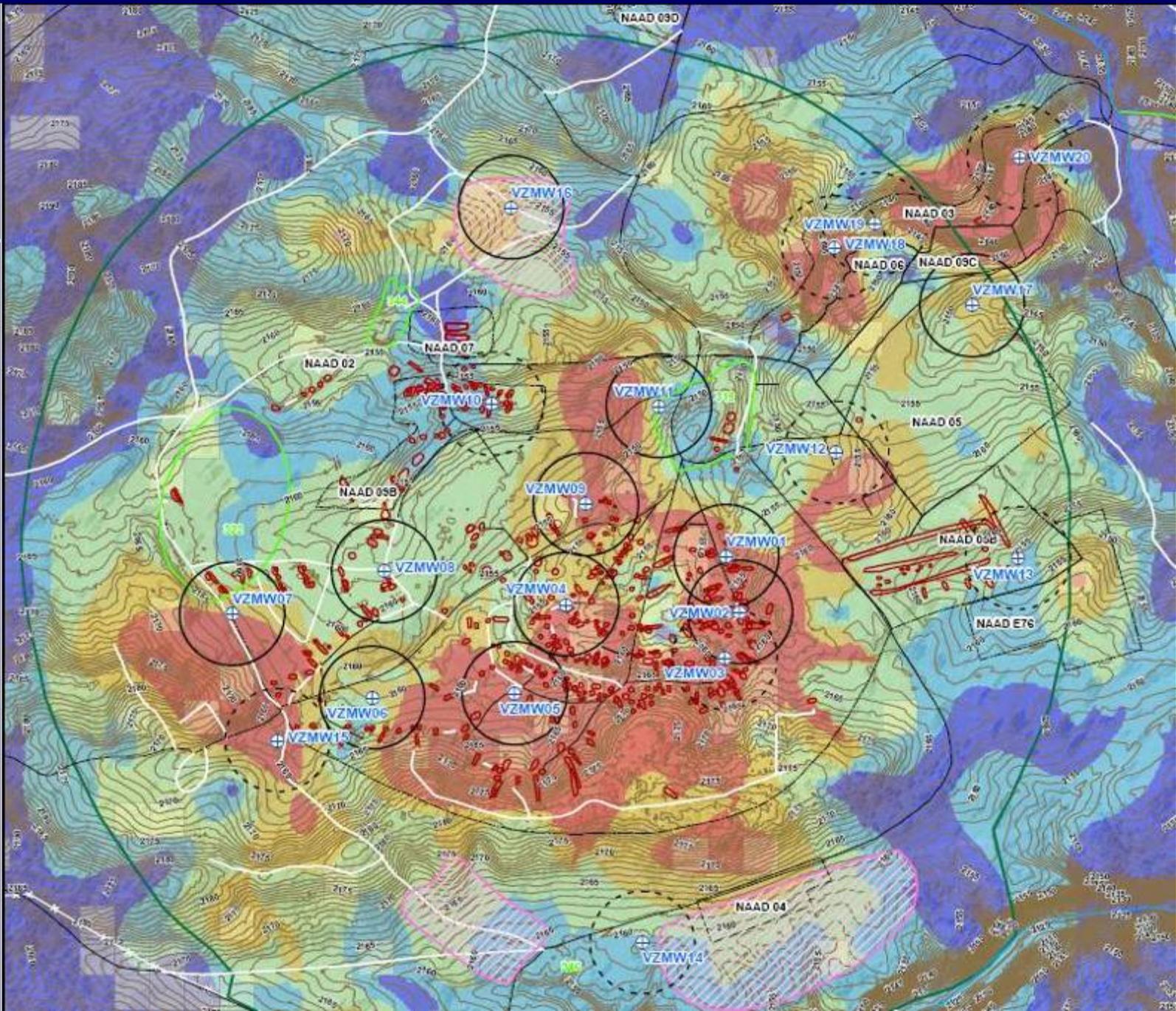
- Analytical results from processed soil batches and samples taken from the soils beneath the former NAAD 02 stockpiles will be incorporated into the final NAAD 02 risk assessment.
- Risk assessment results will be used to support the NAAD 02 Decision Document for site-related chemical constituents.

# MRWA 02

## Vadose Zone Monitoring

### Year 1 Vadose Zone Monitoring

- Sampling/monitoring events completed Feb, March, April, May, June, July and August 2009.
- Draft Year 1 summary report submitted to ADEQ on 3/5
- ADEQ comments received 4/14
- NGB Response to Comments Summary submitted to ADEQ 5/14
- ADEQ response to RtC Summary expected 6/3



# MRWA 02

## Vadose Zone Monitoring

### Year 2 Vadose Zone Monitoring

Draft Year 2 Sampling Plan submitted to ADEQ 5/6/2010

- Comments received 5/11
- Revised Sampling Plan submitted June 1

Two sampling periods are defined for Year 2:

- Winter/spring (December through May) – capture percolation from spring snowmelt
- Summer/early fall (June through September) – capture percolation from monsoon rain

# MRWA 02

## Vadose Zone Monitoring

### Year 2 Vadose Zone Monitoring

Includes original analyte list:

- **Primary Contaminants of Potential Concern (COPCs)**

- Perchlorate
- Explosives

- **Secondary COPCs**

- Nitrate
- Semi-Volatile Organic Compounds (SVOCs)
- Dissolved Metals

**Plus additional analytes:**

- Dioxins/furans from wells close to disposal sites
- White Phosphorous from wells in NAAD 03 canyon
- Total Metals at locations where Dissolved Metals were collected

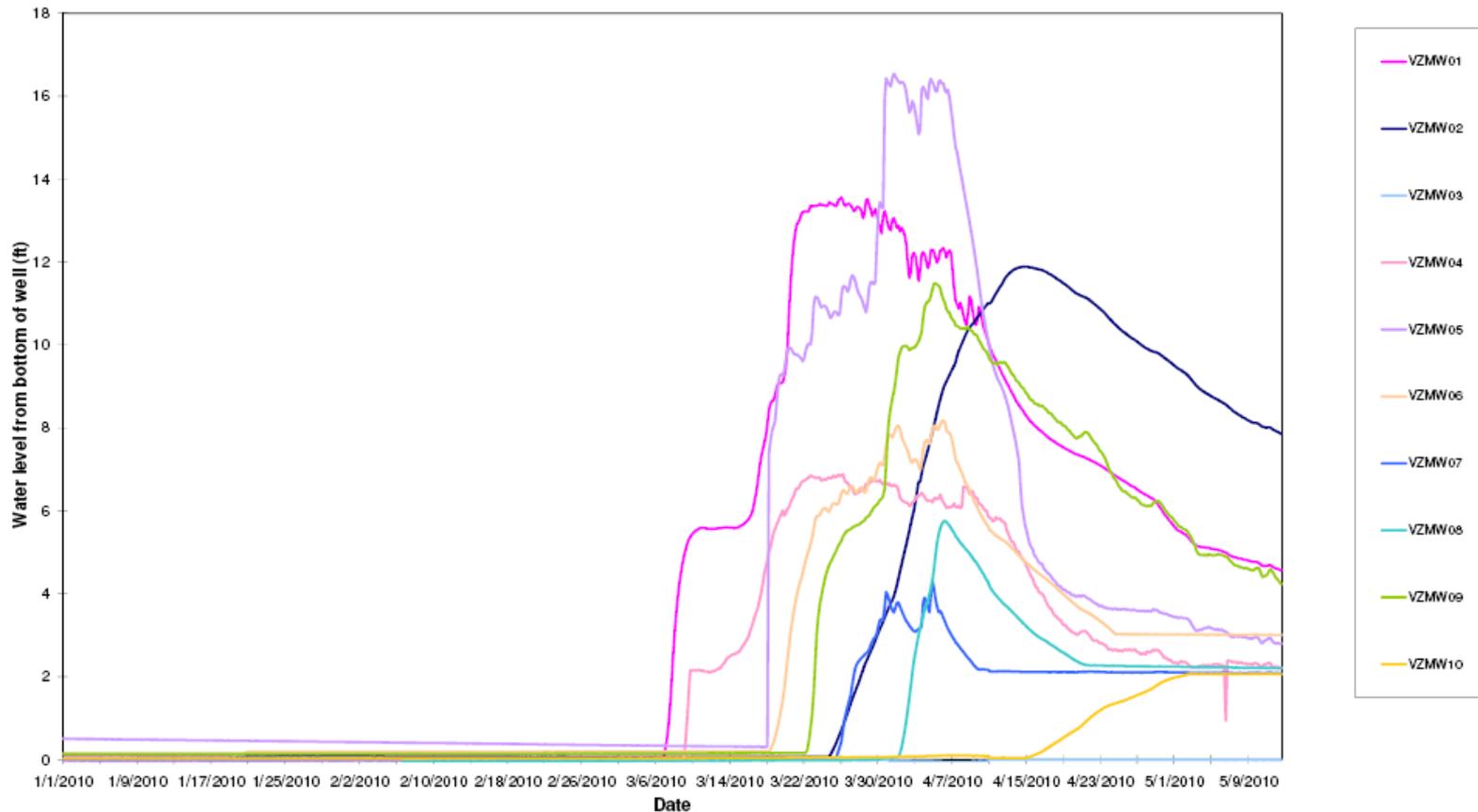
# MRWA 02

## Vadose Zone Monitoring

- Winter/Spring sampling May 6-18
  - Work area access following OD activities
  - Primary COPC samples collected from 17 wells
  - Full secondary COPC samples collected from 13 wells; partial secondary COPCs collected from 4 wells
  - Dioxins/furans samples collected from VZMW-12 & -17
  - White phosphorous samples from VZMW-18
  - Total metals samples collected from VZMW-5, -6, -8, -9, -15, & -17

# Combined VZMW 1-10 Hydrographs January-May, 2010

Water Levels in feet, Camp Navajo OB/OD Vadose Zone Monitoring Wells  
(January 1st- May 12th, 2010)





# MRWA 02

## Vadose Zone Monitoring

Winter/Spring Re-sampling:

- Several samples reported by laboratory to have insufficient volume, exceeded hold times, or arrived at laboratory above maximum chilled temperature
- Re-sampling completed June 2

# MRWA 02

## Open Detonation Area

### 2010 Vadose Zone Monitoring Activities:

- Install telemetry for automated water level monitoring in selected wells
- Install modified well caps
- Replace rain gauge damaged by lightning
- Complete well repairs

**Questions?**