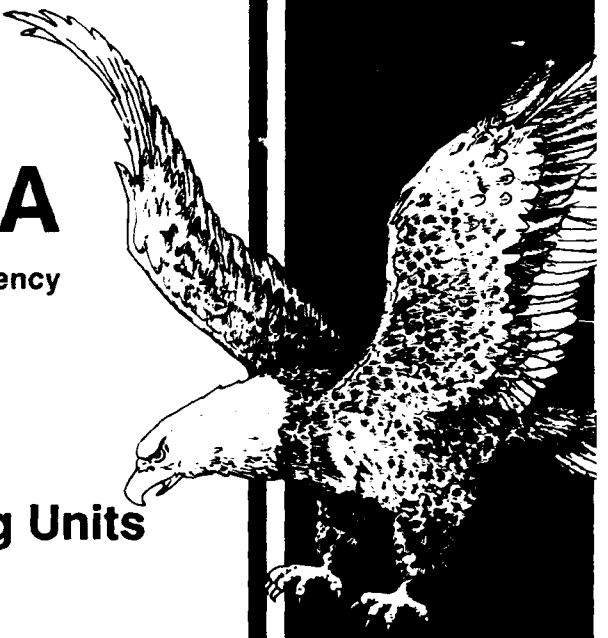
CETHA-BC-CR-89287



# USATHAMA

U.S. Army Toxic and Hazardous Materials Agency



## Enhanced Preliminary Assessment Report:

## Patrick Henry Army Housing Units Newport News, Virginia

October 1989



prepared for

Commander
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

prepared by

Environmental Research Division
Argonne National Laboratory
Argonne, Illinois 60439

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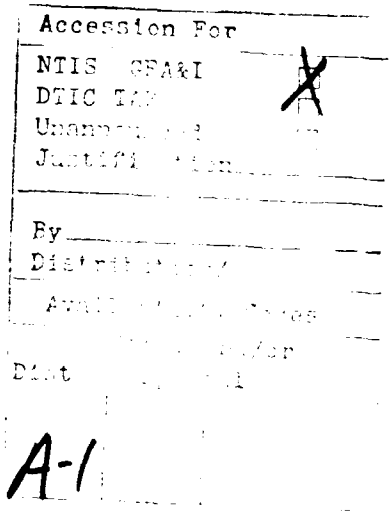


*prepared for*

Commander, U.S. Army Toxic and Hazardous Materials Agency,
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Environmental Research Division,
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19 ABSTRACT (*Continue on reverse if necessary and identify by block number*)

Argonne National Laboratory has conducted an enhanced preliminary assessment of the Army housing property located in Newport News, VA. The objectives of this assessment include identifying and characterizing all environmentally significant operations, identifying areas of environmental contamination that may require immediate remedial actions, identifying other actions which may be necessary to resolve all identified environmental problems, and identifying other environmental concerns that may present impediments to the expeditious sale of this property.

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## SUMMARY

The Patrick Henry housing area located in Newport News, Va., presents no imminent or substantial threat to human health or the environment. Although the area was originally developed as part of a Nike missile battery located in Newport News, Va., no wastes associated with the operation and maintenance of the missile-launch and tracking systems were delivered to or managed at the area. Furthermore, evidence indicates that this housing property existed independently of the battery with respect to water and sewer service and electricity.

Two actions are recommended prior to release of this property:

- Removal of 10 aging underground fuel-storage tanks, and inspection of tank excavations for petroleum contamination, with remediation of all encountered contamination problems.

- Development and implementation of a plan to sample and analyze all electrical transformers on the property for PCBs.

# 1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed. Among the affected installations are 53 military housing areas, including the Patrick Henry housing area addressed in this preliminary assessment.[1]

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency is responsible for supervising the preliminary assessment effort for all affected properties. . These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Army stand-alone housing area in Newport News, Va.

## 1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program and assess the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently),
- Underground storage tanks,
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with possibly continued residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

## 1.2 OBJECTIVES

This enhanced PA is based on existing information from Army housing records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- Identifying and characterizing all environmentally significant operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- Identifying other actions that may be necessary to address and resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

## 1.3 PROCEDURES

The PA began with a review of Army housing records located at Fort Eustis, Newport News, Va., on May 25, 1989. Additional information was obtained through interviews at the Directorat of Housing at Fort Eustis, and with a resident of the housing area. A site visit was conducted at the Patrick Henry housing area, Newport News, Va., on May 25, 1989, at which time more information was obtained through personal observations of ANL investigators. Photographs were taken of the housing units and surrounding properties as a means of documenting the condition of the housing units and immediate land uses. Site photographs are appended.

All available information was evaluated with respect to actual or potential releases to air, soil, and surface and ground waters.

Access to individual housing units was obtained through the senior occupant at the facility.

# 2 PROPERTY CHARACTERIZATION

## 2.1 GENERAL PROPERTY INFORMATION[2]

The Patrick Henry housing area is located at the intersection of Jefferson Ave. (Rt. 143) and Bland Blvd., at the entrance to Patrick Henry Airport in Newport News, Va. The housing area consists of 14 single-family units surrounded by a chain-link fence. It is nestled among 11 wooded acres of tall pine trees. The units were built in the 1950s as housing for military personnel assigned to the Army Nike missile battery in Newport News. The Nike program has since been phased out, but the housing has remained. Because these units are all one-story structures, in recent years the Army has dedicated their use to soldiers arriving at Fort Eustis with handicapped family members. The housing area is now zoned "B-1 Commercial" (private residences as well as commercial concerns such as small retail stores and professional buildings that are appropriate to a residential neighborhood). The property lies within a mile of the Hampton Roads Sanitary Commission and the Patrick Henry Airport; it is surrounded by an office complex, light industry, and commercial concerns.

Figure 1 shows the general location of the facility.

## 2.2 DESCRIPTION OF FACILITY

Figure 2 presents the site plan of the housing area.

### Housing Units[2-4]

The 14 single-story units are built on concrete slabs and have vinyl sidings. Ten of the units have three bedrooms, four have two bedrooms. All units are air conditioned and have oil-fired forced-air heating.

### Utilities[4,5]

Electric power is supplied to the Patrick Henry housing area by the Dominion Resources Corporation (formerly Virginia Electric Power Co.). However, all transformers on the property are owned by the Army. Fort Eustis personnel have reported that the Patrick Henry transformers have not yet been tested for PCBs. The area receives its water from the Newport News Department of Public Works. Solid waste (garbage) is collected by a local contractor and disposed of off-site.

### Fuel Storage[5,6]

Although natural gas is readily available to the housing site, the units still use fuel oil (#2) for heating. The heating oil is stored in underground tanks in the front yard

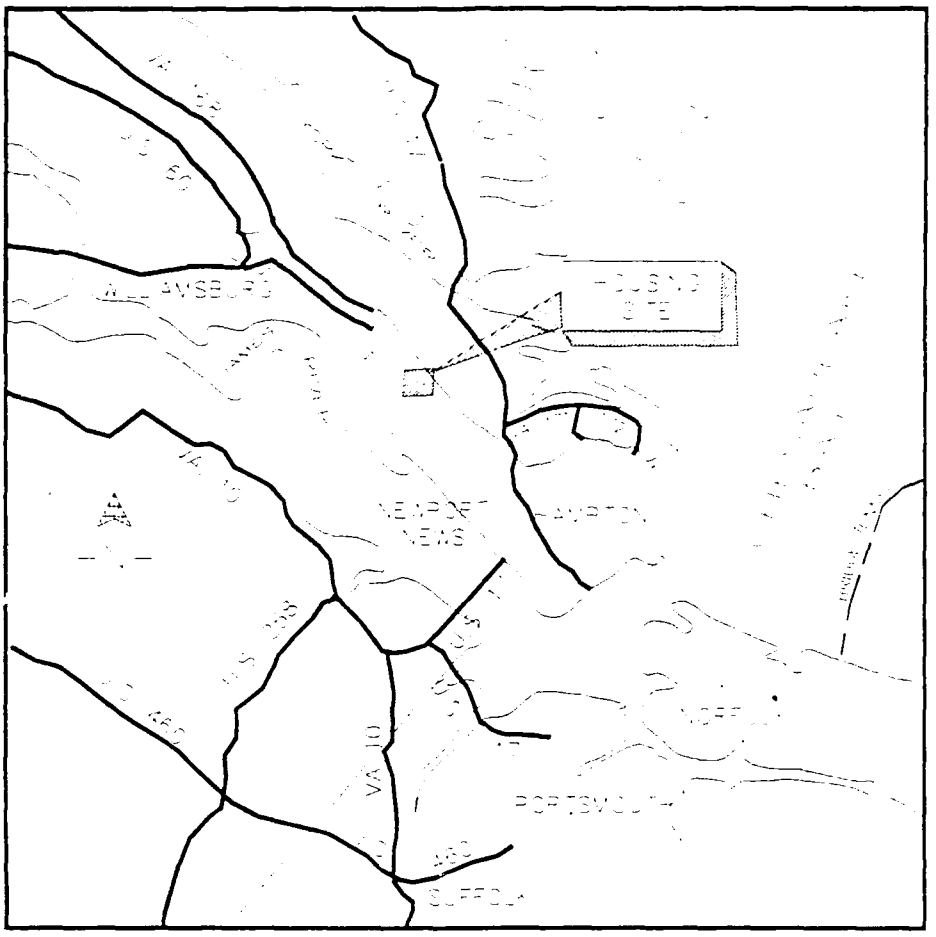


**FIGURE 1 Vicinity Map of Patrick Henry Housing Units**

of each house. Ten tanks have a 275-gallon capacity, and four have a 550-gallon capacity. The four larger tanks were installed in the past two years as replacements for originally installed 275-gallon tanks, which were about 30 years old at the time they were removed and had corroded. It was reported that minor amounts of contamination were found in the tank excavations and that all contaminated soil was removed for proper disposal.

## Sewage[5,7]

The Patrick Henry housing area belongs to the Hampton Roads Sanitary District, which operates and maintains the sewage treatment facilities located within a short distance of the housing units.

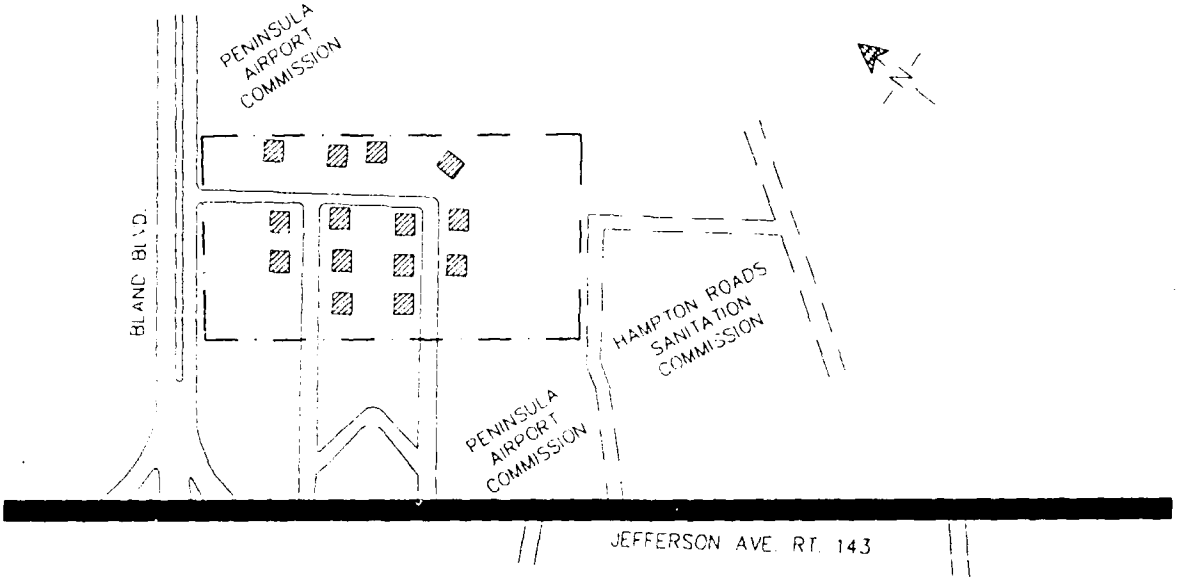



**FIGURE 2 Site Plan Map of Patrick Henry Housing Units**

### Storm Drainage Systems

The property is drained by underground conduits to the Newport News storm sewer network.

### Other Prominent Structures or Property Improvements

There have been no such structures built (since original construction) or improvements made.

## 2.3 PROPERTY HISTORY

### 2.3.1 Nike Defense Program and Typical Battery-Level Practices

Generic information on the national Nike antiaircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers[8] and the other by the U.S. Army Toxic and Hazardous Materials Agency.[9] In both studies, independent contractors relied on information contained in unclassified documents related to the Nike surface-to-air missile program, including engineering drawings and specifications (for the facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operations and maintenance of Nike facilities. Taken together, these two reports represent the most complete assemblage of generic information on the Nike

missile program from an environmental perspective. Salient points from both reports are condensed below.

At its zenith in the early 1960s, the Nike program included 291 batteries located throughout the continental United States. The program was completely phased out by 1976, with many of the properties sold to private concerns or excessed to state or local governments for nominal fees.

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 resources and population centers. Typically, Nike batteries were located in rural areas encircling the protected area. The Ajax was a two-stage missile using a solid-fuel booster rocket and a liquid-fuel sustainer motor to deliver a warhead to airborne targets.

The Ajax missile was gradually replaced by the Nike Hercules missile, introduced in 1958. Like the Ajax, the Hercules was a two-stage missile, but it differed from the Ajax in that its second stage was a solid-fuel rather than liquid-fuel power source and its payload often was a nuclear rather than conventional warhead. Ajax-to-Hercules conversions occurred between 1958 and 1961 and required little change in existing Nike battery facilities. A third-generation missile, the Zeus, was phased out during development and consequently was never deployed.

A typical Nike missile battery consisted of two distinct and separate operating units, the launch operations and the integrated fire control (IFC) operations. The two operating areas were separated by distances of less than two miles, with lines of sight between them for communications purposes. A third separate area was also sometimes part of the battery. This area was typically equidistant from the two battery operating sites and contained housing for married personnel assigned to the battery. Occasionally, these housing areas also contained battalion headquarters, which were responsible for a number of Nike batteries.

Depending on area characteristics and convenience, the housing areas were often reliant on the launch or IFC sites for utilities such as potable water, electrical power, and sewage treatment. In those instances, buried utility lines connected the housing area to one or both of the other battery properties. It is also possible, however, that housing areas were completely independent of the missile launcher and tracking operations. In those instances, the necessary utilities were either maintained on the housing site or purchased from the local community. In many localities, as the character of the land area around the housing units changed from rural to suburban or urban, communities extended utility services to the housing unit locations, in which case conversions from independent systems to community systems were made.

A large variety of wastes was associated with the operation and maintenance of Nike missile batteries. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene. Because of the rural locations of these batteries, and also because very few regulatory controls existed at that time, most of

these wastes were managed "on-site." (Unused rocket propellants and explosives, however, would always have been returned to central supply depots and not disposed of on-site.) It is further conceivable that wastes generated at one of the Nike properties may have been transferred to its companion property for management or disposal.

Wastes related to missile operation and maintenance would not have been purposely transferred from a battery operating area to a housing area with no facilities for waste management or disposal. In some instances, however, the sewage treatment facilities for all Nike battery properties were located at the housing area; that possibility cannot be automatically ignored. Finally, where housing areas received various utilities from either of the operating areas, it is also possible that wastes disposed of on those other properties may have migrated to the housing area via the buried utility lines. And since decommissioning of the Nike batteries did not normally involve removal of buried utility or communication lines, any such contaminant migration is likely to have gone unnoticed.

### 2.3.2 Patrick Henry Housing Units[2]

The Patrick Henry housing area (formerly called Red Hill Village) was a remaining 11-acre land parcel of Camp Patrick Henry, a troop staging area acquired by condemnation in 1942 and used during World War II as an embarkation point for military personnel. It was reassigned to the Nike defense in the 1950s. Fourteen single-family units were constructed to provide family housing for military personnel assigned to the Nike Norfolk battery. Despite its affiliation with the Nike Norfolk 85 battery, this housing area remained independent of the battery with respect to electrical, water, and sewer utilities. Furthermore, no missile-related wastes were ever delivered to the housing site for management or disposal.

In 1971, after the Newport News Nike battery was decommissioned, the property was excessed to the General Service Administration. The property was later withdrawn from excess, but the opinions of title and insurance certificates were not returned to the Army by the GSA. The site has been used for housing since acquisition by the government. Because these houses are all one-story, in recent years the Army has dedicated their use to soldiers arriving at Fort Eustis with handicapped family members.

## 2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

Newport News lies on the Virginia Peninsula, in the southeastern part of the state between the deep-channeled James and York rivers. The peninsula extends from a point about 40 miles east of Richmond to the cities of Newport News and Hampton on Chesapeake Bay and is situated at North latitude 37°. It forms the north side of the sheltered deep-water harbor Hampton Roads. The port of Newport News, and that of its neighbor Norfolk on the south shore, comprise the hub of one of the world's preeminent shipping centers. The Hampton Roads area has a population of more than one million people, about one-third of whom reside in the Newport News-Hampton metropolitan area.[4] The Peninsula consists of the cities of Newport News, Hampton, and Williamsburg, the township of Poquoson, and the counties of York and James City.

The area is largely influenced by two major organizations that are interrelated: the Newport News Shipbuilding Company and the federal government. These organizations account for approximately 30% of all civilian employment on the peninsula, not counting the civilian contractors who do research for NASA and are located here.

Within the past decade, the peninsula has experienced rapid economic expansion with location of a large number of plants and firms, both foreign and domestic, to the area. Industry is being attracted to the area because of the fine port and harbor facilities, rail and highway networks, low tax rates, and availability of skilled labor. Research and development organizations have located here because of the proximity of the Langley Research Center.

The peninsula is traversed by numerous river and waterways and is bounded by the Chesapeake Bay immediately to the northeast and the Atlantic Ocean 15 miles to the east. The climate is a modification of the most desirable marine variety. The winters are mild, while the autumn and spring seasons usually are delightful. July is the warmest month, the average daily maximum temperature being 80°F; the average daily minimum, 71°F. The coldest month is January, with an average temperature of 39.6°F. Cold waves seldom penetrate to this area. The yearly average of snowfall is only 11.0 inches, and usually melts and disappears within 24 hours. Extreme temperatures recorded here are a maximum of 94°F in July, and a minimum of 18°F in January.

The upper part of York County is rolling country, the maximum altitude being between 80 and 100 feet above sea level. The Wicomico Terrace, which underlies much of this area, is strongly dissected by tributaries to the York River, and the high flat terrace remnants are of limited extent. South of Yorktown, the topography changes rather abruptly, and the ground is low and flat. A 50-foot (Talbot) terrace has a limited extent at Grafton (5 miles southeast of Yorktown). The somewhat lower Pamlico Terrace, descending gradually from 25 to 10 feet or so, make up the southeastern part of the county. This terrace also has a limited extent upstream along the York River near Yorktown and Camp Peary.

Most of Newport News is occupied by the Talbot Terrace, the general altitude of which lies between 30 and 40 feet above sea level. The part near the lower tip of Newport News is Pamlico Terrace, with an altitude of 30 feet or lower. In the upper end, the Sunderland Terrace forms a dissected surface generally between 80 and 90 feet above sea level.

## 2.5 GEOLOGIC AND HYDROLOGIC SETTINGS[10]

Newport News, Va., belongs to the Virginia Coastal Plain Physiographic Province, which consists of a seaward-thickening wedge of sands, silts, clays, and marls deposited by fluvial, deltaic, and marine processes on top of a pre-Cretaceous "basement" complex. The geologic formations are, from oldest to youngest, Cretaceous Potomac, Eocene Pamunkey and Chickahominy, Miocene Chesapeake, Pleistocene Columbia, and recent sediments.

The lower aquifer system in southeast Virginia has very nearly the same boundaries as the Lower Cretaceous Potomac group. The southeast Virginia system contains discontinuous bodies of high-yield sands; these sands are connected by transmissive silts and are only partially isolated by a clay bed. In this situation, vertical recharge to the aquifers from overlying deposits may well exceed horizontal recharge from the small outcrop areas of the Potomac group along the fall zone.

Fairly continuous fine-grained material overlies the lower aquifer system. This material conforms in shape to the top of the Lower Cretaceous aquifer near the fall zone, but its eastern extension apparently diverges upward from the top of Lower Cretaceous sediments. The fine-grained material causes a differential in pressure between the upper and lower aquifer systems, and the material has sufficient transmissivity to allow recharge of the lower aquifer system from the upper aquifer system.

The upper aquifer system consists of Eocene Pamunkey, Chickahominy, Miocene Chesapeake, Pleistocene Columbia, and recent deposits. Pamunkey deposits consist of thin lenticular glauconitic sands and some clay and marl interbeds. In general, Pamunkey deposits easily allow the vertical migration of groundwater. Miocene Chesapeake deposits are composed of clays and sandy clays, which constitute most of the southeastern Virginia Coastal Plain. To the east, Chesapeake deposits overlie Pamunkey deposits, and near the fall zone, the Chesapeake group overlaps both the Pamunkey group and much of the Potomac group. Chesapeake deposits permit vertical recharge of lower aquifers along the fall zone and further to the east, where the Potomac aquifers are pumped heavily. The Pleistocene Columbia group consists of terraces, fluvial, and flood-plain deposits. The last unit also permits vertical movement of groundwater.

The principal water-bearing sediments in southeastern Virginia are the thick sands and gravels in the Potomac group of the Lower Cretaceous period. Recharge to the Potomac aquifer partially occurs in the small outcrop area along the western edge of the Coastal Plain near the fall zone. The decline in the piezometric levels and the resultant increase in pressure differentials have caused leakage from overlying clays and sands into the heavily pumped Cretaceous aquifers. The groundwater levels in the overlying Eocene and Miocene aquifers have declined, although they have not been pumped heavily.

# 3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

The Patrick Henry housing area never received or stored Nike-related hazardous waste or hazardous materials, and no Nike-related industrial operations took place here. The area's one environmentally significant operation centers on its 14 underground fuel-storage tanks.

Ten of the tanks, all with a 275-gallon capacity, were installed in the 1950s. Four 550-gallon tanks were installed in the last two years as replacements for original 275-gallon tanks that had corroded and sprung leaks; the new tanks have F4-30 asphalt coatings. All 14 tanks are of single-wall steel construction and are buried in well-drained sandy soil. Reportedly, small amounts of fuel oil were lost at the time the four tanks were replaced, but the contaminated soil was hauled away to a landfill.

The water pipes in the utility room (actually a closet that houses the furnace and the hot water heater) of the housing units have asbestos coverings. However, the covering in the unit that the ANL team visited was observed to be in good condition. It is presumed that the pipe insulations in the remaining units are in similar conditions.

The Army-owned electrical transformers located in the property may contain PCB dielectric fluids. However, no leaks were observed from any of these transformers.

# 4 KNOWN AND SUSPECTED RELEASES

No major releases of contaminants from the Patrick Henry housing area have been reported. The small amounts of fuel oil apparently lost when four underground storage tanks were replaced with new tanks in recent years were apparently successfully remediated by disposing of the contaminated soil at a landfill.

No evidence of any other contamination from the Nike or post-Nike housing activities has been documented.

# 5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although the housing area was originally developed as part of a Nike missile battery, all available documentation and circumstantial evidence support the probability that this housing property was completely independent of the Nike battery's operational activities. The only matter that needs to be addressed before property closure is the underground fuel-storage tanks.

Ten of the 14 underground tanks are more than 30 years old. They are near the very end of their useful life expectancy. It would therefore be prudent to remove all 10 aged tanks now. Should any of the tanks begin leaking before replacement, there would be the added cost and effort of decontamination of the soil and general areas.

The electrical transformers on the property may represent sources of PCB releases, although there is no documentation of spills or leaks from any of these transformers.

# 6 RECOMMENDATIONS

The Patrick Henry housing area presents no imminent or substantial threat to the environment or human health.

If the property is likely to continue being used for residential housing, it is recommended that the 10 aged 275-gallon underground fuel-storage tanks be removed and any fuel-contaminated soil problems be remediated as needed.

If, however, the housing units are likely to be leveled and replaced with commercial concerns, the underground storage tanks could be removed and smaller above-ground tanks installed to serve the houses in the interim until demolition occurs. At the time of underground tank removals, the excavations should be sampled and analyzed for petroleum contamination; any contaminated soils encountered should be removed for proper disposal.

Regardless of whether this area continues to be used for residential housing, all electrical transformers on the property should be sampled and analyzed for PCBs to insure their proper ultimate disposition.

## REFERENCES


1. *Base Realignments and Closures*, Report of the Secretary's Commission (Dec. 1988).

2. Memorandum on "Base Closure, Real Estate Coordination," for CENAD-RF-M, North Atlantic Division; and "Report of Excess, Nike Norfolk 85 Housing (Red Hill Village)," Robert Turner, Real Estate Division (April 28, 1989).

3. Information sheet, Patrick Henry Housing (March 1989).

4. "Installation Utilization Survey," Fort Eustis, Va. (Dec. 31, 1988).

5. Personal communication at Fort Eustis, Newport News, Va. (May 25, 1989).

6. Personal communication at the Patrick Henry housing area, Newport News, Va. (May 25, 1989).

7. Personal communication at Fort Eustis, Newport News, Va. (May 25, 1989).

8. U.S. Army Corps of Engineers, Huntsville Div., *Investigation of Former Nike Missile Sites for Potential Toxic and Hazardous Waste Contamination*, Law Engineering and Testing Co., LEG-Government Services Division, LEG Job #601 (March 1986).

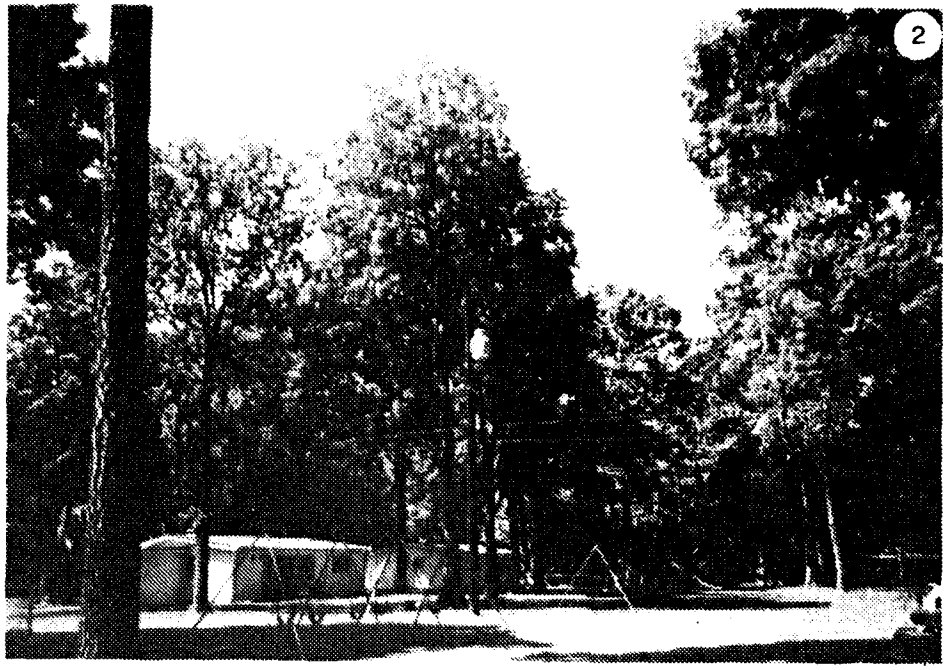
9. U.S. Army Toxic and Hazardous Materials Agency, *Historical Overview of the Nike Missile System*, prepared by B.N. McMaster et al., Environmental Science and Engineering, Inc., for USATHAMA Assessments Div., Aberdeen Proving Ground, Md. (Dec. 1984).

10. *Groundwater of Southeastern Virginia*, Virginia State Water Control Board, Bureau of Water Control Management, Richmond, Va., Planning Bulletin 261-A (Aug. 1974).

# APPENDIX:

## PHOTOGRAPHS OF PATRICK HENRY HOUSING FACILITY AND SURROUNDING LAND


1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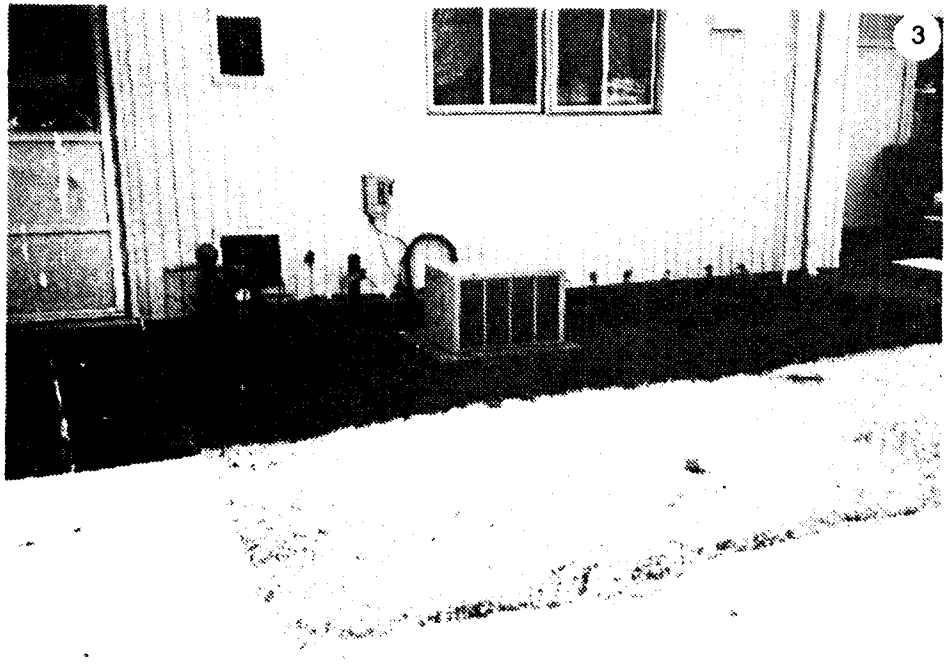
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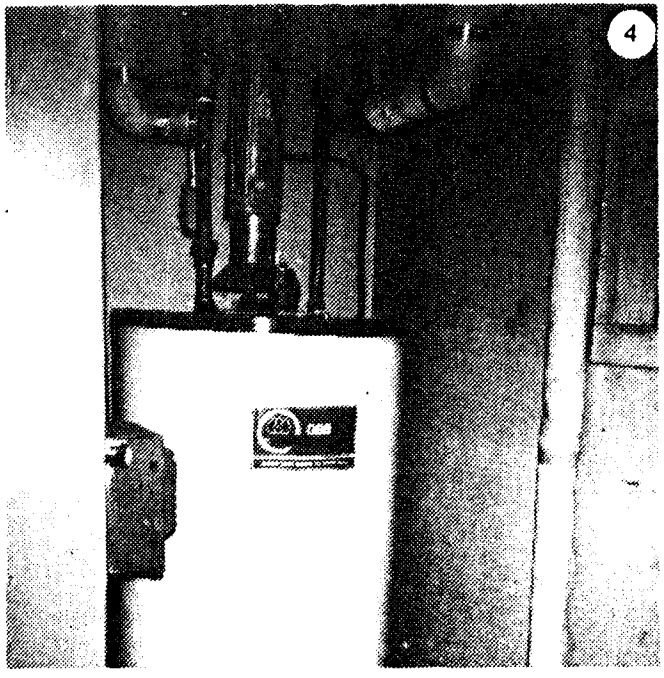
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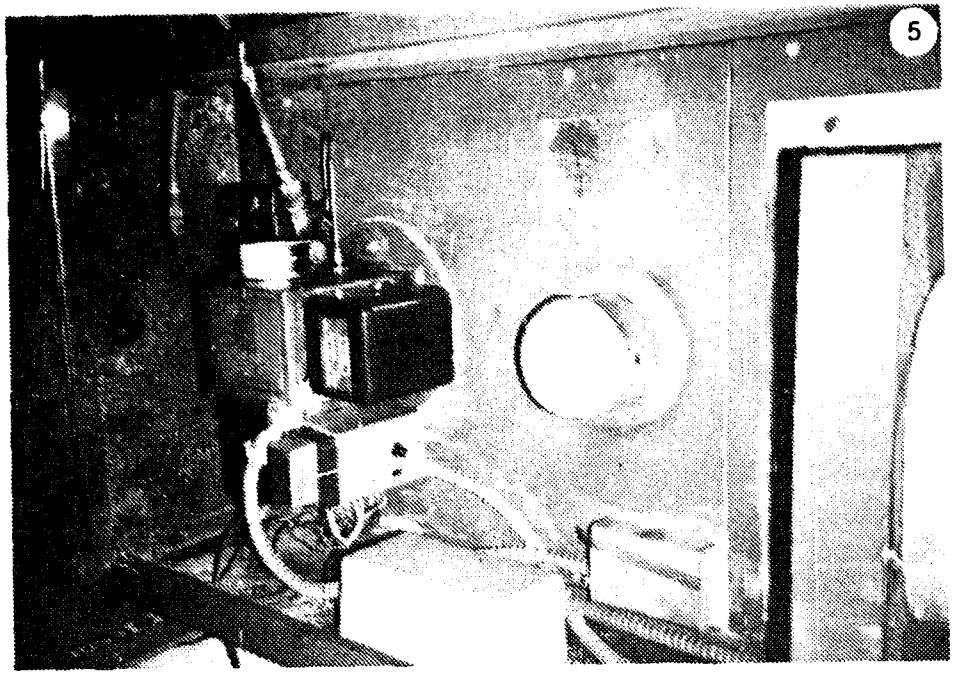
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6

## IDENTIFICATIONS OF PHOTOGRAPHS

1. A typical housing unit, with sidewalks leading to the front door; rain gutter and downspout are also seen.

2. Playground area for children.

3. The head of a filler pipe for one of the underground fuel-storage tanks, right of center; an air-conditioning system is near the house.

4. Hot water heater; insulation can be seen on pipes near the top and also on the right.

5. The controls for one of the oil-fired, forced-air heating system.

6. Utility shed (for storage) attached to one of the houses.