

Camp Navajo - Open Burn/Open Detonation Area and the Installation Restoration Project

[Department of Defense \(DoD\) Site](#)

Boundaries:

[Camp Navajo](#) is located approximately 10 miles west of Flagstaff, south of Interstate 40 at Exit 185 in Bellemont, Arizona. The facility encompasses 28,347 acres and is situated in heavily forested to grassy, gently rolling to steep hilly terrain approximately 7,100 feet above mean sea level. Military facilities present at Camp Navajo include approximately 170 buildings of which 32 are currently used for administration, maintenance, operations, and storage. The Open Burn/Open Detonation (OB/OD) Area is located in the southern part of Camp Navajo and is estimated to be between 2,000 and 5,000 acres.



Camp Navajo Training Site

Site Status Update - Open Burn/Open Detonation (OB/OD) Area:

All remaining field activities including screening and sampling of stockpiled soil, backfilling the Navajo Army Depot (NAAD) 02 pits, on-site detonation of all [Munitions and Explosives of Concern](#) (MEC), and collecting all scrap munitions debris (MD) for off-site recycling were completed in Summer 2010. ADEQ and the National Guard Bureau (NGB) are currently preparing to hold a series of meetings to finalize the NAAD 02 Risk Assessment, the NAAD 02 Decision Document and begin the process of submitting the post closure permit application. The site is expected to transfer to the [Hazardous Waste Permits Unit](#) for post-closure in Summer 2011.

Site Status Update - Installation Restoration Project (IRP):

NGB is preparing the long term management (LTM) sites for decreased monitoring activities and closure of approximately 60 sites. Several reports will be submitted including Proposed Plans and Decision Documents for 28 Installation, Restoration Project (IRP) Buyout Sites, 18 Non-buyout Sites, and seven non-eligible sites. The reports are expected to be submitted throughout 2011. The Five Sites LTM Decision Document was approved in November 2010.

A Five-Year Review (FYR) report for five IRP Sites was submitted in Summer 2010. The protectiveness statement for the five LTM sites states “The remedy appears to be protective of human health and the environment. Threats at the site have been addressed through the removal actions at NAAD sites 11B, 14D, 14G, 40 and 43 through the stabilization and capping of the landfill at NAAD 40 and through the implementation of Land Use Controls 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.”

Community Involvement Activities:

In February of 2002, a Stakeholder’s Advisory Group (SAG) was formed to assist the NGB with stakeholder concerns and meets on a consistent basis. The SAG currently consists of members from agencies such as the [U.S. Fish and Wildlife Service](#), Arizona Department of Environmental Quality (ADEQ), the [Arizona Game and Fish Department](#), the [U.S. Forest Service](#), the [Arizona Army National Guard](#) (AZ ARNG), as well as three community members. Details of meeting agendas and minutes for 2008 and 2009 can be viewed at the [ADEQ Web site](#).

All SAG meetings are open to the public. Investigation and remediation activities are conducted in accordance with Camp Navajo’s Community Relations Plan which was finalized in March 2003. In June 2007, a site tour of the OB/OD Area was given to the public. A [Camp Navajo Newsletter](#) was issued in June 2009, describing current and future project goals. A SAG meeting was held in June 2009.

Site History - Open Burn/Open Detonation Area:

1942: [Camp Navajo](#) was established in 1942 and was originally known as the Navajo Army Depot. The facility operated as a reserve supply depot for the receipt, shipping, storage, surveillance, minor maintenance and demilitarization of ammunition/explosives and assigned commodities. The OB/OD Area was formerly used for demilitarization and land disposal of obsolete and unserviceable conventional ammunition, explosives, and limited chemical warfare agents.



Helicopter Training

1979: Improper disposal occurred in the OB/OD area at sites including the [trinitrotoluene](#) (TNT) washout lagoons and the Former White Phosphorus Detonation and Burn Area (a.k.a. Chemical Canyon). Four landfills containing ordnance and visible [unexploded ordnance](#) (UXO) are located in the OB/OD area. Environmental studies of the facility began in 1979.

1982: Operational control of the base was transferred under an Intra-State Support Agreement from the Secretary of the Army to the AZ ARNG. After the transfer, the missions for the National Guard were training, continuing depot activities, and facilities maintenance.

1993: Operational control was transferred under the [Base Realignment and Closure Act](#) of 1988 (BRAC 1) to the AZ ARNG, and the name was changed to Camp Navajo. The installation continues as a major training site, and also performs a depot-level storage service for the DoD, other government, and civilian entities. As a condition of transfer, the Army maintained responsibility for cleanup activities at the facility.

1994: The Army's demilitarization activities in the OB/OD Area were regulated under [Resource Conservation and Recovery Act](#) (RCRA) interim status. Demilitarization activities ceased in September 1994 in connection with the closure of Camp Navajo under BRAC 1. A Closure Plan was submitted to ADEQ, which was determined to be insufficient.

Contamination at the facility did not qualify the site for inclusion on the U.S. Environmental Protection Agency's (EPA) NPL. However, the facility is subject to all state and federal laws and is being cleaned up to federal standards as part of the [DoD's IRP](#).

1995-2002: Between 1995 and 2001, the Army Environmental Center conducted a Closure Plan Investigation to collect sufficient data to support an appropriate Closure Plan. In 1998, the Army Environmental Center submitted an investigation report, but ADEQ asked for additional sampling and site cleanup. Between 1998 and 2001, very little progress was made on further investigation of the OB/OD Area because of Army funding. In February 2001, a preliminary geophysical report was submitted to ADEQ that revealed potential UXO in the OB/OD area was worse than that previously suspected.

2002: In February, a SAG was formed to assist the NGB with stakeholder concerns. The SAG currently consists of members from agencies such as the U.S. Fish and Wildlife Service, ADEQ, the Arizona Game and Fish Department, the U.S. Forest Service, the AZ ARNG, as well as three community members. Since 2002, [remedial activities](#) in the OB/OD Area included: repair and replacement of the fence around the OB/OD Area, conducting an airborne ordnance detection survey, posting warning signs around the OB/OD Area in English and Spanish, conducting an archive search report, performing detonation pit sampling, consulting with the U.S. Fish and Wildlife Service, conducting a [biological survey](#), updating the community relations plan, and distributing a hunting advisory flyer.

Camp Navajo is home of several threatened and endangered species, including the bald eagle, northern goshawk, ferruginous hawk, osprey, peregrine falcon, the Mexican spotted owl and the Arizona toad. Other inhabitants include the pronghorn and elk. A protected activity center and critical habitat for the Mexican spotted owl is located in the south-eastern portion of the OB/OD Area. Due to the weather in the Bellemont area, the field season would normally last from May thru November. Because the Mexican spotted owl's mating season is from March 1st to August 31st, conservation measures are implemented in consultation with the U.S. Fish and Wildlife Service.

2003: During a soil and surface water sampling event in January, [submunitions](#) were encountered in the historical OB/OD Area. In response to this finding, the area was closed and access was prohibited.

The NGB obtained approval of a Department of Army waiver, which allowed access back into the area for environmental cleanup activities. The NGB prepared the following documents for ADEQ's review: 1) Background and Remediation Metal Standards Technical Memorandum, 2) an Archive Search Report, 3) the Draft-Final Report Airborne Geophysical Survey for Unexploded Ordnance, 4) the Community Relations Plan, and 5) the Final Draft Summary Letter Report of the Open Detonation Pit Sampling Event.

On April 1, ADEQ representatives met with NGB representatives to discuss the future remediation goals for the OB/OD Area. ADEQ representatives were assured by the new NGB Director of Environmental Programs that funding was available for fiscal year 2004 for projected remediation activities.

During the summer, the NGB completed a surface sweep of the ground in the Former White Phosphorus Open Detonation and Burn Area (aka Chemical Canyon, NAAD 03) which allowed for a [remedial investigation](#) (RI) and feasibility study (FS) to be performed. Items retrieved were detonated in a contained detonation chamber and wastes were properly disposed. A geophysical survey was performed after the sweep was completed. The geophysical survey was used to determine areas that may have been used for open burning or detonation of white phosphorus rounds.

2004: In July, the NGB began a two-year surface water and groundwater investigation in the OB/OD Area. [Perchlorate](#) was analyzed in this investigation, and with the exception of surface water in the open detonation pits, the results have been non-detect for contaminants of concern. In October, the NGB began a soil investigation in the NAAD 02 (aka Open Detonation Pits) area. Both surface and subsurface samples were collected and reported in the RI Report. In October, the NGB began investigations at four of the open burn areas (NAADs 05, 06, 08B, and 09D) that were operated under RCRA interim status. The investigation consisted of surface and subsurface soil sampling, and additional trenching in NAAD 08B to investigate numerous historical trenches.

2005: The removal action for the landfill began in January and was completed in September. During the Open Burn Area's Phase I sampling in April, NAADs 05 and 06 had contaminant levels above regulatory levels which, led to a Phase II vertical extent investigation in October.

In June, ADEQ met with the NGB to discuss investigation activities in NAADs 01, 04, 07, 08A, 09A, 10, and E76. These sites were not operated under the RCRA interim status permit and are being investigated under a performance-based contract. ADEQ received the work plan in October to address data gaps within each NAAD. Field work began in October.

2006: NGB continued investigations at NAADs 01, 02, 04, 05, and E76, and also conducted interim removal actions to remove lead-, arsenic-, and TNT-impacted soil. Investigation and removal action reports, including human health and ecological risk assessments, were prepared for numerous sites within the OB/OD Area.

2007: Field activities for summer and fall included soil screening at NAAD 02 and NAAD 09C for soils being transported off site for disposal, screening of soils at NAAD 09C for backfilling into the NAAD 02 Area, surface MEC clearance activities in NAAD 01 and NAAD 02, and continued inspections and sampling of the OB/OD Area. An annual site visit by ADEQ occurred in October. The site visit included a quality assurance, quality control inspection of field activities in the OB/OD Area.

Several reports were submitted for the OB/OD Area including a revised Master Work Plan, a revised Surface MEC Removal Site-Specific Work Plan, the 2006 OB/OD Surface and

Groundwater Annual Monitoring report, the NAAD 02 Site-Specific RI report, the NAAD 02/03 Characterization report, the Final NAAD 05 Human Health and Ecological Risk Assessment, the Draft NAAD 06 Human Health and Ecological Risk Assessment, the NAAD 09C Removal Action report, the Construction Completion report and Risk Screening Evaluation for NAAD 01, the Final NAAD 20 Characterization report, and quarterly MEC Inventory and Accountability reports.

ADEQ also reviewed the LTM Groundwater Monitoring report for NAADs 11B, 14D, 14G, 40 and 43. ADEQ recommended the continuing monitoring of perchlorate in the wells. Camp Navajo continued to conduct groundwater monitoring and reporting at all LTM sites.

2008: No field activities were conducted in the summer or fall. The NGB and ADEQ focused on submitting and approving reports and preparing for field activities beginning in Spring 2009 and post-closure beginning in fall 2009.

2009: Twenty [vadose zone monitor wells](#) were installed in the OB/OD area around NAAD 02 to prepare the site for post-closure under RCRA. Final MEC remediation activities continued until September. After that the site began the transfer to the ADEQ Hazardous Waste Permits Unit to undergo RCRA post-closure. Remediation activities for the summer included surface sweeps and MEC removal near NAAD 02, the screening and backfilling of stockpiled soil into NAAD 02, and the submission of several Decision Documents to complete the closure.

2010: All remaining field activities including screening and sampling of stockpiled soil, backfilling the NAAD 02 pits, on-site detonation of all MEC, and collecting all scrap MD for off-site recycling were completed in the summer. The MRWA 02 EE/CA was approved in the winter. ADEQ and the NGB began a series of meetings to prepare the site to undergo RCRA post-closure.

Site History - Installation Restoration Program:

1970: Beginning in the 1970s, numerous studies and investigations were conducted at the installation. Sites, excluding the OB/OD area, investigated include:

- tank areas
- landfills/waste/ash piles
- igloos/storage areas/pads
- paint/maintenance shops/wastewater lagoons/retention ponds/demolition/demilitarization areas/training areas
- asphalt plants

1982: Operational control of the base was transferred from the Secretary of the Army to the AZ ARNG. After the transfer, the mission for the AZ ARNG was primarily training, with the secondary support mission of leasing storage space to other federal and state entities. Past activities led to known and suspected contamination of several environmental media outside the ammunition demolition areas. These areas included: ammunition workshops, munitions storage,

munitions testing and training ranges, operations facilities (including automotive maintenance and fueling), hazardous materials storage, and solid waste disposal facilities.

1991-1993: The U.S. EPA and ADEQ completed the RCRA facilities assessment and visual inspection at Camp Navajo in Fall 1993. EPA also completed a preliminary assessment/site inspection re-evaluation of Camp Navajo under the [Comprehensive Environmental Response Compensation and Liability Act](#) (CERCLA) in April 1993. The report incorporated records contained in the 1991 Master Environmental Plan and subjected available sampling data to Hazard Ranking System scoring. In October 1993, EPA notified the AZ ARNG that Camp Navajo did not score high enough to be placed on the [National Priorities List](#) (NPL). However, the facility is still subject to CERCLA, state (delegated RCRA, Water Quality Assurance Revolving Fund ([WQARF](#)) etc.) and local laws, and must comply with applicable remedial standards established by the IRP for all federal facilities.

In 1993, operational control was transferred under BRAC 1 to the AZ ARNG, and the name was changed to Camp Navajo. The installation is subdivided into three “zones” with several parcels of land leased to tenants. The interior zone of Camp Navajo is utilized for storage igloos, General Service Administration warehouses, and ammunition and surveillance workshop areas. The southern zone of the installation was formerly used as a demolition area to train ammunition handlers and to demilitarize obsolete munitions. For activities in this zone, the OB/OD Area is described elsewhere. Administrative, military training, and tenant activities are conducted within the buffer zones.

1995-2000: The Former Construction Debris Landfill #5 was first investigated in 1995, with a supplemental investigation in 1999. In 2000, 6,000 cubic yards of debris and soil were transported and disposed at a permitted hazardous waste landfill.

2000: Major removal actions performed included the excavation of TNT contaminated soils at the TNT washout facility, a.k.a., Building 318/319; the demolition of Building 319, and the dewatering and treatment of TNT contaminated groundwater from the perched aquifer immediately beneath Buildings 318/319. The contaminated soils and groundwater were treated by biocomposting on site.

2001: The Former Sanitary Landfill was first investigated in 1998, with supplemental investigations in 1998, 1999, and 2000. Based on these investigations, an environmental engineering and cost analysis was finalized in May 2001, which proposed recontouring, [capping](#) and re-seeding of the site. The [remedial action](#) was completed in October.

2002-2003: Thirty-four sites were involved in investigation and remediation activities under CERCLA in 2002 and 2003. They are summarized as follows:

- Remediation at seven sites was completed.
- Twenty-seven sites were investigated and removal actions conducted during field work in Summer 2002 and 2003 and were slated for closure.

- Contamination at these sites appeared to be limited primarily to the surface. However, additional soil and groundwater characterization was performed to verify the vertical and horizontal extent of contamination, or to verify remediation completion recommendations.
- For those sites with soil contamination above the applicable regulatory standards (Arizona [Soil Remediation Standards](#) Rule, A.R.S. 49-151-152; A.A.C. R18-7) a removal action, combined with long-term groundwater monitoring, was the preferred remedial action.

Proposed plans were prepared for the closure activities. Closure activities at Camp Navajo are conducted in accordance with the Army's IRP for non-NPL sites as authorized by the [Defense Environmental Restoration Program](#), 10 USC Chapter § 2701-2708 and 2810).

2006: RODs were pending for 29 of the sites. After the RODs are approved those sites will be considered closed. Five sites required LTM. The LTM activities included groundwater monitoring and [five-year reviews](#).

2007: The annual Technical Project Planning meeting was held in February. Representatives from the National Guard Bureau and the ADEQ agreed that RODs will replace Decision Documents for all future activities related to the LTM of the facility. ADEQ reviewed the LTM Groundwater Monitoring Report for NAADs 11B, 14D, 14G, 40 and 43. ADEQ recommended the continuing monitoring of perchlorate in the wells. Camp Navajo continued to conduct groundwater monitoring and reporting at all LTM sites.

2008: ADEQ and the NGB reviewed the LTM reports and discussed the decreased monitoring activities for the IRP long-term sites. The NGB prepared monitoring reports for fall 2008 which will be evaluated to determine what remedial actions will be taken for closure of the area.

2009: The NGB prepared the LTM sites for decreased monitoring activities and closure.

2010: A FYR report for Five Installation, Restoration Project (IRP) Sites was submitted in the summer. The LTM sites started ramp-down procedures as outlined by the LTM sites workplan. The Five Sites LTM Decision Document was approved in the fall.

Contaminants:

The contaminants of concern in the OB/OD Area include: metals, explosives, [dioxin/furans](#) and [unexploded ordnance](#) (UXO).

Contaminants of concern associated with installation operations (excluding the OB/OD area) include low levels of [perchlorate](#), heavy metals, [volatile organic compounds](#) (VOCs), semi-volatile organic compounds (SVOCs) such as pesticides and herbicides, residual from explosive waste, and polychlorinated biphenyls ([PCBs](#)). Contaminants of concern at both sites may change as new data become available.

Public Health Impacts:

A public health risk exists due to UXO in the OB/OD Area. This risk is managed by restricting public access to the area; only AZ ARNG and NGB personnel with a UXO escort are allowed. In addition, fencing which includes warning signs is located around the OB/OD Area and is maintained regularly by Camp Navajo personnel.

A public health risk may exist by ingestion of contaminated soils or groundwater at the IRP sites. This risk is managed by restricting site access to AZ ARNG and NGB personnel only. Land use at the installation will be non-residential for the foreseeable future.

Site Hydrogeology:

The Camp Navajo area is underlain by unconsolidated Quaternary [alluvial](#) deposits, volcanic rocks of Quaternary and Tertiary age and Paleozoic sedimentary rocks, mostly sandstones, limestones and shales. Outcrops of the volcanic unit are predominantly basaltic and range from lava flows to cinder cones. Thirteen volcanic vents have been identified within Camp Navajo's boundaries. Several faults have been identified cutting Paleozoic sedimentary rocks and Quaternary-Tertiary volcanic rocks. These faults are regionally important with respect to groundwater sources and recharge.

The regional water table, occurring in the Coconino-Supai sandstone [aquifer](#), is encountered at approximately 1,500 feet below ground surface. Several perched water tables, controlled by local geologic conditions, are present above the regional unconfined aquifer. These perched saturated zones have been identified at various depths to 350 feet and have historically been the predominant source of groundwater in wells immediately adjacent to Camp Navajo.

The [City of Flagstaff](#) relies on the Coconino aquifer for its municipal drinking water; its production wells are located at the Woody Mountain Wellfield, three miles southeast of the eastern boundary of Camp Navajo. Since 2003, Camp Navajo and the town of Bellemont have also begun to tap the regional aquifer. Within the Coconino aquifer, groundwater flow is north to northeast as in Flagstaff.

The OB/OD area contains two canyons: The Former White Phosphorous Detonation and Burn Area (a.k.a. Chemical Canyon) and Volunteer Canyon. The Former White Phosphorous Detonation and Burn Area Canyon is a tributary of Volunteer Canyon. Volunteer Canyon joins Sycamore Canyon and Sycamore Creek only 5.5 miles downstream of Camp Navajo. Within the OB/OD area, the Fossil Mountain and the Harrisburg members of the Kaibab Formation are the dominant rock units present. These units are bisected by several northeast striking normal faults and associated fracture sets that are surficially exposed in outcrop.

The Fossil Mountain member of the underlying Kaibab Formation consists of approximately 75 meters of thick-bedded limestone, sandy-limestone, and sandstone, while the overlying Harrisburg member consists of approximately 50 meters of reddish-orange to white, thinly bedded, sandy-silty limestone, and calcareous silty sandstone.

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Information Repository:

Interested parties may view select site documents at the Northern Arizona University [Cline Library](#) located at 901 S. Knoles Drive, Building 28, in Flagstaff, (928) 523-4459.

Site information is also available at the ADEQ Main Office located at 1110 W. Washington Street in Phoenix. Please contact (602) 771-4380 or (800) 234-5677 to schedule an appointment with 24-hour notice to review these documents. Once all documents requested have been collected, you will be contacted for a review Monday through Friday from 8:30 a.m. to 4:30 p.m. at the ADEQ Records Management Center, 1110 W. Washington Street in Phoenix, AZ.