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INSTALLATION RESTORATION PROGRAM

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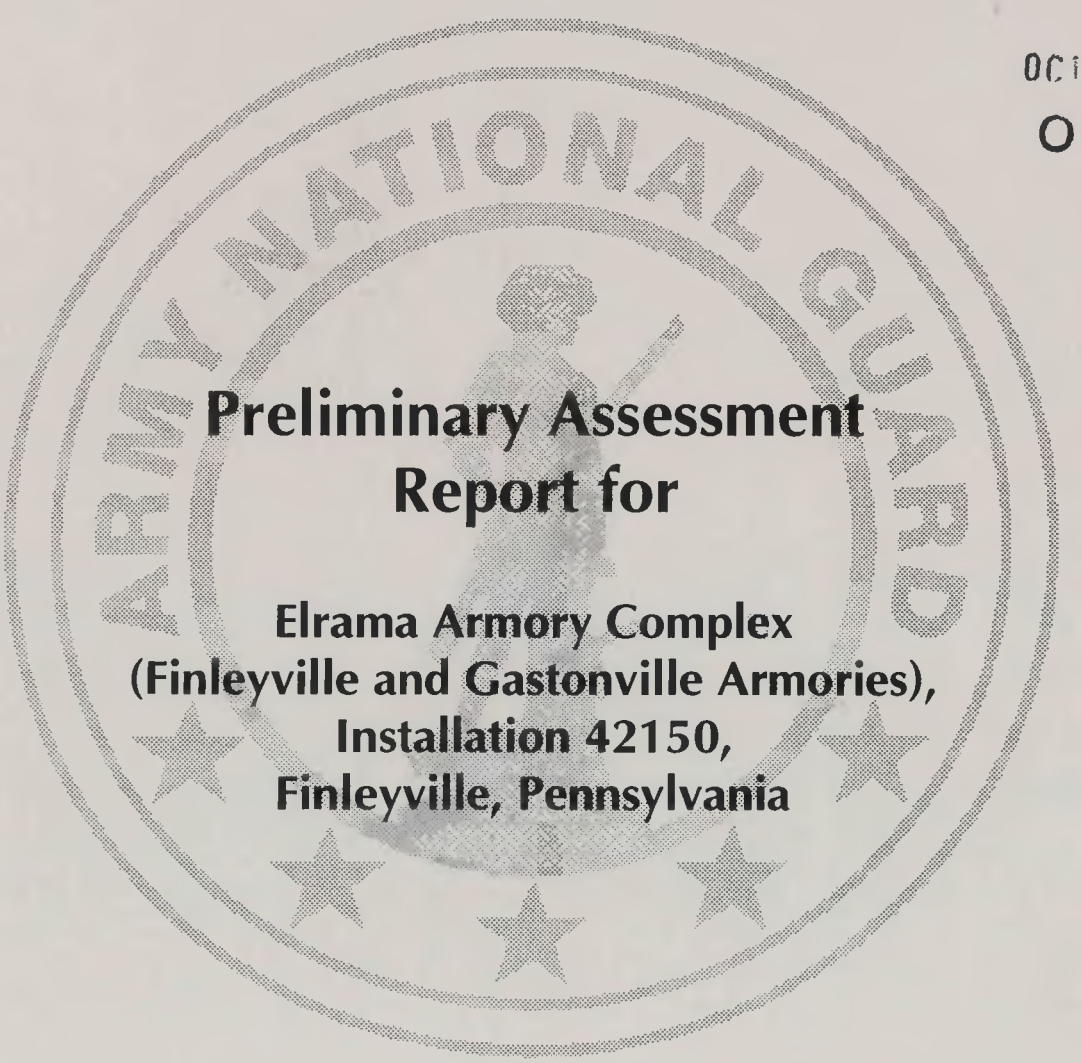

Preliminary Assessment Report for

Elrama Armory Complex (Finleyville and Gastonville Armories), Installation 42150, Finleyville, Pennsylvania

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

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Prepared for

National Guard Bureau, Army Directorate
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August 1993

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Notation

Acronyms

ACM	asbestos-containing material
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COE	U.S. Army Corps of Engineers
DER	Pennsylvania Department of Environmental Resources
DRMO	Defense Reutilization and Marketing Office
EPA	U.S. Environmental Protection Agency
ESO	environmentally significant operation
FISP	Facility Inventory and Stationing Plan
HIPAR	high-power acquisition radar
IFC	integrated fire control
IRP	Installation Restoration Program
MLA	missile launcher area
MSL	mean sea level
OMS	organizational maintenance shop
PA	preliminary assessment
PAARNG	Pennsylvania Army National Guard
PCB	polychlorinated biphenyl
POL	petroleum, oils, and lubricants
POV	privately owned vehicle
RCRA	Resource Conservation and Recovery Act
RFNA	red fuming nitric acid
SARA	Superfund Amendment and Reauthorization Act
TCE	trichloroethylene
USAEC	U.S. Army Environmental Center (formerly USATHAMA)
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency (now USAEC)
USGS	U.S. Geological Survey
UST	underground storage tank
WET	weekend training site

Units of Measure

Btu	British thermal unit
ft	foot
ft^2	square foot
in.	inch
mi	mile
mi^2	square mile
ppm	parts per million
yd	yard
yd^3	cubic yard

Preliminary Assessment Report for Elrama Armory Complex (Finleyville and Gastonville Armories), Installation 42150, Finleyville, Pennsylvania

Summary

This report presents the results of the preliminary assessment (PA) conducted by Argonne National Laboratory at two Pennsylvania Army National Guard (PAARNG) properties near Finleyville, Pennsylvania, known as the Finleyville Armory and the Gastonville Armory. The two properties, known together as the Elrama Armory Complex, are owned by the U.S. Army and have been leased to the PAARNG since 1974. Preliminary assessments of federal facilities are being conducted to compile the information necessary for completing preremedial 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 Elrama Armory Complex properties, phase I of the Department of Defense Installation Restoration Program.

The Elrama Armory Complex, located approximately 2 mi east of the town of Finleyville, Pennsylvania, consists of two properties separated by approximately 1.25 mi. The Finleyville Armory is a 20-acre site located in Union Township, Washington County, Pennsylvania, 2 mi east of Finleyville, Pennsylvania, on the Finleyville-Elrama Road. From 1955 to 1974, the Finleyville Armory property served as the missile launcher area (MLA) of Nike Missile Battery PI-43, one of 11 such Nike batteries that encircled the Pittsburgh metropolitan area. The Gastonville Armory property is a 30-acre site located off Maple Avenue, approximately 1.25 mi east of the Finleyville Armory property and also in Union Township, Washington County, Pennsylvania. The Gastonville Armory occupies the highest geographic point in Washington County and from 1955 to 1974 served as the integrated fire control (IFC) portion of Nike Missile Battery PI-43.

The environmentally significant operations (ESOs) associated with the Finleyville Armory property are (1) a storage building for flammable materials; (2) outdoor areas of chemical usage (e.g., acid fueling facility); (3) the acid storage facility (red fuming nitric acid); (4) a dry well used

for acid disposal in the outdoor acid fueling facility; (5) discharges to the land surface from the sump system for the three missile storage silos; (6) hydraulic fluid reservoirs for the missile elevators located in each silo; (7) a diesel fuel underground storage tank (UST) near the Generator Building; (8) the sewage treatment facility that may have inadvertently or purposefully received industrial wastes from the floor drain in the Warhead Assembly Building; (9) storm-water drainage systems that may have received contaminated runoff or spills from the paved ground surfaces around the acid fueling facility, the Warhead Assembly Building, the Missile Assembly and Test Building, the Generator Building, and the Flammable Materials Storage Building; and (10) minor spillage of waste lubricating oils in an outdoor drummed storage area near the Missile Assembly and Test Building. Of these ESOs, all but the last are associated solely with Nike missile battery operations, which ceased on the property in 1974; however, the UST remains abandoned in place, and hydraulic fluids are believed to still be present in the three missile silo elevator systems. The last ESO, minor spillage in the drummed waste storage area, is associated with the ongoing operation of the PAARNG vehicle maintenance shop in the former Missile Assembly and Test Building. The PAARNG also continues to use the Flammable Materials Storage Building and a former Generator Operator's Shelter for storage of solvents and of petroleum, oils, and lubricants (POL). In addition, the potential still exists for automotive waste fluids generated in the organizational maintenance shop (OMS) to be inadvertently discharged to the floor drain; however, modifications to the property's sewage treatment facility sometime after 1974 would now direct such discharges ultimately to the Peter's Creek Sanitary District wastewater treatment plant.

The ESOs associated with the Gastonville Armory property are (1) the solvent and POL storage building, (2) outdoor areas of solvent and POL usage (e.g., radar towers), (3) a diesel fuel UST abandoned in place near the Generator Building, (4) a gasoline UST abandoned in place at the military vehicle parking area, (5) three outdoor diesel fuel "day tanks" at the Generator Building, (6) the unauthorized disposal of solid wastes in the northeast portion of the property, (7) pad-mounted transformers that may contain polychlorinated biphenyl (PCB) dielectric oils and are abandoned in place at the Generator Building, and (8) an outdoor vehicle washing facility in the military vehicle parking area near the water storage tanks. All of the previously noted ESOs are related to operations of the Nike battery, which ceased on the property in 1974; however, the transformers and USTs remain abandoned in place, the solid wastes deposited in the northeast portion of the property remain, and the PAARNG continues to conduct vehicle washing activities in the military vehicle parking area.

The review of both historical and current practices at the two properties indicates that environmental conditions at the Finleyville Armory and Gastonville Armory properties pose very little risk to human health or the environment. Although vehicle maintenance activities have been conducted by the PAARNG at the Finleyville Armory since 1987, there is no evidence to suggest that those activities have adversely affected the environment. Other activities conducted by the PAARNG on the property since 1974 have presented little opportunity to adversely impact on public health or the environment.

Inspections of the properties revealed no overt evidence of adverse environmental impacts or contamination. Nevertheless, there are still several areas of concern relating to impacts from Nike battery operations. The types of wastes generated from the operation of the Nike missile battery can be reliably inferred from generic sources of information on Nike missile battery operations and from discussions with individuals involved in operations of other Nike batteries in the Pittsburgh area; however, documentation on the quantities of wastes generated and the manner in which those wastes were managed and disposed of by the PI-43 Nike Missile Battery is not available. In addition, there is no information on the possible releases of stored products from the USTs that have been abandoned in place at both properties, no documentation on the manner in which excess Nike-related chemicals were disposed of at the time of the battery's deactivation, and no testing or inventory of in-service and abandoned electrical transformers still on the property. As a result, there is little information upon which to base an assessment of the environmental condition of the properties at the time of deactivation of the Nike battery.

Although there is no evidence of adverse impacts from the properties, circumstantial information suggests that Nike missile battery activities created the opportunity for release of contaminants to the environment, some of which have great environmental persistence. Because no formal assessment of environmental impacts from Nike operations has been previously performed for these properties, it is both reasonable and prudent that additional investigations be conducted to verify the apparent absence of Nike-related contaminants. Furthermore, additional actions are necessary to ensure compliance with federal and state regulations pertaining to the management of PCB items and the proper abandonment of USTs. The activities recommended for the properties should be undertaken in coordination with the U.S. Army Corps of Engineers, Oakdale Service Center.

For the Finleyville Armory property, the former MLA of Nike Missile Battery PI-43, the following actions are recommended:

- In accordance with state of Pennsylvania requirements, remove the abandoned diesel fuel UST from its location adjacent to the former Generator Building, sampling in the excavation for evidence of past releases (residual petroleum hydrocarbon contamination) and removing for disposal any contaminated soils encountered, in accordance with Pennsylvania UST closure standards.

- Sample the sediments present in the storm-water catchment located southeast of the former Missile Assembly and Test Building of the MLA and the soils in the grassy swale to which this catchment discharges for the presence of contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene [TCE], chromium, and lead).

- Sample the soils in the grassy storm-water drainage swale south of the former Generator Building of the MLA for contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, TCE, chromium, and lead).

- Remove and properly dispose of the hydraulic fluids from the reservoirs of the missile elevators in each of the three former missile storage silos, removing all encountered contamination resulting from past releases of fluids from these hydraulic systems in the silos.

- Sample and properly label all in-service electrical transformers on the property for the presence of PCBs, or, alternatively, replace all in-service transformers found to contain PCB dielectric fluids in regulated amounts (greater than 50 ppm) with transformers that contain no PCBs, disposing of any PCB transformers taken out of service in accordance with federal and state of Pennsylvania requirements.

- Sample the former sewage distribution and dosing chamber, the artificial wetland area that has formed immediately upgradient of the four sand filters, and each of the four sand filters for the presence of contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, TCE, chromium, and lead).

- Improve the storage circumstances for waste oils near OMS 22A, adding secondary-containment features that will improve the PAARNG's ability to respond to accidental releases and prevent such releases from entering a nearby storm-water catchment.

For the Gastonville Armory property, the former IFC of Nike Missile Battery PI-43, the following actions are recommended:

- In accordance with state of Pennsylvania requirements, remove the two USTs abandoned on the property (a gasoline UST near the military vehicle parking area and a diesel fuel UST adjacent to the former Generator Building), sampling soils in the excavation of each tank for indications of past releases or petroleum hydrocarbon contamination and removing for disposal any contaminated soils encountered, in accordance with Pennsylvania UST closure standards.

- Remove, sample for PCBs, and properly dispose of the three out-of-service pad-mounted electrical transformers adjacent to the former Generator Building.

- Remove and properly dispose of all solid wastes dumped at the head of the ravine east of the Generator Building.

- Sample and properly label all electrical transformers still in service on the property, or, alternatively, replace all in-service transformers found to contain PCB dielectric fluids in regulated amounts (greater than 50 ppm) with transformers with PCB concentrations below the regulated level.

1 Introduction

This document is a report of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Pennsylvania Army National Guard (PAARNG) properties known as the Finleyville Armory and the Gastonville Armory, located near Finleyville, Pennsylvania. Together, these two properties are also known as the Elrama Armory Complex. The Finleyville Armory and Gastonville Armory properties originally comprised the missile launcher area (MLA) and integrated fire control (IFC) area, respectively, of Nike Missile Battery PI-43. The properties are about 1.25 mi apart. The two properties have been leased by the U.S. Army to the PAARNG since 1974 under one lease agreement (DACA-31-3-75-156) and are currently represented by a single Facility Inventory and Stationing Plan (FISP) real property inventory number. As a result of these factors, the National Guard Bureau, Army Directorate, decided that both properties would be addressed jointly in this one PA report.

1.1 Authority for the Preliminary Assessment

The National Guard Bureau, Army Directorate, has engaged Argonne to perform PAs of selected National Guard 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 National Guard 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 (SARA) (P.L. 99-499).

1.2 Objectives

This PA report is based on existing information from the National Guard records that were made available to the Argonne investigator 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 files located at the headquarters of the PAARNG at Fort Indiantown Gap, Harrisburg, Pennsylvania, on July 12, 1993. Site visits to both the Finleyville Armory and Gastonville Armory properties were conducted on July 13-15, 1993, to obtain additional information through direct observation and interviews with personnel familiar with the properties and their past and current missions. Other relevant information was obtained on July 14, 1993, from Union Township officials and on July 15, 1993, from officials of the Uniontown District Office and McMurray Field Office of the Pennsylvania Department of Environmental Resources (DER).

1.4 Report Format

This PA report presents a summary and evaluation of the data relevant to the PA for these properties. Section 2 describes the properties and their surrounding environment and land use. Section 3 identifies and characterizes the ESOs at each site. Section 4 discusses known and suspected releases to the environment from each property, 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

2.1.1 Finleyville Armory

The Finleyville Armory is located on the Finleyville-Elrama Road in Union Township, Washington County, Pennsylvania, 2 mi east of the town of Finleyville, Pennsylvania, and 8 mi south of the incorporated limits of Pittsburgh. The general location of the Finleyville Armory is shown in Figure 1. A site plan for the Finleyville Armory is found in Figure 2. The descriptions of the facilities in Figure 2 provide information on the former functions of buildings and structures during active Nike missile battery operations and also on their present-day functions as the Finleyville Armory. Additional pertinent property information for the Finleyville Armory is included in Table 1.

The Finleyville Armory property comprises a total of approximately 20 acres, 15 acres of which was developed in 1954-1955 to support MLA activities of Nike Missile Battery PI-43 (PAARNG undated). The entire property is fenced, with one gated vehicle entrance (normally left open) along the Finleyville-Elrama Road. A second, inner security fence encircles the area containing the former missile silos. Terrain in the immediate vicinity of the armory is hilly and moderately rugged, with elevations ranging from 900 to 1,200 ft above mean sea level (MSL). Elevations on the property range from 1,100 ft to 1,190 ft above MSL. The terrain is generally unaltered from its natural state, except that various embankments (revetments) were constructed on the property to establish sheltered areas for dangerous activities such as acid storage and handling, missile fueling, and warhead assembly.

Drainage of storm water from the property is to the adjacent hillside slopes, with culverts and shallow ditches aiding drainage of roads and paved surfaces in the southern portion of the property. No field tiles are believed to be present on the property. (As used here, the term "field tile" refers to any type of engineered storm water drainage system installed below the existing grade and designed to prevent localized flooding by expediting drainage of precipitation. In the context of PA investigations, the presence of a field tile drainage system represents an additional artificial pathway for migration of contaminants released to the ground surface.) Generally, drainage from the southern portion of the property, containing the Barracks/Administration

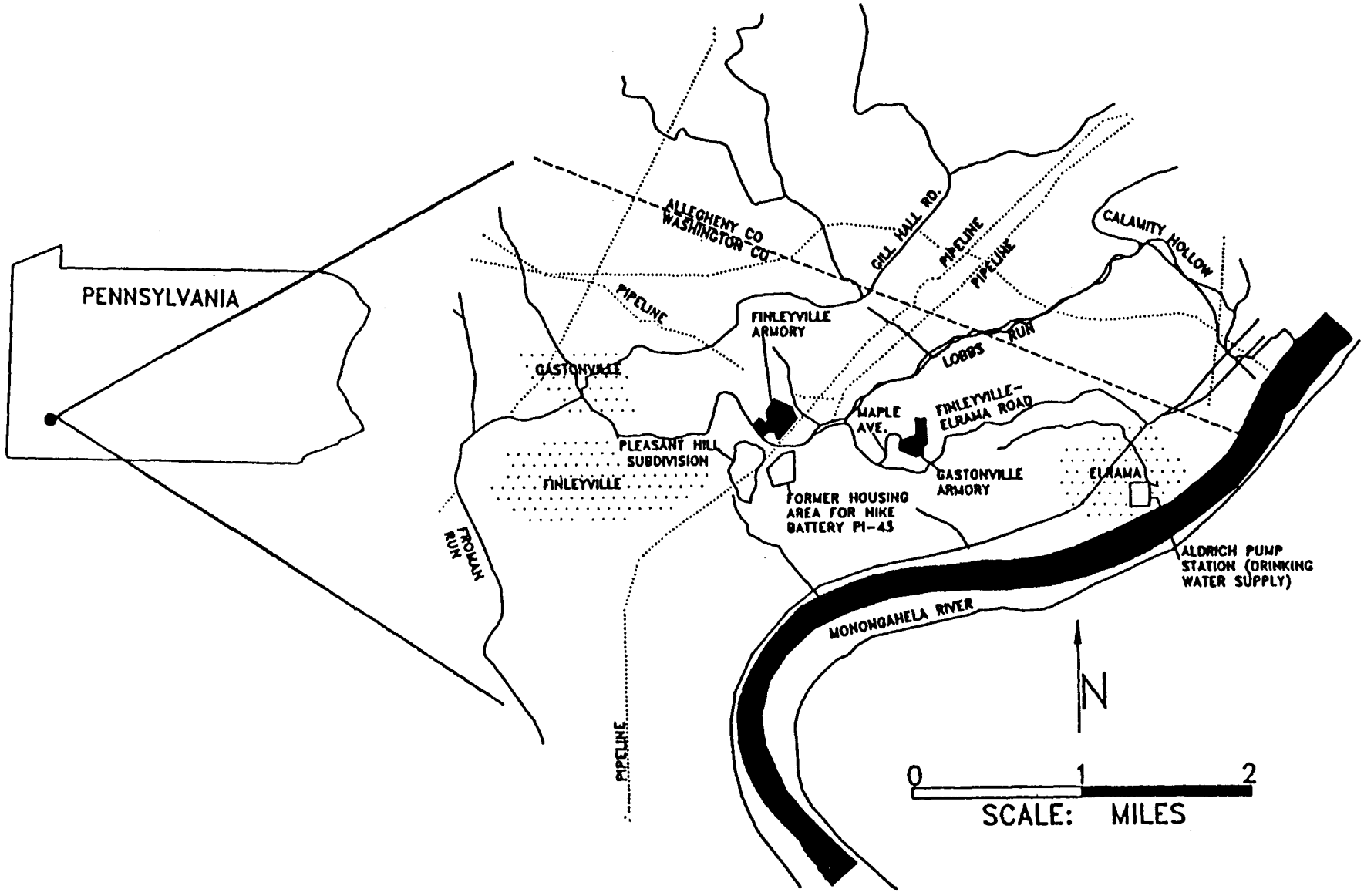
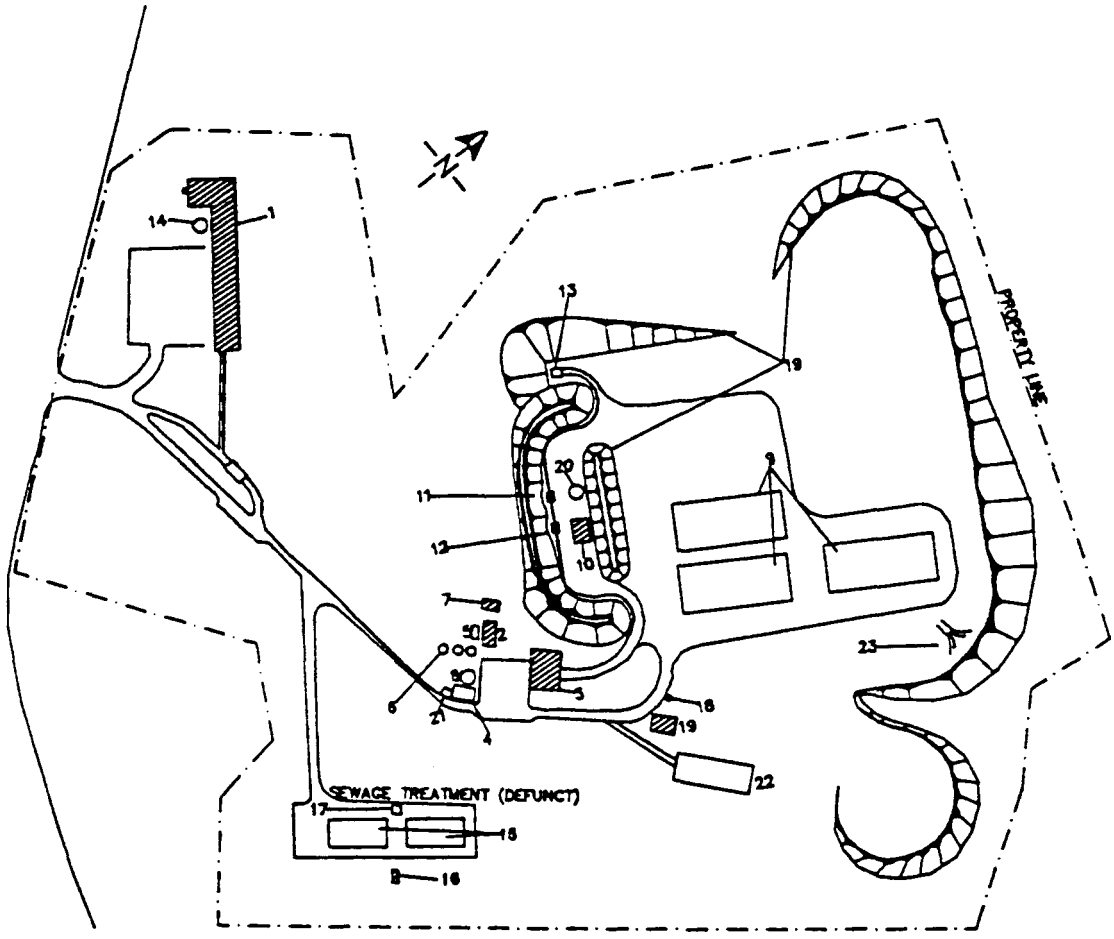


FIGURE 1 General Location of Elrama Armory Complex (Finleyville Armory and Gastonville Armory) (Sources: USGS 1979a,b,c)



1. Administration Building (armory functions since 1975)
2. Generator Building (miscellaneous armory and unit equipment storage since 1975)
3 Missile Assembly and Test Building (OMS 22A; vehicle maintenance since 1987)
4. Flammable Materials Storage Building (POL storage for OMS 22A since 1987)
5. Underground storage tank (6,000-gal; diesel fuel), abandoned in place in 1974
6. Three electrical transformers, not in service since 1974
7. Generator Operator's Shelter (Flammable Materials Storage for OMS 22A since 1987)
8. Waste oil storage area (55-gal drums on pallets; wastes from OMS 22A activities since 1987)
9. Three missile storage silos, abandoned in 1974
10. Warhead Assembly Building (miscellaneous armory and unit equipment storage since 1975)
11. Acid fueling station, abandoned in 1959
12. Rocket fuel fueling station, abandoned in 1959
13. Acid Storage Building, razed in 1959
14. Septic tank (sanitary wastes only), presently in use
15. Four sand filters, not in use
16. Final Chlorinator Facility, not in use
17. Sewage distribution and dosing chamber
18. Three pole-mounted transformers, in service
19. Sentry Shelter, abandoned in 1974
20. Acid Neutralization Pit, abandoned in 1959
21. Sentry Shelter, abandoned in 1974
22. Sentry Dogs' Kennels, removed by PAARNG in 1976
23. Missile silos' sump discharge

FIGURE 2 Site Plan for Finleyville Armory (former missile launcher area for Nike Battery PI-43) (Sources: COE 1955; PAARNG files)

TABLE 1 Identifying Information for Finleyville Armory

Installation address	Finleyville-Elrama Road, Finleyville, Pennsylvania (Former MLA for Nike Missile Battery PI-43)
Geographic location	
Latitude	40° 15' 00" N
Longitude	79° 57' 00" W
Current occupant	Company D, 876th Engineers, PAARNG
FISP[a] installation number	42150
Commander	MAJ Martin Kuhar
Types of facilities	Armory Army Training Facility Weekend Training Site (WET) OMS 22A
License Information:	
Initial lease[b]	DACA-31-3-75-156, 161.61 acres (July 24, 1974)
1st Amendment	Authorizes small-arms range on IFC (March 23, 1976)[c]
2nd Amendment	Deletes 34.24 acres from lease and extends for 5 yr (Aug. 15, 1979)
3rd Amendment	Deletes 0.36 acres from lease (July 17, 1980)
4th Amendment	Amends total acreage to 126.96 acres (Sept. 11, 1980)
5th Amendment	Extends term for 5 yr (March 27, 1984)
6th Amendment	Extends term for 2 yr (Oct. 26, 1990)[d]
Principal contact	Jeffrey Olsen Environmental Specialist PAARNG Fort Indiantown Gap Harrisburg, Pennsylvania (717) 865-8342

[a] Facility Inventory and Stationing Plan.

[b] Lease covers both Finleyville Armory and Gastonville Armory.

[c] Small-arms target range planned for the IFC property was never constructed.

[d] An additional amendment extending the period of the lease is currently in process.

Building and sewage treatment facility, is predominantly to the south and east. Drainage from the central portion of the property, the area containing the former missile fueling facility, the former Warhead Assembly Building, and the former Missile Assembly and Test Building, is to the east-southeast. Drainage from the area containing the former missile storage silos and launching pads is evenly distributed to the west, east, and north. Electric power is provided by the West Penn Power Co.; however, all electrical switches, relays, and transformers on the property are owned by the Army.

Since 1989, potable water has been supplied to the site by the Pennsylvania American Water Co. The source of this water is the Monongahela River, and the water is retrieved at the Aldrich Pump Station, approximately 6 mi east of the armory (Figure 1). From 1954 to 1989, domestic water was supplied to the Finleyville Armory property and to a nearby officers' housing area from water storage tanks located on the topographically higher IFC area of Nike Missile Battery PI-43. (See the following section for additional details of water supply and distribution.)

There are a number of permanent structures on the Finleyville Armory property (Figure 2), all originally constructed in 1954-1955 as part of the Nike battery. (See Section 2.3.1 for additional details of Nike missile battery operations.) Currently, PAARNG armory functions are conducted in the largest structure, the former Barracks/Administration Building. The Barracks/Administration Building is in generally good repair, although the building contains what appears to be asbestos pipe insulation, some of it mildly deteriorated. The former Missile Assembly and Test Building is currently used by the 876th Engineers as an Organizational Maintenance Shop (OMS), serving approximately 35 vehicles. This building is in good condition. The former Generator Building and the former Warhead Assembly Building are currently used by the 876th Engineers for equipment storage. Both of these buildings are in good repair and have been gutted of their original Nike-related appointments, although the UST associated with the Generator Building is still in place but reportedly empty (see subsequent discussion). A small storage building for flammable materials, which is also in good repair and located near the Generator Building, is used for storage of petroleum, oils, and lubricants (POL), as is a former Generator Operator's Shelter also located near the Generator Building (Figure 2). The remaining structures on the property, including the three missile storage silos, are vacant, although the one silo that was inspected during the site visit held some trash and nonhazardous debris, apparently resulting from battery deactivation activities in 1974. Of the original complement of Nike structures, only the Acid Storage Building and the Sentry Dogs' Kennels have been razed (in 1959 and 1976, respectively).

In its original configuration, the sewage treatment facility on the Finleyville Armory property consisted of a septic tank/sand filter/chlorinator system located in the southeast portion of the property. Sewage could be directed to one or more of four sand filters, based on site occupancy levels (i.e., treatment demand). Discharge of treated effluent was to the subsurface from the bottom of the sand filters. The former Barracks/Administration Building and the former Missile Assembly and Test Building are the only facilities connected to the treatment system. The original treatment system was modified sometime after battery deactivation in 1974. Although engineering details are not available, it has been reported that the sand filters and chlorinator were disconnected and that the septic tank was plumbed directly to the Peter's Creek Sanitary District wastewater sewer (Wood 1993). No cleanouts of the septic tank are known to have occurred (Schroff 1993). This modification was no doubt made in response to the dramatic decrease in site occupancy with the decommissioning of the battery and the anticipated difficulty in keeping the original system successfully operating over periods without continuous occupancy of the armory. Currently, an artificial wetland area has been established immediately downgradient of the original effluent distribution and dosing chamber, strongly suggesting that sewage effluent may be breaking out onto the land surface in this area; however, aside from thriving wetland-related vegetation, the area shows no indication of such sewage effluent breakouts. Alternatively, the wetland may be the result of obstructed storm-water flow down the hillside by the concrete walls of the now-defunct sand filters.

The site contains approximately 10,000 ft^2 of paved parking for civilian vehicles and another 188,500 ft^2 of paved parking for military vehicles and equipment (including the paved area over the missile storage silos). Civilian vehicle parking is restricted to the area adjacent to the Barracks/Administration Building. Except for some ornamental plantings around the Barracks/ Administration Building, the ground surfaces not covered by buildings, missile launching pads, or roadways are planted in indigenous grasses. Grounds maintenance is performed by a local contractor. No pesticides or herbicides are reportedly used.

One underground storage tank (UST) is on the property, east of the former Generator Building (Figure 2); however, the underground tank inventory submitted by the PAARNG to the DER indicates no tanks on this property (Leininger 1986). Original Nike blueprints show that the UST was of 6,000-gal capacity and was used to store diesel fuel for the emergency power generators (U.S. Army Corps of Engineers [COE] 1955). Interior appointments of the Generator Building suggest that the UST supplied fuel to a "day tank" located inside the building. This tank, believed to be of 300-gal capacity, was removed during deactivation in 1974 (Wood 1993).

The three underground missile storage silos, each approximately 40 ft by 40 ft and 20 ft deep, have been abandoned. The missile elevators have been raised to ground level and welded in place, as have the elevator doors; however, hydraulic fluids have not been drained from the elevator systems. All missiles and missile storage and handling facilities have been removed from the silos, as have launch control-related equipment in the operator's rooms of each silo. Some general trash and debris were found in the one silo that was accessible for inspection. No leaks of the elevator hydraulic system were observed in that silo. The silos were originally interconnected with sewer lines that delivered seepage water to a central sump, where it was pumped to the ground surface and discharged (Figure 2); however, the sump pump has not been operated since PAARNG occupancy, and it has been reported that the silos often fill with water during periods of heavy rainfall (Wood 1993; Hardy 1993).

Numerous gas pipelines and utility and telephone cables cross the site. In addition, Nike-related buried utility lines and communication cables interconnecting some buildings and facilities also exist. Communication and water supply lines also exist between this property and the nearby Gastonville Armory (the former IFC of Nike Battery PI-43 and the officers' housing area). Easements for these utility and communication lines are held by the Army but are not part of the PAARNG lease.

2.1.2 Gastonville Armory

The Gastonville Armory, also sometimes referred to as the Elrama Armory, is located off Maple Avenue, north of the Finleyville-Elrama Road, in Union Township, Washington County, Pennsylvania, 8 mi south of the incorporated limits of Pittsburgh and 1.25 mi east of the Finleyville Armory property. The general location of the Gastonville Armory is shown in Figure 1. A site plan for the Gastonville Armory is shown in Figure 3. The descriptions of facilities in Figure 3 provide information on both the former functions of buildings and facilities during active Nike missile battery operations and also their present-day functions as the Gastonville Armory. Additional pertinent property information is included in Table 2.

The Gastonville Armory property comprises a total of approximately 30 acres, the central 10 acres of which had been developed to support Nike IFC activities in 1954-1955 (PAARNG undated). The Gastonville Armory property is characterized by hilltop terrain and occupies the highest point in Washington County, with elevations ranging from 1,170 to 1,340 ft above MSL.

1. Barracks/Administration Building (armory functions since 1975)
2. Mess Hall (armory use since 1975)
3. Generator Building (miscellaneous equipment storage since 1975)
4. Underground storage tank (6,000-gal; diesel fuel), abandoned in place in 1974
5. Water Pump House, abandoned in 1989
6. Two water storage tanks (25,000-gal capacity each), abandoned in 1989
7. Water storage pit, abandoned in 1989
8. Military vehicle parking area, in use
9. Underground storage tank (2,000-gal; gasoline), abandoned in place in 1974
10. Frequency Changer Building, abandoned in 1974
11. Three electrical transformers (pad-mounted), out of service since 1974
12. HIPAR Building (miscellaneous equipment storage since 1975)
13. Open dumping of construction and demolition wastes
14. Flammable Materials Storage Building, abandoned in 1974
15. Privately-Owned-Vehicle (POV) Parking Area, in use
16. Acquisition Radar Tower foundation, abandoned in 1974
17. Missile-Tracking Radar Tower foundation, abandoned in 1974
18. Target-Tracking Radar Tower foundation, abandoned in 1974
19. Missile-Tracking Radar Tower foundation, abandoned in 1974
20. Septic tank, in use
21. Sewage distribution and dosing chamber, not in service
22. Four sand filters, not in service
23. Final Chlorinator Facility, not in service
24. Three aboveground diesel fuel "day tanks," removed in 1974

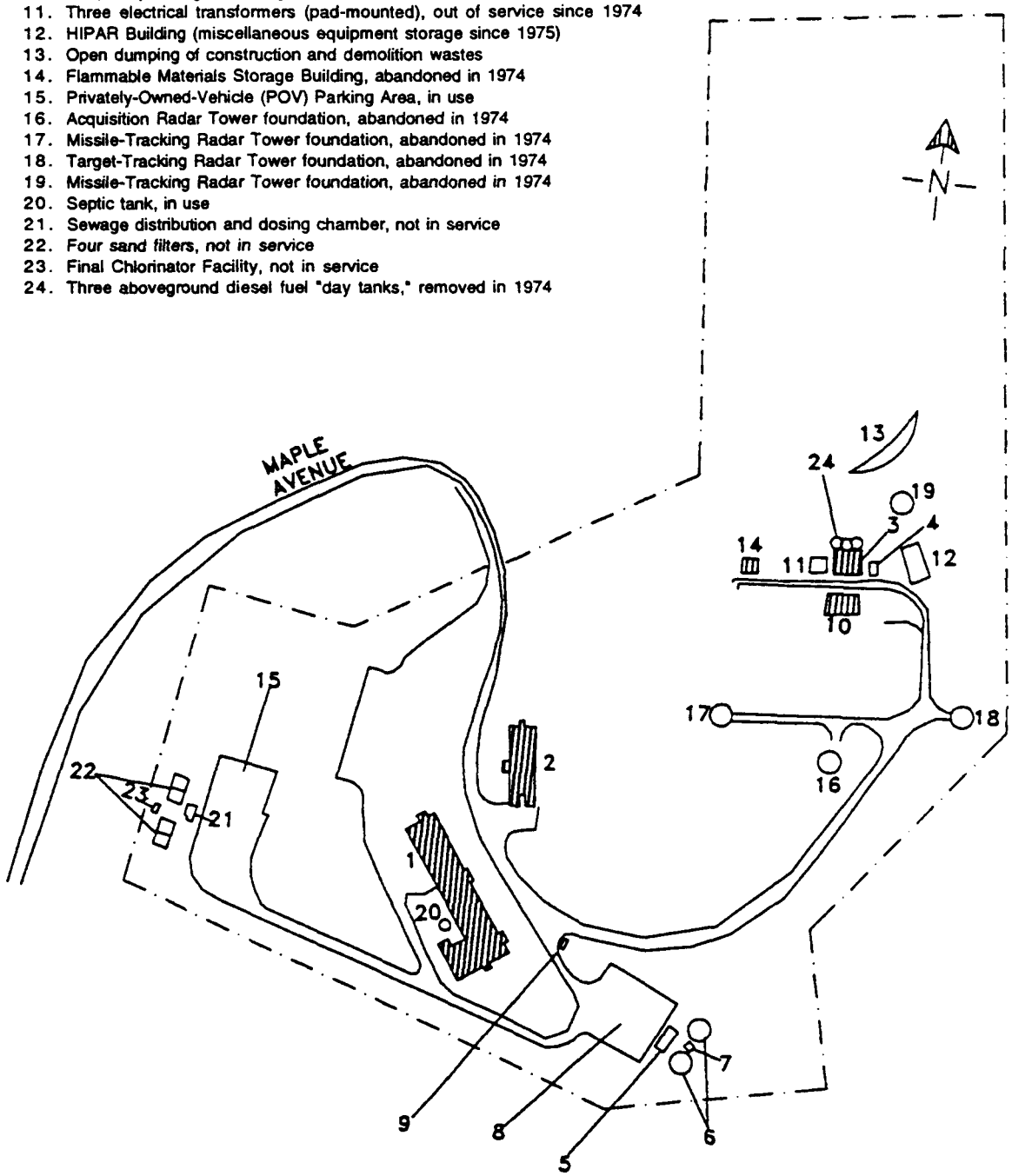


FIGURE 3 Site Plan for Gastonville Armory (former integrated fire control area of Nike Battery PI-43) (Sources: COE 1955; PAARNG files)

TABLE 2 Identifying Information for Gastonville Armory

Installation address	Maple Avenue, Finleyville, Pennsylvania (North of Finleyville-Elrama Road) (Former IFC for Nike Missile Battery PI-43)
Geographic location	
Latitude	40° 15' 00" N
Longitude	79° 58' 00" W
Current occupant	110th Infantry Battalion, 1st Detachment, Company B PAARNG
FISP[a] installation number	42150
Commander	LTC Donald Butler
Types of facilities	Armory Army Training Facility
License Information:	
Initial lease[b]	DACA-31-3-75-156, 161.61 acres (July 24, 1974)
1st Amendment	Authorizes small-arms range on IFC (March 23, 1976)[c]
2nd Amendment	Deletes 34.24 acres from lease and extends for 5 yr (Aug. 15, 1979)
3rd Amendment	Deletes 0.36 acres from lease (July 17, 1980)
4th Amendment	Amends total acreage to 126.96 acres (Sept. 11, 1980)
5th Amendment	Extends term for 5 yr (March 27, 1984)
6th Amendment	Extends term for 2 yr (Oct. 26, 1990)[d]
Principal contact	Jeffrey Olsen Environmental Specialist PAARNG Fort Indiantown Gap Harrisburg, Pennsylvania (717) 865-8342

[a] Facility Inventory and Stationing Plan.

[b] Lease covers both Finleyville Armory and Gastonville Armory properties.

[c] Small-arms target range planned for the IFC property was never constructed.

[d] An additional amendment extending the period of the lease is currently in process.

Terrain in the immediate vicinity of the armory is hilly, with elevations ranging from 900 to 1,100 ft above MSL. The terrain is generally unaltered from its natural state, except that in the eastern half of the property, some minor grade alterations were necessary to create level areas for foundations of the various radar towers and parking pads for portable electronic equipment vans. These foundations and parking pads remain, although the towers have been dismantled and the equipment vans removed during the Army's deactivation of this Nike battery in 1974.

Drainage of storm water from the property is by means of grassy swales and culverts beneath roadways, discharging to the adjacent hillside slopes, with cement liners installed in the swales and ditches in areas having the greatest potential for erosion. No field tiles are believed to be present on the property. Electric power is provided by the West Penn Power Co.; however, all electrical switches, relays, and transformers on the property are owned by the Army.

Since 1989, domestic water has been supplied to the property by the Pennsylvania American Water Co. Connection to this commercial water supply is believed to coincide with the sale by the Army of the officers' housing area for Nike Missile Battery PI-43. (The housing area, located 1/8 mi south of the Finleyville Armory [Figure 1] had been under U.S. Army control until 1989, when it was sold to a private party. The PAARNG has never occupied or controlled the housing area, which is not part of this assessment.)

During active Nike site operations (1955-1974) and until 1989, domestic water was supplied to the Gastonville Armory property from the Elrama Water Authority. The source of this water was the Monongahela River, and water was drawn from a point approximately 3 mi east of the armory in the town of Elrama. Until 1989, the Army also maintained a water pumping station in the valley east of the Gastonville Armory property to overcome the grade for delivery of water to the Gastonville Armory property. Water pumped to the Gastonville Armory site was stored in two 25,000-gal aboveground water tanks still located at the eastern boundary of the property. The water was distributed by gravity feed from these elevated storage tanks to service points on the Gastonville Armory property and also to the Nike Missile Battery PI-43 MLA (the Finleyville Armory property) and the nearby (Nike) officers' housing area. In 1989, when the Army sold the housing area, the water supply from the Elrama Water Authority was discontinued, the water distribution lines interconnecting the three Nike battery properties were disconnected, and the Gastonville Armory and Finleyville Armory properties were both independently connected to the Pennsylvania American Water Co. water supply line, as was the housing area. Neither of the aboveground water storage tanks is currently in use. A paved area adjacent to the water storage

tanks and pump house is currently used by the 876th Engineers for military vehicle parking. Occasional vehicle exterior washing is also conducted in this area.

In the original configuration of the IFC, sanitary wastes from the former Barracks/Administration Building and the Mess Hall were managed by means of a septic tank/sand filter/chlorinator system located in the southwest portion of the property. The treatment facility served only the Barracks/Administration Building and the Mess Hall. Treated effluent discharged from the bottom of the sand filters. An identical sewage treatment system at the Finleyville Armory was modified after battery deactivation by disconnection of the sand filters and connection to the Peter's Creek Sanitary District sewer. Although there is no documentation, it is likely that this treatment system has undergone similar modification, and it is apparent from visual observation that the sand filters and the chlorinator facility are not now in use.

The site contains a number of permanent structures. The two largest buildings, the former Barracks/Administration Building and the former Mess Hall, are both in good repair and are currently used by the PAARNG for armory activities. In addition, a third building, the former High-Power Acquisition Radar (HIPAR) Building in the northeast portion of the site, is used as an unheated equipment storage warehouse. The Generator Building is also used for (unheated) miscellaneous storage. The remaining buildings, all much smaller in size and originally used to house radar tracking equipment, are vacant or contain miscellaneous materials and debris resulting from dismantlement of Nike appointments. Some of the vacant buildings (e.g., the Generator Building and Frequency Changer Building) are badly deteriorated. Asbestos-containing materials (ACMs) used in the construction of the Nike buildings (e.g., "transite" wallboard and asbestos pipe insulation) show significant deterioration, especially in the vacant buildings. Much of the ACM originally installed in the occupied buildings has been replaced during remodeling conducted by the PAARNG. That ACM which remains (in the form of pipe insulation, wallboard, and floor tiles) is in generally good condition, but some small areas are mildly deteriorated.

The site contains approximately 13,000 ft^2 of paved parking for civilian vehicles and another 6,084 ft^2 of paved parking for military vehicles, which are located adjacent to and east of the Barracks/Administration Building, respectively. The extreme northern portion of the property slopes steeply to the north and has been allowed to revert to scrub forest vegetation. Except for trees and shrubs in this ravine and ornamental evergreen plantings near the Barracks/ Administration Building, the remaining portions of the property are planted in indigenous grasses. Grounds maintenance is performed by a local contractor. No pesticides or herbicides are reportedly used.

Two USTs are on the property, neither of which is currently in use; however, the UST inventory submitted by the PAARNG to the DER only lists one tank for this property (Leininger 1986). The largest UST is a 6,000-gal tank located near the Generator Building. This UST was used to store diesel fuel for the electrical power generators. Building design suggests that this tank supplied fuel to three "day tanks" (one for each engine-generator set) originally installed outside the north wall of the Generator Building and since removed. The UST was presumably emptied as part of the Nike battery deactivation in 1974 and was abandoned in place. The second UST, a 2,000-gal tank located near the military vehicle parking area, was once used to store military vehicle fuel. This UST was also emptied during Nike battery deactivation in 1974 and was abandoned in place. Fuel dispensing pumps associated with this UST have been removed. No records exist of releases to the environment from either UST during its active life, but also no record indicates that the USTs were assessed for possible releases at the time of their abandonment.

Numerous gas pipelines and utility and telephone cables cross the site. In addition, Nike-related buried utility lines and communication cables interconnecting some facilities exist. Communication and water supply lines also exist between this property and the nearby Finleyville Armory (the former MLA of Nike Missile Battery PI-43) and the (Nike) officers' housing area. Easements for the utility and communication lines interconnecting battery properties are still held by the Army but are not part of the PAARNG lease.

2.2 Description of Facilities

Only those facilities that are in current use by the PAARNG for armory functions are discussed in the following paragraphs. Section 3 provides information on ESOs that may have occurred during Nike battery operations (1955-1974) and also during PAARNG occupancy (1974 to present).

2.2.1 Finleyville Armory

Armory activities are confined to the former Administration Building. Activities include administrative functions and classroom training. No field training is conducted on the armory property. Wastes resulting from armory activities are very limited and nonhazardous in nature. Solid wastes (household garbage and office paper wastes) are collected in dumpsters before being hauled to off-site sanitary landfills by a local hauler.

In addition to armory activities, the 876th Engineers operate a vehicle maintenance shop in the former Missile Assembly and Test Building. Although the 876th Engineers have only been assigned to the Finleyville Armory since 1990, they have conducted vehicle maintenance at the Missile Assembly and Test Building since 1987. The shop, OMS 22A, performs primary maintenance on approximately 35 vehicles assigned to the 876th Engineers. Wastes generated as a result of these activities include waste crankcase oils, waste antifreeze, waste Stoddard solvents (from a low-pressure parts degreaser), brake repair wastes, and spent automotive batteries. Very minor amounts of paints and protective coatings are also used in the shop for spot painting and corrosion control. All waste fluids are recycled through a PAARNG statewide contract with Safety-Kleen Corp. Waste batteries are turned in (wet) to the Defense Reutilization and Marketing Office (DRMO) at the Army's nearby Oakdale Service Center. The building is equipped with a washroom and one floor drain in the vehicle maintenance bay, both of which are connected to the sewage effluent distribution and dosing chamber of the on-site sewage treatment facility without benefit of an oil/water separator.

Small amounts of hazardous chemicals and POL to support vehicle maintenance are currently stored in two small buildings, the former Generator Operator's Shelter and a former Flammable Materials Storage Building (Figure 2). Waste oils are stored on pallets beside the Flammable Materials Storage Building until pickup and recycling by Safety-Kleen Corp. When vehicles and equipment assigned to the 876th Engineers, including some portable (trailer-mounted) fuel tanks, are not being used in off-site training exercises, the vehicles and equipment are stored on the pavement above the former missile silos.

2.2.2 Gastonville Armory

Armory activities at the former IFC are confined to the former Barracks/Administration Building and the former Mess Hall. Activities are limited to administrative functions and classroom training. Only solid wastes (household garbage, office paper wastes, and kitchen wastes) are generated. Solid wastes are accumulated in dumpsters and hauled to off-site sanitary landfills by a local contractor. No industrial activities currently take place on the property.

Military vehicles are parked in the paved area adjacent to the water storage tanks (Figure 3). Some exterior vehicle washing also takes place in this area. Vehicle washing is also expected to have occurred at this location during Nike operations. Also during Nike operations, vehicle fuel was dispensed from a UST located at the western edge of the military vehicle parking area

(Figure 3). Currently, PAARNG vehicles are fueled by means of a tanker truck, presumably on this vehicle parking pad.

2.3 Property History

The following sections provide a brief historical account of the Nike missile program in general, as well as additional details relating specifically to Nike Missile Battery PI-43.

2.3.1 Nike Missile Installations

Generic information on the Nike missile program has been compiled by both the COE (Law Engineering Testing Co. 1986) and the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), now known as the U.S. Army Environmental Center (USAEC) (McMaster et al. 1984). In both of these studies, independent contractors relied on information contained in unclassified documents related to the Nike missile program, including engineering drawings and specifications (for both the Nike facilities and the missiles), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operation and maintenance of Nike batteries. While much information about the Nike defense program is available, some remains classified for reasons of national security.

Taken together, these two reports represent the most complete assemblage of information on the Nike missile program from an environmental perspective. Nevertheless, both reports note the paucity of specific information regarding the generation and subsequent disposal of wastes associated with the operation of Nike missile batteries. Waste management is not addressed to any great extent in the field manuals, the deactivation plans, or the operational reports filed by the individual installations. Consequently, although the nature and composition of wastes could be logically inferred, conclusions about their subsequent management and the long- or short-term environmental impacts from Nike batteries are speculative and largely undocumented. The degree of inaccuracy resulting from interpolation of operation manuals is, therefore, acknowledged but still undefined. Salient information from both reports is condensed in the following paragraphs.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing or (in some cases) augmenting conventional artillery batteries and providing protection from aerial attack for strategic locations and resources. Typically, a number of batteries were placed in rural areas encircling the protected resource or location. At its zenith,

the Nike program involved over 290 batteries located throughout the continental United States; however, throughout the program, no missile was ever fired from any Nike battery. Phasing out the entire Nike program was complete by 1976. Some properties were deemed to be excess and were sold to private concerns or handed over to local communities for nominal fees. Many were sold or leased to state National Guards.

A typical Nike battery consisted of two distinct and geographically separate operating units, the MLA and the IFC area. The MLA was usually 40-50 acres, while the IFC was typically 10-50 acres. The two areas were separated usually by less than 2 mi, with lines of sight between them for communication and tracking purposes. When topography permitted, the IFC was normally placed at the higher elevation. A third area containing barracks facilities was also sometimes included in a battery. Alternatively, or additionally, barracks were incorporated into the IFC area.

The first missile deployed at Nike batteries was the Ajax, a two-stage missile using a solid-fueled booster rocket and a liquid-fueled sustainer motor to deliver high-powered explosives to airborne targets. Nike Hercules missiles were introduced in 1958 and gradually replaced all Ajax missiles in batteries by 1961. The Hercules was also a two-stage missile, differing from the Ajax in that its second stage was solid-fueled and its payload could be either conventional explosives or a nuclear warhead. Otherwise, the design of the Hercules was such that launching facilities designed for the Ajax could be easily converted, with only minor modifications, to handle Hercules missiles, although conversion of a Nike battery to Hercules required modifications and upgrades of communication and tracking equipment at the IFC. An improved version of the Hercules missile was introduced in 1963 but was deployed at only a few installations. A third missile, the Zeus, was under development when the Nike program was phased out in 1974. The Zeus was never deployed.

Maintaining the missiles in a state of combat readiness required the storage and use of a variety of missile components, as well as fuels, solvents, hydraulic fluids, and paints. Each missile was on a routine maintenance program that required partial dismantlement and reassembly at the Nike battery. In addition to this routine maintenance, some of the missiles from each battalion were sent to a central depot annually for more extensive maintenance and recalibration. In addition to maintenance activities, readiness drills included fueling and arming the missile. Together, routine maintenance activities and readiness drills represent the largest source of waste materials.

Activities or areas at the MLA where chemicals were stored or used and where wastes were expected to be generated included missile assembly; drainage and seepage systems; diesel and fuel oil storage systems (including both aboveground and belowground tanks); magazine seepage systems (sump pumps); warhead-arming-area drainage systems; missile-fueling-area drainage systems; the motor pool maintenance area (when such activities took place at the MLA of the battery); infiltration wells for liquid disposals (primarily inhibited red fuming nitric acid [RFNA] fuel initiator); on-site landfills; septic systems; and unofficial, conveniently located disposal areas.

Potential areas and activities at the IFC area where chemical wastes might be generated included motor pool maintenance areas (when such activities took place at the IFC of the battery); septic systems; diesel, fuel oil, or gasoline storage systems (including both aboveground and belowground tanks); maintenance of electric power generators and radar equipment; on-site landfills; and unofficial, conveniently located disposal areas.

Of the two operational areas comprising a battery, the MLA is expected to represent the greater potential for environmental contamination. Chemicals routinely used at both the MLA and IFC and typical annual usage rates (for both the MLA and IFC) include benzene (volume unknown); carbon tetrachloride (250 gal); chromium and lead (contained in paints and protective coatings); petroleum hydrocarbons; perchloroethylene; toluene; 1,1,1-trichloroethane (125 gal); 1,1,2-trichloroethane (125 gal); Stoddard type 2 solvent (500 gal); hydraulic fluids (500 gal); and trichloroethylene (TCE) (100 gal). This list does not represent the complete array of hazardous materials present at the Nike battery, but rather those chemicals used in substantial quantities that are expected to have environmental persistence. Chemicals related to the liquid rocket fuel systems were also present in substantial quantities at the MLA; however, the inherent chemical reactivities of many of these materials suggest little potential for long-term environmental persistence. Chemicals associated with missile fuel cycles and their typical annual usage rates included inhibited red fuming nitric acid (RFNA) (125 gal); aniline-furfuryl alcohol (10 gal); unsymmetrical dimethyl hydrazine (10 gal); battery electrolyte (10 gal); and jet fuel (JP-4) (500 gal). Nike batteries could typically use up to 25,000 gal of diesel fuel and gasoline per year for operation of electric power generators and assigned vehicles.

Finally, explosives contained in warheads, especially the Hercules nuclear warheads, were strictly controlled for reasons of both personnel safety and national security. Furthermore, major maintenance of warheads was performed at the arsenals where the warheads were originally assembled and not at the MLAs. Therefore, the MLA site is not expected to have been the point of

purposeful release or disposal of any warhead-related materials, and few activities conducted at the MLA presented the potential for accidental releases of warhead chemicals.

Deactivation of the Nike batteries, inferred largely from archived field manuals and Army directives, involved the removal of all missile components, warheads, and rocket fuels and fuel initiators (i.e., RFNA). Although on-site disposal of some minor amounts of missile-related chemicals may have occurred, these materials were returned to arsenals or test firing ranges for disposition or disposal. Deactivation also involved the dismantlement of radar and communication towers, the removal of all electronic equipment, and the removal of power generating equipment such as generators and transformers. Fuel tanks supplying the power generators and buried electrical and communication cables were normally not removed. Electronic equipment associated with missile firing (located in the underground missile storage magazines) was normally removed, but the hydraulic systems (including hydraulic fluids) for the missile elevators were normally left in place. Concrete foundations for radar towers and mobile equipment vans were left in place, as were drain tiles, septic systems, dry wells, or other infiltration basins that may have been present.

Deactivation plans normally did not provide specific directives or officially established opportunities for disposal of related chemicals (outside of rocket fuels, warhead explosives, or vehicle fuels), leading to the speculation that chemical disposal was accomplished through the most convenient means available and at the battery commander's discretion. This may have included on-site disposal in landfills or infiltration basins, disposal in local landfills, or simply discharging materials onto the ground surface.

2.3.2 Finleyville Armory

The Finleyville Armory is located on the former MLA, which, together with its companion IFC area (located approximately 1.25 mi east) and an officers' housing area (located approximately 1/8 mi south), comprised Nike Missile Battery PI-43, also known as the Elrama Battery. PI-43 was one of 11 such Nike batteries encircling the greater Pittsburgh metropolitan area. Other Pittsburgh batteries were located near the towns of Rural Ridge, Indianola, Irwin, Murryville, Herminie, Hickman, Bryant, Coraopolis, and West View, Pennsylvania. Although state National Guards often operated some Nike batteries, especially in the later years of the program, that was not the case for the Elrama Battery, which was operated by the Army until its deactivation; however, PAARNG personnel were responsible for operation of some of the other Pittsburgh Nike batteries (Wood 1993).

Nike Missile Battery PI-43 was established around 1954-1955. Before that time, the land is believed to have been undeveloped and used for agricultural purposes. The battery was originally outfitted with Nike Ajax missiles. This battery was reportedly converted to Nike Hercules missiles around 1958-1959, about the same time when other Pittsburgh batteries were undergoing a similar conversion (Wood 1993). Very little modification was done to the physical facilities as a result of the change to Hercules missiles, except that the acid fueling and liquid rocket fuel fueling facilities became obsolete and were dismantled. During its entire active period, 1955-1974, Nike Missile Battery PI-43 was operated by the Army's 171st Air Defense Artillery, Company D.

Deactivation of Nike Missile Battery PI-43 took place in 1974 (except for the Ajax fueling facilities, which were deactivated in 1959). Deactivation involved removal of all electric power generators, dismantlement of radar tracking towers, removal of all electronic equipment, and emptying of all fuel storage tanks. All underground electrical cables interconnecting various buildings on the property and interconnecting this property with the IFC and the housing area were disconnected but left in place, as was the UST adjacent to the Generator Building. Buildings and parking pads (for portable electronic equipment vans) were also left in place. Water lines connecting the IFC with the MLA and the housing area remained operational until 1989, as did the water storage and pumping facilities on the IFC. The PAARNG was responsible for maintaining that portion of the water distribution system that was located on the IFC and MLA properties.

Since 1975, the PAARNG has occupied the site under a lease agreement with the U.S. Army (DACA-31-3-75-156). The COE, Oakdale Service Center, continues to be the government agent responsible for this property. This property was converted to armory use in April 1975 and was used originally only as a weekend training site (WET) and for storage of vehicles and equipment; however, very little was actually done to the physical facilities during PAARNG occupancy. The PAARNG has engaged in basic maintenance and modernization to keep the buildings and grounds in acceptable shape. Among the major refurbishments, the heating system for the Administration Building was recently modernized. This resulted in the generation of asbestos wastes (date unknown); however, those wastes were disposed of off-site by the contractor hired for this work (Wood 1993).

The PAARNG personnel also reported minor problems in the early years of National Guard occupancy, such as leaks in buried water supply lines and improperly deactivated buried electrical cables, all of which have been repaired (Wood 1993; Hardy 1993). None of the documented problems on the site are believed to have caused adverse environmental impacts. The

PAARNG personnel also removed the Sentry Dogs' Kennels sometime in 1976 (Wood 1993). Grounds maintenance is currently provided by a private contractor but was performed by the PAARNG in the earlier years of Guard occupancy. No pesticides or herbicides were used (Hardy 1993).

The Finleyville Armory was originally occupied by the 1st Detachment, Company B, 110th Infantry Battalion, of the PAARNG; however, since 1990, Company D of the 876th Engineering Battalion uses this property for armory functions. Authorized strength for Company D presently stands at 50 personnel, although it has been as high as 300 personnel in the past; however, fewer than five individuals occupy the site on a continuous basis. This armory site is used primarily for equipment storage, classroom training, and battalion administrative support activities. No field training activities resulting in the generation of hazardous or problematic wastes occur at this property; however, since 1987, the former Missile Assembly and Test Building has been converted to a vehicle maintenance shop, OMS 22A. Primary maintenance (oil and fluid changes; brake repair) is conducted at this OMS on approximately 35 vehicles assigned to the 876th Engineers.

2.3.3 Gastonville Armory

The Gastonville Armory property, the former IFC of Nike Missile Battery PI-43, was converted to armory use shortly after its occupancy by the PAARNG in 1975. As with the Finleyville Armory, very little was actually done to the physical facilities to accomplish this. The PAARNG has engaged in basic maintenance and modernization to keep the buildings and grounds in acceptable shape. Among the major refurbishments, the heating system for the Administration Building was recently modernized (exact date unknown). This resulted in the generation of asbestos wastes; however, those wastes were disposed of off-site by the contractor hired for this work (Wood 1993).

The Gastonville Armory was originally occupied by Company D of the 876th Engineering Battalion; however, since 1990, the armory has been occupied by the 1st Detachment, Company B, 110th Infantry Battalion. Authorized strength for the Gastonville Armory is approximately 129 personnel. This armory site is used exclusively for equipment storage, classroom training, and administrative support activities. No field training activities that result in the generation of hazardous or problematic wastes occur at this property.

2.4 Permitting Status

No environmental permits are currently in effect for either the Finleyville Armory or the Gastonville Armory, and none are believed to be required. The 876th Engineers have been operating an OMS at the former Missile Assembly and Test Building on the Finleyville Armory site. A total of 35 vehicles are supported by this shop. Wastes resulting from first-level maintenance activities at this shop include waste solvents from parts-degreasing operations; waste automotive fluids (waste oils and waste antifreeze); spent batteries; and asbestos-containing brake shoes. Waste fluids are stored for short periods on-site before removal by a recycling contractor (Safety-Kleen Corp.), which also services the parts-degreasing equipment. The shop qualifies as a conditionally exempt small-quantity generator under the Resource Conservation and Recovery Act (RCRA) and, as such, may store hazardous wastes for short periods without needing an RCRA storage facility permit.

Debris from building demolition was found deposited at the head of a ravine in the northern portion of the Gastonville Armory site, near the former Generator Building; however, this debris was not an authorized disposal. No permits have been issued for the Gastonville Armory property for disposal of solid waste or construction and demolition waste. Solid wastes generated as a result of armory activities (primarily paper wastes and kitchen wastes) are hauled by a local contractor to permitted solid-waste landfills. No other armory-related activities at either the Finleyville Armory or the Gastonville Armory would require environmental permits.

2.5 Surrounding Environment and Land Use

2.5.1 Demographics and Land Use

The Finleyville and Gastonville armories lie in the uppermost portion of Subbasin 19 of the Monongahela River basin (DER 1982; Ohio River Basin Commission 1975). The Monongahela River drainage, together with that of the Allegheny River, comprises the headwaters of the Ohio River, located approximately 6 mi north-northeast of these properties. The Monongahela River basin, which occupies 7,384 mi^2, lies in the eastern portion of the Ohio River basin and includes parts of the states of Maryland, West Virginia, and Pennsylvania. Roughly 36% of the land area of the Monongahela River basin lies within Pennsylvania.

The Monongahela River basin is located in the Appalachian Plateaus physiographic region. The terrain is rugged, and valleys are deep and narrow. Flat areas are limited to narrow flood plains and some terraces and flat-topped hills. The Gastonville Armory lies atop one such hill, known locally as Pollock's Knob (USGS 1979b).

The land use patterns within the basin reflect the major topographic characteristics of the area. In 1982, land use within Washington County was as follows: 10.3% urban, 47% agriculture, 35% forest, and 7.7% other (including mining) (DER 1982); however, more recently, Washington County has experienced an increase in residential (suburban) development, including the general Finleyville area. Most of the agriculture, manufacturing, mining, and urban and industrial centers are located in the less rugged western half of the basin. Forested lands predominate in the eastern half of the basin. Hay and livestock are the chief agricultural products. Much coal mining has occurred in the basin, with the use of both surface and underground mining techniques. Most of the coal mining has occurred in the western third, especially along the main channel of the Monongahela River. Industrial activities are concentrated along the Monongahela River, especially along the lower channel within the Pittsburgh metropolitan area. Land use in the immediate vicinity of the armories is predominantly agricultural, with residential areas distributed along major roadways and in subdivisions.

Oil and gas wells are scattered throughout the basin, with many located in the immediate vicinity of the armories. The entire area is crisscrossed with gas and petroleum pipelines that serve not only to distribute natural gas for indirect heating, but also to collect raw gas recovered from the various production wells located throughout the area. Outcropping of bedrock has caused these pipelines to be placed on or very near the land surface in some particularly rugged areas.

The Monongahela River basin also roughly defines area 5 of the Eastern Coal Province. Coal production in area 5 gradually declined from 70 million tons in 1975 to 57 million tons in 1978. Roughly half of that total resulted from surface mining operations throughout the basin, and nearly 60% of the surface-mined coal came from Washington County and surrounding counties (Ohio River Basin Commission 1975). No active coal mines currently exist within the immediate vicinity of the armories.

Projections of population for Washington County that were developed by the Pennsylvania Office of Planning and Development show a 20% increase over the period, 1970-1990 (DER 1982). The current population of Washington County is 204,584 (League of Women Voters of Washington County 1993). Union Township, located in the northeastern corner of the county, has

a population of 6,322. Nottingham Township, which borders Union Township on the west and south, has a population of 2,303. The town nearest to the armories, Finleyville, has a population of 446 (League of Women Voters of Washington County 1993). Population within a 4-mi radius of the armories (which includes a small portion of Allegheny County) is estimated to be 8,000.

2.5.2 Climate

Washington County contains some of the highest mountain elevations east of the Mississippi River. The county's location places it in the path of a number of major storms that approach the area from the north, west, and south. Winter storms originate in polar Canada and travel due south from Hudson Bay or east from the Rocky Mountains. At times in the winter, warm air from the Gulf travels north into the area, causing alternate thawing and freezing. Summer storms from the south bring heavy rains and hot humid weather.

Precipitation is fairly evenly distributed throughout the year, being lowest in the fall and highest during the spring and summer. Snow usually begins in October and ends in May. Amounts of snow vary with elevation, ranging from 35 to over 125 in. at the highest elevations. Mean annual precipitation is 36 in. Recorded temperature extremes range from a high of 105°F in July to a low of -30°F in January. Topography greatly influences the freeze-free period, which can range from 110 days in higher elevations to 185 days in areas close to Pittsburgh (DER 1982).

2.5.3 Surface Water and Physiography

Characteristics of surface water flow within the Monongahela River basin are largely the result of topographic features. The valley containing the Finleyville Armory drains west to Peter's Creek or Froman Run, south to unnamed tributaries, or northeast to Lobbs Run, all of which eventually discharge to the Monongahela River. The Gastonville Armory property drains south to unnamed tributaries or north to Lobbs Run, all of which discharge to the Monongahela River. The Monongahela is a major north-flowing river passing as close as 1 mi south of the Gastonville Armory (Figure 1). Average annual runoff in Subbasin 19 ranges from 14 to 28 in. and is primarily influenced by precipitation distribution; however, land use, land cover, and geologic factors also exert some influence (DER 1982). Flows in most valley streams are seasonably variable. Most streams are found at the valley floors, although hillside streams are also possible as a result of groundwater breakouts through seeps and exposed bedrock fractures.

2.5.4 Groundwater and Hydrogeology

The Finleyville and Gastonville armories lie within the Appalachian Plateaus physiographic province (Ohio River Basin Commission 1975; Herb et al. 1981). Rock types are primarily sandstones and shales that contain thin beds of coal. The rocks are divided into 10 stratigraphic units. From youngest to oldest, these units are the Dunkard Group of Permian and Pennsylvanian age; the Monongahela, Conemaugh, and Allegheny groups and the Kanawha Formation of Pennsylvanian age; Greenbrier Limestone and Pocono Group of Mississippian age; and the Hampshire, Chemung, and Brallier formations of Devonian age. Coal beds are numerous in the Pennsylvanian system. The Allegheny Group and the Monongahela Group have 12 ft and 3 ft, respectively, of workable coal. The Conemaugh Group has only thin beds of coal that are generally not workable. The Pennsylvanian system accounts for approximately 75% of the rock units present in the geographic area.

Soils in the Monongahela River basin are grouped into 35 associations composed of combinations of 31 major soils. Soils in the Finleyville area are composed mainly of the Guernesey-Culleoka Association and are formed in unconsolidated water-sorted alluvial materials. Soil pH values range from highly acidic to neutral. Terrain slopes range from 3% to 35%. Underlying clays are expected to have generally low permeabilities. These low permeabilities, combined with shallow soil overburdens, probably contribute to the numerous septic system failures that have occurred in the Finleyville area; however, despite low permeabilities, the Gastonville Armory property can be expected to have great to moderate potential for aquifer contamination, primarily because of anticipated shallow depths to bedrock. Thicknesses of the soil mantle in the surrounding valleys (including the area of the Finleyville Armory) are expected to be greater, affording more natural protection to bedrock groundwater. (It is important to note that these conclusions are extrapolated from general soil characteristics and are not the result of site-specific studies or information.)

Quaternary deposits consist of alluvium that overlies bedrock in most places along stream valleys. The alluvium is generally permeable and, when saturated, yields moderate to large supplies of water. Numerous private domestic and agricultural water supply wells exist in the area. Although there is no official registry of these wells, it is reasonable to assume that such private wells located in valleys are completed in alluvial aquifers at depths ranging from 80 to 300 ft below ground surface. Groundwater in bedrock occurs largely in secondary openings, such as joint planes or solution openings, and can be abundant in localized areas. The Conemaugh Group

crops out in the extreme northern part of the county and along some stream valleys and is the source of moderate supplies of groundwater.

The Monongahela River and its tributaries have cut valleys below the water table in the interstream areas. Under conditions of low stream flow, the aquifers discharge on the slopes of the valleys in the form of hillside springs and seeps. Conversely, during conditions of high stream flow, surface streams on valley floors will recharge aquifers. Water in the Monongahela River basin is generally of good quality; however, groundwater and surface water readily interact throughout the basin, especially in the valley floors, so that surface water contamination often also results in subsequent groundwater contamination and vice versa. Areas of marginal or degraded water quality exist in the northern portions of the basin, primarily because of pollution from coal mining. Active and inactive coal mining operations are suggested as the major source of groundwater and surface water pollution within the basin, as is the case throughout the Eastern Coal Province. In the western and north-central parts of Washington County, collapse of unsupported roof material in worked-out coal mines has caused fracturing and dewatering of the overlying aquifers and contamination of lower aquifers. Acid mine drainage has been shown to have degraded over 22% of the surface water streams within the basin. Nonpoint pollution in the basin is generally associated with sheet erosion and contamination of groundwater by strip mining. In most areas, stream bank erosion is minor. Domestic sewage and industrial discharges are the other major impacts on surface water quality throughout the basin. Surface water quality is also influenced by groundwater as it discharges to stream beds during low stream flows or enters surface streams via hillside seeps and springs.

Groundwater pollution is also known to have occurred from oil and gas wells located throughout the Monongahela River basin. Problems exist from active oil and gas drilling operations, but pollution from abandoned wells is also considered to be extensive. Around 1973, Washington County was ranked sixth among Pennsylvania counties in natural gas production and fourth in crude petroleum production. Literally thousands of wells have been drilled, and many were improperly abandoned. In some areas, saltwater from lower artesian aquifers has migrated up into freshwater aquifers through improperly sealed oil or gas boreholes. Acid mine drainage often contaminates groundwater through improperly sealed abandoned wells. Other identified hazards to water quality include sanitary landfills, wastewater retention and treatment lagoons, underground injection control wells, and storage of mine spoils and raw materials (Ohio River Basin Commission 1975).

2.5.5 Sensitive Environments

Subbasin 19 is located on a major waterfowl migration route that is part of the Atlantic Flyway. Besides being used by black ducks and Canadian geese, this route is also the general route taken by pintail, baldpate, teal, and wood ducks, as well as diving ducks, en route to and from their breeding grounds. No significant wetlands providing waterfowl habitat are within Subbasin 19, although open bodies of water serve as resting areas for migrating birds (DER 1982). No threatened or endangered species are known to inhabit the Finleyville or Gastonville Armory properties or properties in the immediate vicinity.

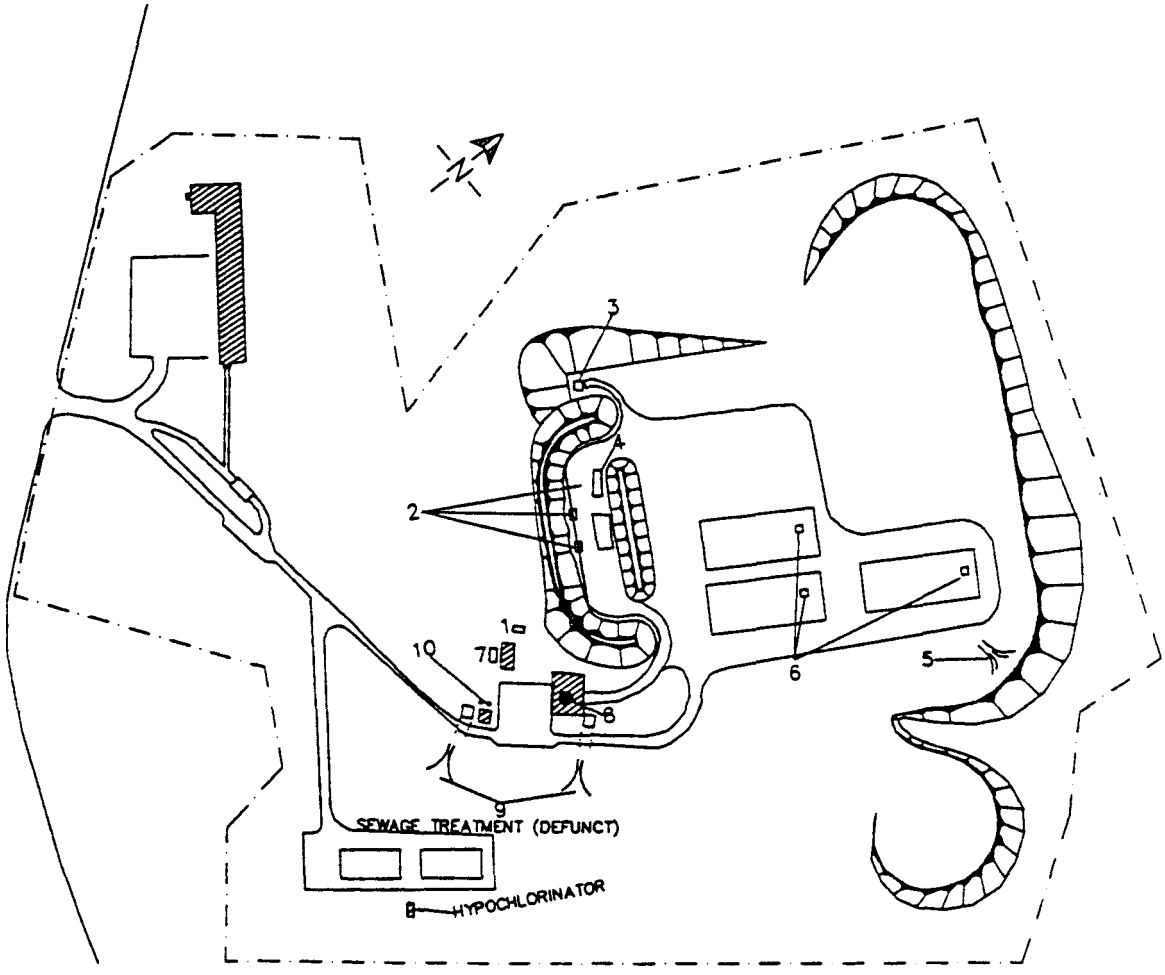
3 Environmentally Significant Operations

For the purposes of this assessment, an ESO is identified as any current or past practice that is known or suspected to have resulted in the release of contaminants to the environment (including as a result of accidental spills or leaks), as well as all activities or areas for which there is the potential for such releases to have occurred, either as a result of facility design, operational practices, or accidental releases. The PA has identified 10 ESOs at the Finleyville Armory, nine related to Nike operations over the period of 1955-1974, one of which continues to apply to PAARNG activities, and one related solely to ongoing PAARNG activities. The PA has identified eight ESOs at the Gastonville Armory, all relating to Nike operations and one of which is related also to current PAARNG activities. The ESOs for each property are discussed subsequently.

3.1 Finleyville Armory

The ESOs at the Finleyville Armory relating to Nike operations include (1) the Flammable Materials Storage Building; (2) outdoor areas of chemical usage (e.g., acid fueling facility); (3) acid (RFNA) storage buildings; (4) a dry well in the acid fueling facility used for acid disposal; (5) sump discharges to the ground surface from each of the three missile storage silos; (6) sumps serving the missile elevators located in the silos; (7) a diesel fuel UST near the Generator Building; (8) discharges of industrial wastes to the on-site sewage treatment facility, which may have purposefully or inadvertently occurred at the floor drain in the Warhead Assembly Building; and (9) storm-water drainage systems that may have received contaminated runoff or spills from the land areas around the acid fueling facility, the Warhead Assembly Building, the Missile Assembly and Test Building, the Generator Building, and the Flammable Materials Storage Building. These ESOs are shown in Figure 4.

The ESOs associated with current PAARNG activities on the Finleyville Armory property include (1) the on-site sewage treatment facility, which may have received industrial wastes via the floor drain in the former Missile Assembly and Test Building (now used as a vehicle maintenance shop) and (2) the outdoor storage of drummed automotive fluid wastes beside the former Flammable Materials Storage Building.



1. Flammable Materials Storage Building (storage of flammable materials for OMS 22A)
2. Outdoor fueling facility where solvent usage occurred
3. Acid Storage Building, razed in 1959
4. Dry well for acid disposal, removed in 1959
5. Sump discharges from missile silos (one discharge point; precise location unknown), not functional since 1975
6. Three hydraulic fluid reservoirs in missile storage silos, abandoned
7. Underground storage tank (6,000-gal; diesel fuel), abandoned in place in 1974
8. Floor drain in Missile Assembly and Test Building, in use by OMS 22A
9. Storm-water catchments, road culverts, and grassy swales
10. Waste drum storage area, in use by OMS 22A since 1987

FIGURE 4 Locations of ESOs at Finleyville Armory (Sources: COE 1955; site inspection observations)

During Nike MLA operations (1955-1974), solvents were used in the maintenance of communications equipment, electric power generators, and other mechanical equipment and in the assembly, disassembly, and cleaning of missile components. These solvents, which included benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and TCE, were presumably stored in the buildings in which they were used and also in a small Flammable Materials Storage Building located west of the former Generator Building (Figure 4). This storage building is also expected to have been the primary storage location for POL used in generator and equipment maintenance. The building does not have secondary-containment features that would prevent spilled chemicals from reaching the environment.

Solvent wastes would have been generated primarily at the Generator Building, the Missile Assembly and Test Building, the Warhead Assembly Building, and (probably to a very limited degree) in each of the three missile storage silos. Since these solvents were used primarily for cleaning electrical contact surfaces, motors, and mechanical equipment, the solvents can be expected to have largely been lost to evaporation after application onto the equipment being cleaned; however, the use of solvents to clean smaller, easily removable equipment and missile fuel cells may have resulted in waste liquids for disposal. Spills of solvents inside major buildings would not necessarily have resulted in a release to the environment, except in the case of the Missile Assembly and Test Building, where a floor drain could have delivered the spilled material to the sewage treatment system, and the case of the missile silos, where spills may have been ultimately released to the environment via the sump pumps installed in each of those silos. Because seepage is known to have occurred in the silos, materials spilled in those facilities also had the potential to impact the surrounding subsurface region, including shallow groundwater aquifers.

No additional details are available regarding how or specifically where solvents were used or how waste solvents were managed or disposed of. Likewise, no details are known on how waste POL (e.g., waste oils from the servicing of the electric power generators) were managed. Paints and coatings used for corrosion control were also presumably stored in the Flammable Materials Storage Building or in each of the operations buildings. Details of the use of such paints and coatings are not available, but the amounts of resulting wastes are expected to be minimal.

During Nike operations involving Ajax missiles (1955-1959), liquid rocket fuel (unsymmetrical dimethyl hydrazine) and initiators (inhibited RFNA) were handled in the outdoor fueling facility adjacent to the former Warhead Assembly Building. (Liquid fuels were not used in Hercules missiles, which were installed on the site in 1959.) Solid fuels in both the Ajax and

Hercules missiles were loaded at the arsenals and not likely to have been removed from missiles or otherwise handled at Nike batteries. Nitric acid was stored in a small, revetment-protected building west of the fueling facility; the building has since been razed. There is no information on the specific location where liquid rocket fuels were stored. Defueling rockets (as part of readiness drills) would have resulted in waste acids and waste liquid fuels.

Waste acids are known to have been discharged down a dry well located within the fueling facility area (Figure 4). Typically, such acid dry wells were 5 ft in diameter and 40 ft deep and filled with crushed limestone and gravel; however, site plans for the MLA show the acid dry well to be a shallow rectangular pit, the sides of which were constructed of concrete (COE 1955). Regardless of its shape, the dry well's function was the same. Reportedly, the acid dry well was cleaned (flushed?) during conversion of the battery to Hercules missiles in 1959 (Wood 1959), but no documentation could be found. If operating properly, the acid dry well would have successfully neutralized the free acidity of discharged nitric acid, resulting in soluble nitrates being released to the subsurface below the bottom of the dry well; however, if channeling occurred in the limestone, then free acidity may have also escaped and subsequently mobilized heavy metals naturally present in the subsurface soils which were encountered.

There is no information on how waste liquid rocket fuels were handled at the MLA; however, because of the fuel's extreme fire risk, high toxicity, and chemical reactivity (violent decompositions, including spontaneous combustion upon exposure to air or oxidizers), it is unlikely that directives would have been issued for any on-site disposals. Most likely, waste fuels were handled and transferred in closed systems and returned to one of the arsenals which supported the Nike program.

3.2 Gastonville Armory

The ESOs at the Gastonville Armory include (1) the Flammable Materials and POL Storage Building; (2) areas of outdoor solvent and POL usage (e.g., radar towers); (3) a diesel fuel UST near the Generator Building (abandoned in place); (4) a gasoline UST near the military vehicle parking area (abandoned in place); (5) three outdoor diesel fuel "day tanks" at the Generator Building (removed); (6) unauthorized disposal of solid wastes in the northeast portion of the property; (7) pad-mounted electrical transformers adjacent to the Generator Building; and (8) an outdoor vehicle washing facility near the water storage tanks. Of these ESOs, the transformers and the USTs remain in place, and only vehicle washing activities have continued during PAARNG occupancy. These ESOs are shown on Figure 5.

1. Flammable Materials and POL Storage Building, abandoned in 1974
2. Areas of outdoor solvent and POL usage (former radar towers)
3. Underground storage tank (6,000-gal; diesel fuel), abandoned in place in 1974
4. Underground storage tank (2,000-gal; gasoline), abandoned in place in 1974
5. Three diesel fuel "day tanks," removed in 1974
6. Open dumping of construction and demolition wastes, date of placement unknown
7. Three electrical transformers (pad-mounted), abandoned in 1974
8. Military Vehicle Washing Facility

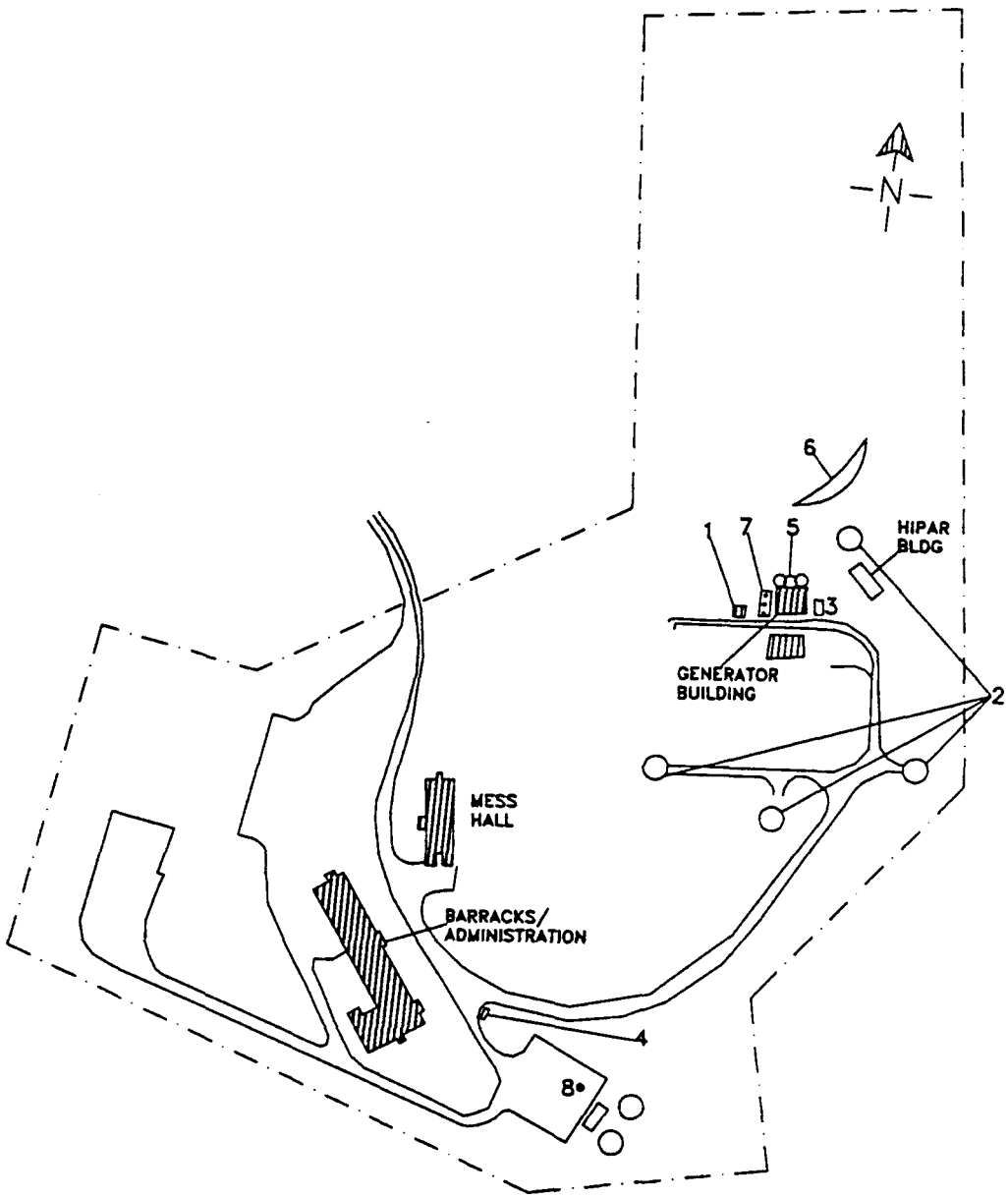


FIGURE 5 Locations of ESOs at Gastonville Armory (Sources: COE 1955; site inspection observations)

During Nike IFC operations (1955-1974), solvents and POL were stored in (and may have been dispensed from) a small building adjacent to the Generator Building. This building has no secondary-containment features that would have prevented spills or leaks of stored products from reaching the environment. Solvents and POL can also be expected to have been stored in various other buildings. In general, although these buildings also had no secondary-containment storage areas, small spills or leaks could be expected to have been controlled inside the building and would not necessarily have resulted in a release to the environment, as that term is defined within CERCLA; however, this may not have been fully the case for the Generator Building, which had belowground electric cable and fuel line raceways leading from the structure to the outdoor transformer pad, the aboveground day tanks, and the nearby Frequency Changer Building. No evidence of major spills or leaks was observed in any of the buildings, however, including the raceways of the Generator Building.

During Nike operations, solvent and POL usage would have occurred in the Generator Building, the Frequency Changer Building, and the HIPAR Building, and outdoors at each of the four radar towers. Only usage of solvents at the radar towers is presumed to represent real potential for release of solvents to the environment as the result of accidental spills or leaks. Even so, the quantities of solvents and POL used in the servicing of these towers are expected to be minimal. No documentation or hearsay information is available regarding major spills or leaks of POL at the tower locations. In most instances, it is likely that solvents would have evaporated after being applied to the equipment being cleaned; however, rebuilding of some smaller equipment may have also resulted in liquid solvent wastes. No documentation exists on how solvent wastes were managed at the IFC. Likewise, no documentation was found on how wastes resulting from the maintenance of the electric power generators (e.g., waste crankcase oil) were managed.

Although no record was found of authorized on-site disposals of solid wastes associated with the Nike program, approximately 20 yd^3 of building demolition waste and electrical equipment has been discarded on the ground surface at the head of a ravine in the northeast portion of the property, near the Generator Building. Although the materials appear to be largely inert (e.g., bricks, concrete), some interior wallboard that may contain asbestos is also present and subject to weathering. The solid waste materials appear to have been at this location for some time.

Three pad-mounted electrical transformers are still in place adjacent to the Generator Building. Dielectric oils in these transformers have not been tested for the presence of PCBs; however, no evidence of spills or leaks was apparent during facility inspection. A pad adjacent to the HIPAR Building also may at one time have held electrical transformers. No spills or leaks are

evident at this location. Additionally, it is possible that power amplifiers in the Frequency Changer Building or the HIPAR Building may have had cooling systems that used dielectric oils (that may have contained PCBs) or aqueous coolants that may have contained glycols for freeze protection. No additional information is available on whether such waste fluids were generated or how they were managed; however, no evidence was found, either within or around these buildings, to indicate that spills or leaks or discharges of such materials to the ground surfaces had occurred.

Finally, no documentation exists to indicate that maintenance of vehicles assigned to Nike Missile Battery PI-43 took place at the IFC. Furthermore, none of the original Nike facilities were designed to accommodate such activities. Some minor amounts of vehicle maintenance (e.g., topping off fluids) may have taken place on the paved parking area adjacent to the water storage tanks. Presumably, all other maintenance of PI-43 vehicles took place at one of the other Pittsburgh area Nike batteries or at a central Army support center.

4 Known and Suspected Releases

4.1 Releases to Groundwater

No releases to groundwater have been documented; however, it has been reliably established that waste RFNA was discharged to a dry well in the outdoor acid fueling facility at the Finleyville Armory property (Figure 4). Because of the nominal design of such dry wells, it is possible that discharges to the dry well resulted in contaminants infiltrating the subsurface soils and reaching the uppermost aquifer. No documentation exists on the performance of the dry well or the total quantity of acids thus disposed of. Also, no record was found of adverse impacts on groundwater resulting from this practice. The dry well was reportedly cleaned in 1959, when the battery was converted to Hercules missiles (Wood 1993).

Around 1989, a number of private residences abutting the Finleyville-Elrama Road and in the Pleasant View residential subdivision south of the Finleyville Armory (Figure 1) experienced water quality problems in groundwater drawn from their private water supply wells (Shade 1993; Parish 1993). These private wells are most likely completed in the uppermost alluvial aquifer, but some may also be completed in bedrock aquifers. Analyses of samples of private well water indicated unacceptable levels of fecal coliform bacteria, traceable to malfunctioning septic systems in the area; however, the analyses of the private water supplies did not identify other chemical contaminants that could be uniquely associated with past activities at the Nike properties (Shade 1993). These water quality problems led ultimately to the installation of a public water supply line in this area, funded by a state of Pennsylvania community improvement loan. An ordinance passed by the borough of Finleyville, which was designed to ensure income for repayment of the loan, required all property owners to hook up to the public water supply and to mechanically disconnect their private wells from their houses' water distribution systems; however, the ordinance did not require the sealing of the private wells, and it is believed that many private wells are still being used for garden and landscape irrigation and other nonconsumptive uses (Parish 1993).

The three missile silos on the Finleyville Armory property extend approximately 20 ft below grade. At this depth, the silos may intersect the uppermost alluvial aquifer. Seepage that routinely occurs in the silos after heavy rainfall appears to support such a conclusion, although such seepage may also result simply from precipitation infiltrating through the vadose zone. Nevertheless, spills of chemicals in the silos have the potential to impact groundwater by leaving

the silos through cracks and seams in the concrete walls and floors of the silos. No such releases of chemicals from the silos have been documented. During the Nike operational period, accumulated seepage was collected in a central sump and discharged to the surface, thus limiting the impact that spilled chemicals could have had on the groundwater, but providing a mechanism for soil and surface water contamination. No other releases of contaminants to groundwater are known or suspected.

4.2 Releases to Surface Water

Releases of contaminants to surface water could have occurred through a variety of mechanisms: contaminated runoff moving from paved operational areas onto adjacent ground surfaces or into storm-water catchments and grassy swales at both the Finleyville and Gastonville properties; and releases to the land surface of effluents from the sewage treatment facilities on the Finleyville Armory and Gastonville Armory properties. (Although both properties had similarly designed sewage treatment facilities, only the facility at the Finleyville Armory is considered to have the potential to receive [and subsequently release via leaching through the sand filters] industrial contaminants, because of its receipt of discharges from a service drain in the former Missile Assembly and Test Building. By contrast, the Gastonville Armory sewage treatment facility received discharges only from sanitary facilities in the former Barracks/Administration Building and the Mess Hall. Many of the chemicals used in the operation of the Nike battery could have significantly disrupted the operation of the on-site sewage treatment facilities if they had been released to the sewers in sufficient quantities. No wholesale failures of the treatment facilities at either property have been documented, however.)

No documentation exists of surface water contamination resulting from past or current operations at either of the properties. Inspection of the facilities revealed no evidence of contamination of the identified drainage ways by which contaminants may reach surface waters; however, at the Finleyville Armory property, an artificial wetland, approximately 20 ft by 40 ft, has been created immediately downgradient of the sewage effluent distribution and dosing chamber, suggesting that seepage of effluent has occurred at this area. It is alternatively possible that this wetland has resulted from an interruption of natural surface drainage patterns on the hillside by the concrete sides of the sand filters and that the wetland is sustained solely by natural runoff that continues to be obstructed in this manner.

4.3 Releases to Soil

No documentation exists of releases of contaminants to soils at either of the properties, except for the purposeful disposal of RFNA at the acid fueling facility on the Finleyville Armory property and the unauthorized disposal of solid wastes (building debris) at the Gastonville Armory property; however, as previously noted, potentially contaminated precipitation runoff from paved operational areas onto adjacent land surfaces is possible at both properties. No overt evidence was found of contaminated land surfaces resulting from such runoff mechanisms, however. Of the operational activities that have had the potential to result in contaminated runoff, only sporadic exterior vehicle washing at the Gastonville Armory property is continuing today in the paved vehicle parking area adjacent to the water storage tanks; however, no evidence indicates that significant amounts of contaminated runoff has been generated as a result of these activities.

Waste oils resulting from the operation of OMS 22A on the Finleyville Armory property are stored in 55-gal drums on pallets outside the former Sentry House near the Missile Assembly and Test Building. No secondary-containment feature exists at this storage location. Some minor amounts of oil spillage onto the gravel beneath the pallets was observed during the site inspection. Also, this storage location is approximately 20 ft from a storm-water catchment. Wholesale releases of stored waste materials can reach this catchment, where they would subsequently be delivered to the grassy swale draining this portion of the property to the east; however, no evidence of contaminants was found along this identified drainage pathway, and spillage in the drum storage area is limited in areal extent and does not appear to have migrated with runoff of precipitation.

4.4 Releases to Air

A number of minor releases to air can be inferred from the operation of the Nike battery. Specifically, RFNA contains approximately 85% nitric acid and up to 15% nitrogen dioxide. Exposures of this acid to the air (as might have taken place in the outdoor acid fueling facility) are likely to have resulted in the release of some nitrogen dioxide to the atmosphere. Likewise, disposal of waste acid in the dry well is also likely to have resulted in minor amounts of nitrogen dioxide and nitric acid aerosols being released to the atmosphere. Likewise, the handling of liquid rocket fuels (dimethyl hydrazine) at the fueling facility over the period of 1955-1959 can be expected to have resulted in the release of minor amounts of fuel to the atmosphere as the result of purgings of transfer lines; however, open transfers of hydrazine fuel are not likely to have occurred because of that chemical's extreme reactivity. No long-term environmental impacts can be inferred

from this practice, however, and no documentation exists of accidental release of hydrazine in quantities representing a long-term environmental consequence.

At both properties, operation of the electric power generators would have resulted in the emission of waste combustion gases and particulates from each of the diesel engines. These emissions are presumed to have been released to the atmosphere without treatment or control. The use of volatile solvents to clean equipment at both properties is expected to have resulted in evaporative losses of solvents to the atmosphere, especially when cleaning took place at outdoor facilities, such as the radar towers. Occupied structures were heated by either natural gas or electric resistance heating. Natural gas boilers and furnaces are sources of carbon dioxide and minor amounts of particulate emissions; however, none of the indirect heating systems is of such a size (i.e., Btu capacity) to require an emission permit. Finally, emissions from vehicular traffic can be expected to have occurred during both the Nike operational period and also during the period of PAARNG occupancy. All anticipated emissions to the atmosphere are minor in scope and of no environmental concern.

The potential for fugitive dusting at the two properties is also quite low. At the Finleyville Armory property, some erosion of revetments encircling the former Acid Storage Building has resulted in bare soil that may represent a very minimal source of fugitive dust; however, although this erosion is close to the former Acid Storage Building, no chemical contamination is known or suspected to exist in this area.

4.5 Other Releases

No other releases of contaminants to the environment have been identified for either the Finleyville Armory property or the Gastonville Armory property.

5 Human and Environmental Receptors

5.1 Groundwater

The population within a 4-mi radius of the Finleyville Armory and the Gastonville Armory is estimated to be approximately 8,000 (League of Women Voters of Washington County 1993; USGS 1979b,d). Until 1989, most occupied residences and facilities within the immediate vicinity of the Finleyville Armory and the Gastonville Armory relied on private wells for all water needs; however, the Nike properties, including the housing area, were supplied with water from the Elrama Water Authority. In 1989, a Pennsylvania American Water Co. water supply line was installed along the Finleyville-Elrama Road, and all residential and industrial structures within the burrough of Finleyville were required to hook onto this supply, including the Army properties (Parish 1993; Wood 1993). Currently, therefore, reliance on groundwater for consumptive water needs is greatly reduced, limited only to area farmers whose properties were too distant from the newly installed water line for economical hookup. It is estimated that less than 10% of the area's population still relies on groundwater for potable supplies. Farm wells are expected to still be in use and to provide the primary supply for livestock water needs. Artificial irrigation of crops is not widely practiced in the area. Private wells may still be in use at other residences for nonconsumptive uses, such as garden and landscape irrigation.

5.2 Surface Water

No lakes or reservoirs are found on or in the immediate vicinity of either the Finleyville Armory or the Gastonville Armory. The nearest continuous flowing river is the Monongahela, which passes within 1 mi south of the properties. Numerous unnamed streams exist in the area as a result of precipitation runoff from hillsides. Flow in these streams is seasonal; and consequently, they support little or no aquatic organisms. Even major streams in the area are subject to great seasonal flow variation. None of the minor streams in the immediate vicinity of the armories are known to be used as potable drinking water supplies, although it is likely that streams provide drinking water for livestock and native animal species. The closest major river, the Monongahela, serves as the drinking water source for virtually the entire population within a 4 mi radius of the armories, except for those individual farms which still rely on private groundwater wells.

5.3 Soil

No areas of major soil contamination have been identified at either armory property. Only one area of minor surface soil contamination was observed, a 3-ft^2 area of stained rock and gravel at the waste oil drum storage area near OMS 22A on the Finleyville Armory property. Only individuals working at the OMS, estimated to be fewer than five, and those involved in removal of the stored wastes for off-site recycling have any opportunity for exposure to this contamination. Both properties have perimeter fences and are locked when not occupied, suggesting that there is no possibility for casual or unauthorized visitors to the properties. The potential for contact with contaminated soils is effectively nil.

5.4 Air

No significant releases of contaminants to the atmosphere are occurring on either armory property. Mechanisms of contaminant release to the atmosphere during Nike operations are no longer operative. The potential for exposures to airborne contaminants is virtually nonexistent.

5.5 Other Receptors

No other receptors have been identified that could be exposed to contaminants originating on either armory property.

6 Preliminary Assessment Findings and Conclusions

6.1 Summary of Preliminary Assessment Findings

The PAARNG Finleyville Armory, located on the Finleyville-Elrama Road in Union Township, Washington County, Pennsylvania, represents no imminent or substantial threat to public health or the environment. From 1955 to 1974, the Finleyville Armory property served as the MLA of Nike Missile Battery PI-43. Since 1974, the property has been occupied by the PAARNG under a lease agreement with the Army and has been used for armory functions and vehicle maintenance. The primary ESOs are (1) the Flammable Materials Storage Building; (2) outdoor areas of chemical usage (e.g., acid fueling facility); (3) the acid storage facility (RFNA); (4) a dry well used for acid disposal in the acid fueling facility; (5) discharges to the ground surface from each of the three missile storage silos via a central sump; (6) hydraulic fluid reservoirs for the missile elevators located in each silo; (7) a diesel fuel UST near the Generator Building; (8) the sand filters in the on-site sewage treatment facility that may have received contaminants via a floor drain in the Warhead Assembly Building; (9) storm-water drainage systems that may have received contaminated runoff or spills from the paved ground surfaces around the acid fueling facility, the Warhead Assembly Building, the Missile Assembly and Test Building, the Generator Building, and the Flammable Materials Storage Building; and (10) minor spillage of waste lubricating oils in an outdoor drum storage area near the Missile Assembly and Test Building. Of these ESOs, all but the last are associated with Nike missile battery operations, which ceased on the property in 1974; however, the UST remains abandoned in place, and hydraulic fluids are believed to still be present in the three missile silo elevators. The minor spillage of petroleum wastes in the drummed waste storage area is associated with the ongoing operation of the PAARNG vehicle maintenance shop in the former Missile Assembly and Test Building. In addition, the potential still exists for automotive waste fluids generated in the OMS to be inadvertently discharged to the floor drain; however, modifications to the sewage treatment facility after 1974 would now direct such discharges ultimately to the Peter's Creek Sanitary District wastewater sewer.

The PAARNG Gastonville Armory property, located on Maple Avenue in Union Township, Washington County, Pennsylvania, represents no imminent or substantial threat to public health or the environment. The Gastonville Armory property functioned as the IFC area of Nike Missile Battery PI-43 from 1955 to 1974. Since 1974, the property has been occupied by the PAARNG under a lease agreement with the Army and has been used solely for armory functions.

The ESOs at the Gastonville Armory include (1) the Flammable Materials and POL Storage Building; (2) areas of outdoor solvent and POL usage (e.g., radar towers); (3) a diesel fuel UST; (4) a vehicle fuel UST; (5) three outdoor diesel fuel "day tanks"; (6) unauthorized disposal of solid wastes in the northeast portion of the property; (7) pad-mounted transformers adjacent to the Generator Building; and (8) an outdoor vehicle washing facility in the military vehicle parking area near the water storage tanks. All of the previously noted ESOs are related to operations of the Nike battery, which ceased on the property in 1974; however, the transformers and USTs remain abandoned in place, solid wastes deposited in the northeast portion of the property remain, and the PAARNG continues to conduct vehicle washing activities in the military vehicle parking area.

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 both the Finleyville Armory property and the Gastonville Armory property present little to no threat to human health and the environment, and no immediate removal actions are warranted. Careful inspection of both facilities revealed no areas of overt contamination and no indication of adverse impacts from activities conducted on the properties, either by the Army during the operational period of the Nike missile battery or by the PAARNG since battery deactivation. Nevertheless, circumstantial information inferred from a general knowledge of Nike missile battery operations and the lack of documentation of the environmental condition of the properties at the time of battery deactivation indicate that it is both reasonable and prudent to conduct additional investigations to verify the apparent absence of significant environmental contamination. Such actions will ensure continued protection for the local community and the environment and full compliance with federal and state environmental regulations pertaining to the continued use or proper disposal of PCB-containing electrical equipment and the proper abandonment of USTs. Specifically recommended actions, all to be taken in coordination with the COE, are as follows.

For the Finleyville Armory property, the former MLA of Nike Missile Battery PI-43, the following actions are recommended:

- In accordance with state of Pennsylvania requirements, remove the abandoned diesel fuel UST from its location adjacent to the former Generator Building, sampling in the excavation for evidence of past releases (residual petroleum

hydrocarbon contamination) and removing for disposal any contaminated soils encountered, in accordance with Pennsylvania UST closure standards.

- Sample the sediments present in the storm-water catchment located southeast of the former Missile Assembly and Test Building of the MLA and the soils in the grassy swale to which this catchment discharges for the presence of contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, TCE, chromium, and lead).

- Sample the soils in the grassy storm-water drainage swale south of the former Generator Building of the MLA for contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, TCE, chromium, and lead).

- Remove and properly dispose of the hydraulic fluids from the reservoirs of the missile elevators in each of the three former missile storage silos, removing all encountered contamination resulting from past releases of fluids from these hydraulic systems in the silos.

- Sample and properly label all in-service electrical transformers on the property for the presence of PCBs, or, alternatively, replace all in-service transformers found to contain PCB dielectric fluids in regulated amounts (greater than 50 ppm) with transformers that contain no PCBs, disposing of any PCB transformers taken out of service in accordance with federal and state of Pennsylvania requirements.

- Sample the former sewage distribution and dosing chamber, the artificial wetland area that has formed immediately upgradient of the four sand filters, and each of the four sand filters for the presence of contaminants associated with Nike missile battery operations (petroleum hydrocarbons, benzene, carbon tetrachloride, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, TCE, chromium, and lead).

- Improve the storage circumstances for waste oils near OMS 22A, adding secondary-containment features that will improve the PAARNG's ability to respond to accidental releases and prevent such releases from entering a nearby storm-water catchment.

For the Gastonville Armory property, the former IFC of Nike Missile Battery PI-43, the following actions are recommended:

- In accordance with state of Pennsylvania requirements, remove the two USTs abandoned on the property (a gasoline UST near the military vehicle parking area and a diesel fuel UST adjacent to the former Generator Building), sampling soils in the excavation of each tank for indications of past releases or petroleum hydrocarbon contamination and removing for disposal any contaminated soils encountered, in accordance with Pennsylvania UST closure standards.

- Remove, sample for PCBs, and properly dispose of the three out-of-service pad-mounted electrical transformers adjacent to the former Generator Building.

- Remove and properly dispose of all solid wastes dumped at the head of the ravine east of the Generator Building.

- Sample and properly label all electrical transformers still in service on the property, or, alternatively, replace all in-service transformers found to contain PCB dielectric fluids in regulated amounts (greater than 50 ppm) with transformers with PCB concentrations below the regulated level.

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Appendix:

Interview Information

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Individuals Interviewed

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Harrisburg, Pennsylvania

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Department of Military Affairs
Pennsylvania Army National Guard
Fort Indiantown Gap
Harrisburg, Pennsylvania

Purchasing Officer
Department of Military Affairs
Pennsylvania Army National Guard
Fort Indiantown Gap
Harrisburg, Pennsylvania

State Retention Officer
Department of Military Affairs
Pennsylvania Army National Guard
Fort Indiantown Gap
Harrisburg, Pennsylvania

Shop Chief
Organizational Maintenance Shop 22A
Finleyville Armory
Finleyville, Pennsylvania

Recruiting Officer
Pennsylvania Army National Guard
Gastonville Armory
Finleyville, Pennsylvania

Readiness NCO
Pennsylvania Army National Guard
Finleyville Armory
Finleyville, Pennsylvania

Township Supervisor
Union Township
Finleyville, Pennsylvania

District Sanitarian
Pennsylvania Department of Environmental Resources
Uniontown Field Office
Uniontown, Pennsylvania

Water Quality Specialist
Pennsylvania Department of Environmental Resources
McMurray District Office
McMurray, Pennsylvania

Drinking Water Specialist
Pennsylvania Department of Environmental Resources
McMurray District Office
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