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ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

**Preliminary Assessment Report for
Florence Military Reservation,
Installation 04080,
Florence, Arizona**

Prepared for

National Guard Bureau, Army Directorate
Aberdeen, Maryland

August 1993

Prepared by

Applied Geosciences and Environmental Management Section
Environmental Research Division
Argonne National Laboratory

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Nomenclature

Acronyms

ADWR	Arizona Department of Water Resources
AZARNG	Arizona Army National Guard
CAP	Central Arizona Project
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	U.S. Environmental Protection Agency
ESO	environmentally significant operation
IRP	Installation Restoration Program
NGB	National Guard Bureau, Army Directorate
PA	preliminary assessment
POL	petroleum, oils, and lubricants
POW	prisoner of war
RCRA	Resource Conservation and Recovery Act
SLUP	special land use permit
TDS	total dissolved solids
USGS	U.S. Geological Survey
UST	underground storage tank
UTES	unit training equipment site
UXO	unexploded ordnance

Units of Measure

d	day
ft	foot
ft ²	square foot
gal	gallon
in.	inch
L	liter
mg	milligram
mi	mile
ppm	parts per million

pt	pint
qt	quart
ybp	years before the present
yr	year

**Preliminary Assessment Report for
Florence Military Reservation,
Installation 04080,
Florence, Arizona**

Summary

This report presents the results of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Arizona Army National Guard property near Florence, Arizona. Preliminary assessments of federal facilities are being conducted to compile the information necessary for completing preredial activities and to provide a basis for establishing corrective actions in response to releases of hazardous substances. The principal objective of the PA is to characterize the site accurately and determine the need for further action by examining site activities, quantities of hazardous substances present, and potential pathways by which contamination could affect public health and the environment. This PA satisfies, for the Florence Military Reservation property, phase I of the Department of Defense Installation Restoration Program.

Florence Military Reservation is a 5,655-acre site located in the southern portion of Arizona, about 65 mi southeast of Phoenix, in the county of Pinal. Florence Military Reservation includes Unit Training Equipment Site (UTES) 1, an artillery firing range, and ammunition storage. The subject of this PA is the UTES. The environmentally significant operations associated with the UTES property are (1) vehicle maintenance and refueling, (2) supply/storage of materials, and (3) the vehicle washrack.

The review of both historical and current practices at the property indicated that the Florence Military Reservation property poses minimum risk to human health or the environment, although Argonne's reviewers noted some areas of concern. Some preliminary soil sampling should be done in the area of the vehicle washrack leach fields and in the vicinity of the dry well connected to the drain from the battery storage room in the UTES maintenance facility, Building 160. This recommendation is based on previous clogging of the leach field drain lines. Whether any drainage has occurred from the battery storage room to the dry well on the west side of the building is unknown.

In addition, some soil sampling should be undertaken in the landfill previously used by a prisoner-of-war camp and located immediately north of the Florence Gardens mobile home park.

No signs of soil contamination are visible; the absence of contamination would be confirmed by sampling. Some sampling should also be done at the old UTES repair facility in the southwest corner of the site. Little is known about past disposal practices at this site, and problem areas could be identified by sampling.

Soil sampling in all of the above areas would provide information about soil contamination levels beneath the surface and subsequent migration of contaminants. Such an investigation would lead to the development of a baseline point of reference and could potentially lead to a full site investigation, if the sampling indicated that to be warranted.

1 Introduction

This document is a report of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Arizona Army National Guard (AZARNG) property known as Florence Military Reservation, located in Florence, Arizona.

1.1 Authority for the Preliminary Assessment

The National Guard Bureau, Army Directorate (NGB), has engaged Argonne to perform PAs of selected NGB properties. These assessments are being done in a manner consistent with both the Department of Defense Installation Restoration Program (IRP) and the U.S. Environmental Protection Agency's (EPA's) Potential Hazardous Waste Site Preliminary Assessment Guidance. Preliminary assessments of NGB properties are conducted under the authority and direction of the IRP; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or, more commonly, Superfund); and the Superfund Amendments and Reauthorization Act of 1986 (P.L. 99-499).

1.2 Objectives

This PA report is based on existing information from the NGB records that were made available to Argonne investigators and from other sources. Although this PA effort did not extend to the generation of new data, it nonetheless identifies areas where existing data are incomplete, unreliable, or ambiguous and recommends ways to address such shortcomings.

The objectives of the PA are to satisfy phase I of the IRP and to

- Identify and characterize the environmentally significant operations (ESOs),
- Identify property areas or ESOs that may require a site investigation,
- Identify ESOs or areas of environmental contamination that may require immediate removal,
- Identify properties for which no further action is needed, and

- Provide information sufficient to prescore the site with the EPA's PA Scoresheets (September 1991).

1.3 Procedures

The PA began with a review of AZARNG files located at the Division of Military Affairs, Phoenix, Arizona, from July 6-9, 1993. A site visit was conducted on July 7, 1993, to obtain additional information through direct observation and interviews with personnel familiar with the property and its operations. Other relevant information was obtained on July 8-9, 1993, from the Arizona Department of Water Resources (ADWR), the Arizona Department of Environmental Quality, and the Florence Museum in Florence, Arizona.

1.4 Report Format

This PA report presents a summary and evaluation of the data relevant to the PA for this property. Section 2 describes the property and its surrounding environment and land use. Section 3 identifies and characterizes the ESOs at the site. Section 4 discusses known and suspected releases to the environment, and Section 5 discusses potential human and environmental receptors for such releases. Section 6 summarizes the findings and conclusions, discusses the quality and reliability of the supporting information, identifies areas requiring further action, and suggests how such actions can be accomplished. Section 7 lists pertinent materials reviewed. The Appendix gives interview information.

2 Property Characterization

2.1 General Property Information

Florence Military Reservation consists of land acquired and controlled under four agreements. The primary source of land was Executive Order 1633, dated October 28, 1912, which originally set aside 6,161.2 acres for use by the National Guard. This land is the subject of this report because the land was previously owned by the federal government. The AZARNG controls additional state land under two separate agreements: 1,361 acres is leased, with effective dates of July 1, 1993, through June 30, 2003; and 17,836 acres is controlled under a special land use permit (SLUP). Additional land (840 acres) is leased from the Bureau of Land Management.

The principal use of this land is for live-fire exercises (field artillery), unit maneuvers, simulated engagements, and small-arms range qualification and familiarization. Projectiles are fired from the leased land onto impact areas located in the land acquired by the executive order. The impact area is approximately 1,360 acres in size. This area is used for troop weapons training in a wide variety of weapons ranging from small arms to heavy artillery (155 mm). The area is fenced and posted, and access is restricted but not controlled. Materials and contaminants of potential concern include UXO (unexploded ordnance rounds), explosive compounds, and heavy metals (lead). Contamination is presumed to be present in shallow surface soils because of the nature of the materials and their mode of placement. Shallow craters and UXO can be seen throughout the area. This area was not considered to be a part of this PA because the UXO cannot be handled by routine sampling procedures.

A unit training equipment site (UTES) supports the activities of the firing range and is the primary focus of this report. The UTES is located approximately 65 mi southeast of Phoenix on state route 80/89, about 1.5 mi north of the town of Florence, Arizona, in the county of Pinal. The UTES is used by National Guard units throughout the state for artillery training. Figure 1 shows the general location of the property, and Table 1 lists pertinent information about it.

Immediately to the north of the UTES site, along the northern boundary, is the federal detention center, which is operated by the U.S. Bureau of Prisons. The facility, which was formerly used to house people guilty of immigration violations, now houses criminals found guilty of federal crimes and sentenced to prison. This detention center is a maximum security facility and is currently being expanded to house more prisoners.

FIGURE 1 General Location of Florence Military Reservation

TABLE 1 Identifying Information for Florence Military Reservation

Installation address	1001 N. Florence Blvd. Florence, AZ 85232-9704
Geographic location Township and range	T4S, R9E; T4S, R10E
FISP ^a installation number	04080
Types of facilities	UTES Artillery firing range Ammunition storage
License information	Federal Executive Order 1633; Oct. 28, 1912

^a Facility Inventory and Stationing Plan.

Florence Gardens, a privately owned mobile home park, is located immediately to the north of the federal detention center. The park has its own sewage treatment plant and purchases water from a private utility company.

To the north of Florence Gardens is the remainder of the land granted to the AZARNG under the original executive order. The land is separated from the Florence Gardens site by the Central Arizona Project (CAP) irrigation canal. This area of land is designated on U.S. Geological Survey (USGS) topographic maps (1965; 1981) as the Florence National Guard Target Range. A landfill occupies the southern portion of this land and is believed to have been used by the prisoner-of-war (POW) camp when it was in operation.

During the site visit, the suggestion was made that the landfill previously used by the POW camp occupying the site during World War II, located immediately north of the Florence Gardens mobile home park, should be inspected to obtain an understanding of its contents. The inspection was conducted by Argonne personnel, and the contents were determined to be household solid waste along with some building debris, probably resulting from the closure of the POW camp at the end of the war. No evidence of hazardous waste was found during a walkthrough of the site. This finding could be confirmed by some preliminary soil sampling downgradient of the site.

Two large, dirt-covered ammunition storage igloos and ten small magazines for Class A and Class C munitions are located in the same vicinity. This area is secured, with controlled

access, and is patrolled by a private security firm that makes two passes per hour and has no previous history of any materiel mishandling. For this reason, and because of the nature of the ammunition stored here, this area was not considered to be a topic of concern under this PA. The storage igloos and magazines are not considered to be a threat to nearby residents because of the location of the storage and the sparse population in the area.

2.2 Description of Facilities

The UTES facility, shown in Figure 2, consists of approximately 61 acres. The facility is located about 1.5 mi north of the town of Florence, Arizona, and is surrounded by irrigated agricultural land and a federal detention center immediately to the north. The site is secured by a chain-link fence that is locked after hours, with no sentry on duty.

2.2.1 Former UTES Facility

The old UTES facility is located in the southeast corner of the site. The old UTES site was used for maintaining artillery tracked vehicles and heavy engineering equipment. The facility consisted of two concrete-block buildings: (1) Building 112 is used for storage and workshop space; it was constructed in 1958 and contains 884 ft²; and (2) Building 116 is an administration and storage building, which was constructed in 1958 and contains 2,500 ft².

Other structures located at the former UTES facility but no longer in productive use include Building 104, which was a supply storage building constructed of concrete block with approximately 400 ft². A storage building for petroleum, oils, and lubricants (POL), which was constructed in 1978, contains 208 ft². A sunshade, consisting of approximately 1,800 ft², was constructed in 1978, with the purpose of shielding mechanics who were performing vehicle work and inspections outside on the gravel apron. These structures, while no longer in use, are still standing.

2.2.2 New UTES Facility

A new UTES maintenance facility, Building 160, was constructed in 1980. This facility is located on the northeast corner of the site and consists of a maintenance shop/office, a fuel dispenser, and a washrack.

FIGURE 2 Unit Training Equipment Site

The maintenance shop/office is a concrete block structure with three high-door bays in the vehicle work area, inside storage rooms, a boiler room, a battery storage room, and locker rooms. On the south side of the building, immediately outside the high-bay doors, is a concrete apron with a high sun shade overhead. The area of the maintenance shop is approximately 7,400 ft².

The sanitary sewer from the maintenance building runs off the site to the northwest and is connected to the sanitary sewer line of the federal detention center located to the north. The battery acid storage room contains an eye washing facility and a floor drain, which empty to the west end of the building into a dry well. Each of the three vehicle work bays has a floor drain. These drains run out of the building to the southeast and are connected to the oil-water separator and the leach field system, adjacent to the vehicle washrack.

The maintenance facility is surrounded on the west and south sides by a vehicle storage yard. Presently, 46 tracked vehicles and seven wheeled vehicles are on-site. The tracked vehicles consist of Howitzer artillery and support vehicles. The wheeled vehicles consist of a large forklift loader, three 20-ton cranes, one ditcher, one shop pickup truck, and one shop stake truck. The number of vehicles on-site varies according to the type of training exercises taking place.

Immediately to the west of the maintenance facility is a curbed concrete slab that is used for storing waste oil and other miscellaneous materials. Four connex buildings, for the storage of waste oils and supplies, are located on the west edge of the curbing in front of the high-bay doors.

2.2.3 Fuel Dispenser

The fuel dispenser is located approximately 75 ft south of the maintenance building and consists of a concrete apron with approximate dimensions of 45 ft × 45 ft. Two fuel dispensing pumps are located on the apron, one for diesel fuel and the other for unleaded gasoline. In addition, beneath the concrete apron are two underground storage tanks (USTs); both are steel, have a 2,000-gal capacity, and were installed in 1981.

The USTs are tested annually and were last tested in May 1993. The diesel fuel tank passed the nonvolumetric tank tightness test, but the tank containing unleaded gasoline did not. The test results suggested that a vapor leak is present at the top of the tank, possibly at the riser fill pipe. The test report recommended that the top tank connections, the vent pipes, and the fill riser be checked, tightened, and/or replaced as necessary. The tank will be retested, and appropriate action will be taken on the basis of the results.

2.2.4 Vehicle Washrack

The vehicle washrack is located east of the new UTES maintenance facility. The washrack consists of two concrete aprons, slightly sloped toward each other, with a drain leading to an oil-water separator between them. A power wash/steam water heater is located adjacent to the concrete apron. Vehicles are hosed off to remove heavy dirt and debris before they are driven onto the concrete aprons. This practice minimizes blockage of the oil-water separator. Once a vehicle is on the apron, it is power washed with hot water and steam. This is done upon return from training exercises or prior to maintenance activities.

Wash water from the washrack drains into the oil-water separator. Floor drains from the bays in the maintenance building drain into this same separator. Water from the separator then drains into two leach beds located along the eastern side of the washrack. Each leach bed is 55 ft long, 13 ft wide, and 12 ft deep.

2.2.5 Other Facilities

The remainder of the UTES site consists primarily of the following:

- A helicopter pad measures about 2,500 ft².
- Five tent slabs, measuring 800 ft² each, are used when provisional tents are erected to house additional National Guard troops during training exercises.
- The mess hall (Building 124), which was constructed in 1978, is a metal structure with an area of 480 ft².
- The shower and latrine (Building 120), which was constructed in 1975, is a metal structure with an area of 987 ft².

Outside of the security fence in the northwest corner of the site is a former storage and landfill area. A walk-through of this site was made; and some old vehicle parts, such as frames and old wheels, were found, along with some shell casings on pallets for return, as well as some old plumbing fixtures. While the site is somewhat in disarray and unsightly, nothing was observed that would lead to any suspicion of disposal of hazardous wastes or material.

Utilities supporting the UTES site consist of water obtained from the Florence Gardens Water Co. and electricity obtained from the San Carlos Power Cooperative. All sewage systems, with the exception of the new maintenance facility, are septic tank; gas is bottled propane.

2.3 Property History

The Florence AZARNG site was created by Executive Order 1633, dated October 28, 1912. The executive order set aside 6,161.2 acres of land for use by the National Guard as a rifle

range. In 1944, some of the land in the executive order was taken over by the Secretary of War for use as a POW camp.

The POW camp had a capacity of 6,200 persons (5,000 prisoners and 1,200 troops). The camp buildings were of semipermanent construction and consisted of buildings to house all of the men, a large hospital (486 beds), large warehouses, a motor pool, machine shop, bakery, laundry, cold storage plant, water system, and sewage treatment.

Between 1946 and 1950, the land used for the POW camp was declared surplus and was never returned to the AZARNG. The land was placed under the control of the U.S. Bureau of Prisons and became a federal detention center. The amount of land remaining under the control of the AZARNG was 5,655 acres. In 1969, the Industrial Development Authority of the town of Florence was deeded a portion of the surplus property. In 1971, the state of Arizona was deeded a portion of the surplus land, approximately 60 acres.

2.4 Permitting Status

This installation has no ESOs that require a permit under the Resource Conservation and Recovery Act (RCRA). The Florence Military Reservation is a small-quantity generator of hazardous waste and is not required to be permitted as a treatment, storage, or disposal facility. The EPA RCRA identification number is AZ 4572890024. Hazardous waste types generated at the installation are listed wastes F001, F002, and F005.

No ESOs at this installation are designated for CERCLA activities. No wastewater discharge permits have been issued in connection with the ESOs at this site.

2.5 Surrounding Environment and Land Use

2.5.1 Demographics and Land Use

The on-post population at the Florence Military Reservation is approximately 12 full-time military personnel. Transitory operations increase the number of personnel severalfold, but these increases are periodic and short-lived. Approximately 5,100 National Guard personnel train at the site annually. This site is used 15 days per month, 180 days per year. Heavy artillery training

occurs on four weekends per year. This type of training is restricted because of air-space regulations and requires extensive notification procedures. The surrounding community has a population of approximately 6,000, primarily located in the town of Florence 1.5 mi south of the installation, in the federal detention center located directly adjacent to and north of the installation, in the Florence Gardens mobile home park, located approximately 0.25 mi north of the installation, and in the Arizona State Prison, located on the southeast side of Florence.

Land use in the Gila River valley is agricultural, principally irrigated cotton and cattle grazing. The Arizona State Prison and several gravel pits are also in the area. No heavy industry currently exists in the area. The river valley is flanked by low hills, with low mountains to the north, east, and south.

2.5.2 Climate

The climate at the installation is arid, dominated by low precipitation and low humidity. Precipitation averages 10.20 in./yr and ranges as low as 5.44 in./yr. Mean annual temperature ranges from 68.5° to 70.7°F. Summer precipitation follows a pattern of sporadic heavy storms. Winter precipitation is characterized as lighter, but longer in duration. Because of the high rates of evapotranspiration (45 in./yr), little precipitation is available for recharge of groundwater. Only during the winter months are conditions favorable for recharge through precipitation (Beer 1988).

2.5.3 Surface Water and Physiography

The Florence Military Reservation is located above the north side of the Gila River stream channel in the Gila River valley near Florence, in south-central Arizona (Figure 1). This region is part of the Sonoran Desert in the Mexican Highland section of the Basin and Range physiographic province (MacMahon and Wagner 1985). Elevation at the installation is approximately 1,500 ft above mean sea level. The installation is located near several intermittent streams that dissect the alluvial fan/alluvial deposits local to the installation. The only perennial source of surface water is groundwater pumpage to irrigation canals paralleling the Gila River channel: the North Side Canal, which passes east-west 0.25 mi south of the installation; and the larger Casa Grande Canal, located on the south of the Gila River. These canals are fed by the Ashurst-Hayden Diversion Dam, which is a component of the San Carlos Irrigation Project. The Ashurst-Hayden Diversion Dam also releases water to the Gila River, but because of the highly permeable nature of the riverbed, only infrequent large releases result in flow in the Florence area (Beer 1988).

2.5.4 Groundwater and Hydrogeology

Information on the regional hydrogeology of the Santa Cruz basin where the Florence facility is located, was derived from a review of the ADWR regional groundwater flow model (Wickham and Corkhill 1989) and the U.S. Bureau of Reclamation's CAP reports (1977). Site-specific information is taken from ADWR data files and a master's thesis by Beer (1988).

The area of the project is situated in the Basin and Range physiographic province and is characterized by broad, flat alluvial valleys separated by mountain ranges. This topography was initially formed by warping and large-scale normal faulting of thick deposits of conglomerate and sandstone, as well as accumulations of volcanic rock during the middle Tertiary Period, approximately 30 million years before the present (ybp). The basin-and-range aspect was accentuated by differential uplift and subsidence and faulting that continued into Pliocene time, less than 5 million ybp. Alluvial and lacustrine "valley fill" deposits, which are a major component of the present surface topography, began forming in the Tertiary Period, and are evident today as fans, pediments, and valley floors. Valley fill is effectively the groundwater reservoir for central Arizona.

2.5.4.1 Regional Hydrogeology and Aquifer Characteristics

In central Arizona, groundwater is subject to greater changes in elevation due to anthropogenic influences than any in other location in the United States. Because of these fluctuations and human reliance on groundwater, the stratigraphy of the area has been well studied. Four water-bearing units are recognized in the Santa Cruz basin: (1) an upper alluvial unit, (2) a middle silt-and-clay unit, (3) the lower conglomerate unit, and (4) the hydrologic bedrock unit (Wickham and Corkhill 1989). Water-bearing bedrock underlies the region and consists of Precambrian granite, gneiss, and schist, and Mesozoic granite and related crystalline rocks, as well as volcanic, sedimentary, and metamorphic rocks. Current ADWR models consider this bedrock to be impermeable. Regional depth to bedrock ranges from the ground surface along mountain fronts to 9,800 ft below ground surface. Figure 3 shows a generalized model of the varying depth distribution of the water-bearing formations in the region.

The lower conglomerate unit sits unconformably on the bedrock unit and is the deepest alluvial material in basin areas. This unit is comprised of semiconsolidated and consolidated

FIGURE 3 Generalized Model of Varying Depths of Water-Bearing Formations in the Region

coarse sediments of granite, cobbles, boulders, sands, and gravels. The maximum thickness of this unit is unknown, with a measured range from less than 50 ft to 1,560 ft. Depths range from less than 50 ft below ground level to greater than 6,700 ft below ground level. The lower conglomerate unit is the lowest aquifer and the most used, with a mean yield of 9%, an estimated storage coefficient range from 10^{-3} to 10^{-5} , and hydraulic conductivities averaging 254 gal/d/ft².

The middle silt-and-clay unit is located above the lower conglomerate unit, as shown in Figure 3. This unit consists of fine grained sediments, including silt, clay, and sands. Thickness varies from less than 50 ft to greater than 6,500 ft. Although less productive than the units lying above and below, the middle silt-and-clay unit is locally productive.

The upper alluvial unit is at the land surface and is present in a large portion of the Santa Cruz basin. This unit consists of unconsolidated or slightly consolidated sand and gravels. Unit thickness ranges from less than 50 ft near mountain fronts to 1,200 ft at the center of basins. This unit typically acts as an unconfined aquifer; however, local confining layers are present. The lower portion of this unit is a transitional zone in which coarser material from the upper alluvial unit is interbedded with finer alluvial material more typical of the middle silt-and-clay unit. The upper alluvial unit is highly productive, with some wells yielding 3,000 gal/min. Specific yields average 11%, hydraulic conductivities average 436 gal/d/ft². Dewatering of this unit has occurred in the region, particularly where wells penetrate less than 200 ft.

2.5.4.2 Local Hydrogeology

The following review is based on a study of groundwater in the Florence, Arizona, area that was conducted as a project for a master's thesis (Beer 1988) and on well data from the ADWR and the USGS.

The Florence Military Reservation is located in the lower Santa Cruz basin, which consists of three water-bearing units consistent with the regional aquifer units described in the previous section: (1) the lower conglomerate unit, (2) the middle silt-and-clay unit, and (3) the upper alluvial unit. The bedrock underlying these units is composed of Precambrian granite, gneiss, and schists. Bedrock is encountered at approximately 750 ft below ground level and yields little water unless fractures and faults exist. This bedrock unit outcrops on the north side of Poston Butte, located approximately 2 mi west of the Florence facility. The lower conglomerate unit exists at depths of 250-400 ft below ground level and is generally 300-500 ft thick. This unit is comprised

of moderately cemented conglomerate rocks interbedded with mudstone, siltstone, and basaltic rocks. Moderate water yields are obtained from this unit. The quality of water from the lower conglomerate unit ranges from fair to good. The middle silt-and-clay unit consists of poorly sorted and unconsolidated sand, gravel, silt, and clay. The depth to the top of this unit ranges from ground level to 100 ft below ground surface; and thickness ranges from 200 to 400 ft. This unit is the most permeable water-bearing unit in the Florence area and thus is the source of water for more than 50% of the wells in the area. As a result of heavy pumping, water levels in the middle silt-and-clay unit have declined substantially. In the area of the installation, Quaternary alluvium overtops the middle silt-and-clay unit and consists of coarse, unconsolidated materials ranging up to cobbles and boulders in size. In the Gila River channel, alluvium achieves thicknesses of up to 100 ft but tapers to thinner intervals on valley slopes. Although this unit is highly permeable, evapotranspiration is too great to afford extensive saturation. When precipitation is adequate, the surface alluvium serves as a recharge zone.

2.5.4.3 Local Aquifer Characteristics

The principal water-bearing zones in the vicinity of Florence Military Reservation are deep valley-fill sediments associated with the middle silt-and-clay unit and the lower conglomerate unit lying below it. Maximum saturated thickness ranges from 450 to 800 ft. Domestic supply wells closest to the installation are completed to depths of 300-540 ft. Piezometric surface mapping in the Gila River channel shows depths to water in the surface alluvium (upper alluvial unit) to range from 150 to 200 ft below ground level (Wickham and Corkhill 1989; Beer 1988). The general direction of groundwater flow is southwest and northwest, as indicated by the groundwater elevations shown in Figure 4. Transmissivity in the Gila River valley ranges from 25,000 to 150,000 gal/d/ft, with values of 100,000-150,000 gal/d/ft estimated for the vicinity of the installation (Beer 1988). Estimates of hydraulic conductivity range from 9 to 400 ft/d, with an average of 85 ft/d for the Florence area. Vertical conductivity is estimated at 1/100 of the horizontal, or an average of approximately 1 ft/d. Calculated storage coefficients for the Florence area range from 15% to 20% (Beer 1988). Recharge to groundwater in the vicinity of the Florence Military Reservation is highly variable and issues mainly from precipitation; from canal, lateral, and river channel infiltration; from excess irrigation water; and from subsurface inflow. Annual withdrawal of groundwater in the Florence area for the period of 1961-1985 ranged from 7,584 to 30,327 acre-ft. Substantial subsidence of the water table has occurred since the turn of the century, when the depth to water was approximately 50 ft. Since then, withdrawal for irrigation has doubled the depth to groundwater, although in the last decade, excess precipitation has led to some recovery of groundwater levels.

FIGURE 4 Groundwater Elevations

2.5.4.4 Local Groundwater Quality

Recent studies by Beer (1988) and by Malcom Pirnie, Inc., have identified nitrates and total dissolved solids (TDS) as two changing and degrading constituents of groundwater in the Florence area. Nitrate concentration varies in the Gila River valley; a sampling study in 1985 located two nitrate hot spots in the groundwater in the vicinity of the Arizona State Prison and north of the Casa Grande Canal 2 mi northeast of the prison. The only values for wells near the Florence Military Reservation were low for the area (less than 1 ppm). The source of the nitrates is thought to be chemical fertilizer additions to irrigation water, a prison dump, and farm animal operations. Concentrations of TDS are high in the Gila River valley; in 1985, samples ranged from 800 to 2,000 mg/L. Concentrations of TDS are thought to be elevated because of the current "wet cycle" of precipitation and irrigation percolation.

2.5.5 Sensitive Environments

Two vertebrate species of concern and two protected plants are present in the vicinity of the installation. The Sonoran desert tortoise and the chuckwalla are protected under state wildlife law, and the saguaro and barrel cactus are protected under the Native Plant Law of the state of Arizona (Christofferson 1993); however, on the Florence Military Reservation, no specific locations or critical habitats have been established that could put these species at risk from releases of pollutants.

3 Environmentally Significant Operations

The PA team from Argonne identified three ESOs (Figure 5) at the Florence Military Reservation: (1) vehicle maintenance and refueling, (2) supply/storage of materials, and (3) the vehicle washrack.

3.1 Vehicle Maintenance and Refueling

Routine maintenance on tracked and wheeled vehicles is performed at the UTES facility. Vehicle and engine parts are cleaned in a citrus-based solvent, and cleaning tanks are serviced monthly by an outside vendor. Vehicle batteries are stored in a dedicated battery storage room in the maintenance shop. Maintenance personnel no longer have to remove battery acid from old batteries or to fill new batteries with acid. This function is performed by an outside vendor when batteries are delivered to the site. Some battery acid is stored on-site for replacement of fluid in batteries currently in use. Before the vendor began handling all battery acid, maintenance personnel had to neutralize and drain acid from used batteries. The neutralized acid was then poured into containers for shipment to Phoenix, Arizona, for disposal or was dumped into a floor drain leading to a dry well. This practice has not been followed in the past five years. No information is available about the occurrence of past spills.

Vehicle refueling is done just south of the UTES maintenance facility. Two pumps, one for diesel fuel and the other for unleaded gasoline, are located on the concrete refueling apron. Vehicles are driven onto the apron and then refueled. The USTs are located beneath the apron. The site visit revealed that the concrete apron was not curbed. In the event of a fuel spill, the liquid would run off the apron onto the surrounding soil.

3.2 Supply/Storage of Materials

Many products are kept on hand and are stored until used for vehicle maintenance. Table 2 provides a list of the materials. The majority of the products listed in Table 2 are stored in the maintenance building. Generally, the quantities stored are small, sufficient to be a 30-day supply. Some supplies are stored outside on the concrete slab located on the west side of the building. Additional POL products are stored in a connex building.

FIGURE 5 Locations of ESOs at Florence Military Reservation

TABLE 2 Inventory of POL at UTES 1

NSN	POL	Container Size	Quantity
Indoor storage			
8030-00-290-5141	Coating compound, batteries	Gallon	5
Unknown	Safety green paint	Pint	2
Unknown	Sealskin paint	Quart	1
Unknown	Black paint	Quart	1
8010-00-527-2045	Yellow paint	Gallon	2
8010-00-111-8005	Enamel, como black paint	Gallon	2
8010-00-515-2208	Primer coating paint	Gallon	4
8010-00-059-8505	Enamel, gloss white paint	Gallon	2
Unknown	Concrete stain	Gallon	1
Unknown	TMP green paint	Gallon	1
Unknown	Coller coating	Gallon	1
8010-00-687-8191	Primer lacquer	Quart	3
5610-00-641-0427	Walkway compound	Gallon	9
8030-00-290-5140	Coating compound, ammo	Can	3
Unknown	Rubber lubrication	Gallon	1
Unknown	Insecticide	Gallon	1
8040-00-664-4946	Tent cement	Quart	2
9150-00-543-7220	Lubricating oil	Can	2
6850-01-160-3868	Inhibitor corrosion spray	Quart	9
Unknown	Battery cleaner	Can	4
8030-00-938-1947	Corrosion preventive	Can	8
6850-00-419-5004	Cleaning compound	Can	16
PN S749	Lubricating solid film	Can	1
Unknown	Moisture barrier, electrical	Can	1
Unknown	Carburetor cleaner spray	Can	8
Unknown	Paint remover	Can	14
8030-00-155-6444	Antiseize compound	Can	14
8010-00-582-5302	Black lacquer spray	Can	14
Unknown	Mid-blue spray paint	Can	1
8010-00-297-0593	Primer coating compound	Can	10
8010-00-582-5382	Flat white spray	Can	0
8010-00-079-3762	Gloss white spray	Can	16
8010-00-721-9747	Blue lacquer spray	Can	5
8010-00-721-9744	Yellow lacquer spray	Can	5
8010-00-141-2952	Red lacquer spray	Can	5
8010-00-348-7715	Enamel, brown spray	Can	3
6850-00-598-7328	Engine cleaner	Kt	16
00-224-6663	Rifle bore cleaner	Gallon	6
9150-00-753-4686	LSA	Gallon	35
6810-00-281-2001	Monobutyl ether	Gallon	1
8010-01-200-2637	Thinner	Gallon	2
8010-00-160-5788	Thinner dope, lacquer	Can	6
8010-00-189-6727	OE-HDO, 10 weight	Quart	100
8010-00-935-1017	GAA, tubes	Tube	0
Unknown	SAE, 80-90 weight	Quart	10
Unknown	Nylub	Quart	2

TABLE 2 (Cont.)

NSN	POL	Container Size	Quantity
Indoor Storage (Cont.)			
9150-00-186-6681	OE-DHO, 30 weight	Quart	8
9150-00-103-5392	Lubricating gear oil	Quart	18
6810-00-930-6311	Trichloroethane	Can	6
6850-01-063-4760	Cleaning solvent	Can	13
6850-00-598-7311	Leak preventive	Can	14
9150-00-110-9455	BFS brake fluid	Gallon	2
Unknown	Starting fluid, diesel	Can	4
9150-00-159-4472	Hydraulic fluid petro spray	Can	32
9150-00-261-7899	Penetrating oil	Can	0
9150-00-273-2389	All-purpose lubricating oil	Can	25
8010-00-181-8080	Thinner, aircraft	Gallon	41
9150-00-252-6383	OHA hydraulic fluid	Quart	72
9150-00-223-4134	OHA hydraulic fluid	Gallon	35
9150-00-985-7099	Lubricating oil, turboshaft engine	Quart	26
9150-00-935-9807	OHT hydraulic fluid	Quart	0
Unknown	DOT 3 brake fluid	Bt	1
8125-01-193-3443	Oil sampler kits	Box	9
6850-00-965-2087	High-pressure cleaning compound	Can	3
9150-00-243-5199	Lubricating oil, exposed gear	Gallon	23
Outdoor storage			
Used POL			
9150-00-189-6720	30-weight oil	Drum	4
	10-weight oil	Drum	2
6850-00-181-7940	Antifreeze	Drum	4
	Calla solvent	Drum	DI
	30-weight oil, 5-gal can	Can	0
	10-weight oil, 5-gal can	Can	0
9150-00-935-9810	OHT hydraulic fluid	Drum	6
9150-00-681-5999	Aircraft engine turbo oil	Drum	1
	GAA, 35-lb can	Can	2
New items			
9150-00-823-7860	Lubricating compound, dimethylsilicone	Can	12
9150-00-698-2382	Dextron II	Quart	15
8040-00-273-8717	Adhesive	Pint	4
	Propane	Bottle	4

During the site visit, the outside storage area contained both new and used POL products. The concrete curb surrounding the slab has a drain pipe going through the curb from the inside of the retention area to the outside of the curb onto the soil. The cap used for closing the drain pipe and preventing any drainage from the enclosed area was off and lying beside the drain pipe.

3.3 Vehicle Washrack

The drain from the vehicle washrack flows into the oil-water separator before flowing to two leach beds. The floor drains in the vehicle maintenance bays flow into the same system. These leach beds are simple excavated cuts in the ground filled with coarse gravel. If the washrack is not properly used, it can become plugged with grease and sludge, thus impeding the operation of the oil-water separator. This occurred in 1987.

4 Known and Suspected Releases

4.1 Releases to Groundwater

Currently, no releases to groundwater from ESOs have been determined, although the UTES has disposed of liquid wastewater and low pH liquids associated with the battery room into the leach beds located under the vehicle washrack and into the battery-room dry well, respectively. Although releases from these two ESOs have occurred periodically during the life of the UTES, the depth to the aquifer of concern is 160 ft below these two buried liquid leach units; and this fact, coupled with the arid environment, strongly suggests that no release to groundwater has occurred.

4.2 Releases to Surface Water

No releases of contaminants to surface water are known or suspected. A visual inspection of the ESOs conducted during the site visit suggests that the only sources of potentially contaminated runoff at the UTES are the dump area and the vehicle washrack. The dump area is not a source of release to surface water because the area does not contain any hazardous materials or hazardous waste and is drained only by small, ephemeral stream channels that do not generate enough hydraulic energy to cause significant transportation of soil. Liquids from the vehicle washrack do not contain significant contaminants, and this intermittent runoff does not flow overland far enough to enter an intermittent surface water body. For these reasons, the vehicle washrack is excluded from consideration as a source of releases.

4.3 Release to Soil

No releases to the soil were found that would constitute a source of exposure to receptors. The dump area immediately to the north of Florence Gardens consists of approximately 200 acres of dispersed solid waste but does not appear to contain any hazardous materials or hazardous wastes and thus is not considered a source of releases to the soil. Two other ESOs, the vehicle washrack leach field and the battery room leach unit, both release waste liquids to the subsurface, but neither ESO releases potential contaminants into surface soils, and, thus, these two ESOs are not considered here.

The Argonne PA team was made aware of a release to the soil involving hydraulic fluid. A spill of 110 gal of hydraulic fluid occurred on March 12, 1992. Twenty gallons of the fluid spilled onto the ground, and the remaining 90 gal was caught in a drain pan under the M578 recovery vehicle. It is common practice to place a drain pan under all of these vehicles. On the following day, a response team placed the contaminated soil into containers for subsequent disposal.

The spill was caused by vehicle lockout cylinder separation. Improved lockout cylinders have been installed on the M578 vehicles remaining at the site. In addition, the AZARNG is planning to install a cement containment parking facility for the four vehicles remaining at the site. There was no visual sign of the spill during the site visit.

4.4 Releases to Air

There are no known or suspected releases to air from the Florence Military Reservation; however, a short time prior to the site visit by the Argonne PA team, some personnel from the UTES facility were overcome by an unknown substance. The affected personnel were taken to the hospital for treatment. The diagnosis was that methane was the cause of the occurrence.

The only source of methane at the site was from raw-sewage treatment pads located immediately to the east of the site at the Florence Gardens maintenance yard. Raw sewage is transported from the sewage disposal site located at the northwest corner of the UTES site and is spread out on concrete pads to dry. The concrete pads are located immediately to the east of the site. When the wind is from the east, the methane is carried onto the UTES site.

4.5 Other Releases

No other releases are known or suspected.

5 Human and Environmental Receptors

5.1 Groundwater

Groundwater is heavily used for irrigation and drinking water in the Gila River valley. A 1988 inventory of groundwater use in the Florence area noted 104 wells within a 12-mi segment of the Gila River valley centered on Florence. Of these wells, approximately 12% were used for domestic purposes, irrigation, and stock; 10% were used for domestic purposes and stock; and 5% were used for municipal supply (Beer 1988). The Florence Military Reservation receives drinking water from the town of Florence's water supply wells located in the town of Florence, approximately 1.5 mi south of the installation.

The town of Florence uses three wells located within the town limits. These wells are typical of drinking water wells in the area, drawing from an aquifer to a depth of 575 ft (screen interval not determined). Other public or semipublic well systems within a 4-mi radius of the installation include the Arizona State Prison wells, located approximately 2.5 mi southeast of the installation, and the supply wells for the Florence Gardens mobile home park, which are located approximately 0.5 mi south of the installation (Duet 1993). These systems use wells with depths of 300, 540, and over 400 ft. These systems comprise the vast majority of drinking water use in the vicinity of the installation and draw largely from the middle silt-and-clay unit aquifer. The total population supplied by groundwater for drinking within a 4-mi radius of the installation is approximately 6,000 (Beer 1988).

5.2 Surface Water

No human receptors are associated with surface water within the 15-mi target limit distance. The Gila River, located 0.25 mi south of the installation, is an intermittent stream in the Florence area, and the CAP canal, which passes east and west 1 mi north of the UTES, is a concrete-lined irrigation canal. Neither of these surface water bodies supplies domestic water or fish resources.

5.3 Soil

Receptors for soil contamination are limited to the workers at the Florence Military Reservation; however, all identified ESOs are subsurface units that do not pose a surface soil source of contaminants.

5.4 Air

Although the Florence Military Reservation is located in an arid environment conducive to dust generation, no surface contamination was noted during the site visit; and with the exception of one reported spill of hydraulic fluid from a military vehicle, no surface sources of contamination are known to exist.

5.5 Other Receptors

No other significant receptors were identified.

6 Preliminary Assessment Findings and Conclusions

6.1 Summary of Preliminary Assessment Findings

The Florence Military Reservation is located in Florence, Arizona. The principal use of this site is for live-fire exercises (field artillery), unit maneuvers, simulated engagements, and range qualification and familiarization. A UTES supports the activities of the firing range and is the primary focus of this report. The primary ESOs are (1) vehicle maintenance and refueling, (2) supply/storage of materials, and (3) the vehicle washrack.

6.2 Recommendations for Further Action

The primary objective of the PA is to identify and evaluate ESOs that would result in either (1) immediate action, (2) site investigation, or (3) no further PA/IRP action. Generally, the available information indicates that the Florence Military Reservation presents a minimum level of risk to human health and the environment; however, on the basis of the information made available to Argonne, some areas deserve further consideration to ensure protection for the local community and the environment.

Some soil sampling should be done near the area of the vehicle washrack leach beds, near the dry well located west of Building 160, and in the old UTES area. This recommendation is based on previous clogging of the washrack leach field drain lines and the possibility that battery acid drained from the battery storage room in Building 160 into the dry well. Little is known about past activities in the old UTES area. Soil sampling would provide an indication of what is going on beneath the surface in terms of soil contamination and migration of contamination. An investigation of this nature would also provide a baseline point of reference, should the question be brought up in the future.

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Appendix:
Interview Information

Appendix:

Interview Information

Individuals Interviewed

Environmental Health Specialist
Office of Military Affairs
Arizona National Guard
Phoenix, Arizona

Shop Foreman
UTES Training Site
Florence Military Reservation
Florence, Arizona

Argonne Investigators

Peter Ketels
(303) 986-1140 (x266)

John DuWaldt
(303) 986-1140

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