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# USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

## Enhanced Preliminary Assessment Report:

### Nahant Army Housing Units Nahant, Massachusetts



September 1989

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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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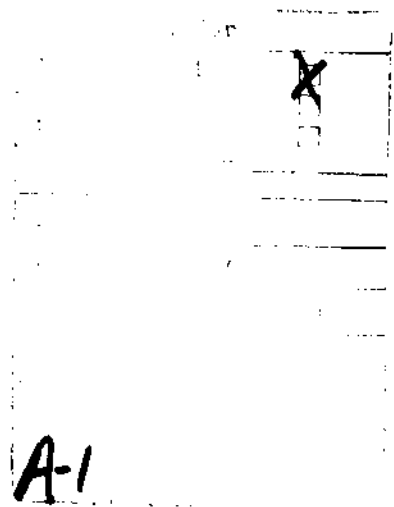
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**Enhanced Preliminary  
Assessment Report:  
Nahant Army Housing Units  
Nahant, Massachusetts**

September 1989



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



Environmental Research Division,  
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## SUMMARY

The Nahant housing facility located in Nahant, Mass., presents no imminent or substantial threat to human health or the environment. No immediate remedial actions are warranted for the site. Past and present use of this property has exclusively been to provide housing units for military personnel, and no large quantities of wastes have been generated or disposed of on-site. No adverse impacts from housing operations have been identified. The facility was originally developed as part of the Nike missile battery located in Nahant, Mass., but no missile-related wastes were delivered to or managed at this site.

Concerns exist, however, about the underground heating-oil tanks at each housing unit on the property. Although these tanks were replaced two years ago, the site inspection revealed that filler pipe caps were missing from a number of the tanks. Since these filler pipes are generally finished at grade, rain and run-off can enter these uncapped filler pipes and displace stored fuel.

Another concern is the accumulated household trash that sits just below the playground area. Numerous garbage bags are heaped together with other remnants of disposed wastes. Although it is unlikely that any of this debris may cause serious health threats, it is a potential risk to the health of the children who play in the immediate area.

The following actions are recommended prior to release of this property:

- Replace missing oil filler pipe caps to underground heating oil tanks at all units on the property.
- Remove the miscellaneous trash below the playground area, and dispose of it properly.

The recommendations assume this property will most likely continue to be used for residential housing.





## 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 Nahant housing area addressed in this preliminary assessment.<sup>1</sup>

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 (USATHAMA) 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 Nahant, Mass.

### 1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing 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 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 Devens, Mass., approximately 35 miles northwest of Boston the week of May 15-19, 1989. Additional information was obtained from the Army Corps of Engineers District Office in Waltham, Mass., on May 17 and from conversations with personnel from the office of the Area Engineer, Fort Devens on May 18. A site visit was conducted at Nahant, Mass., on May 16, 1989, at which time additional 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

The housing units in Nahant are located on Gardner Road, Goddard Drive, and Castle Road. The Army Corps of Engineers Office for the southeast Boston area, located in Waltham, Mass., is responsible for major renovations and upgrading within the facility.

Figures 1 and 2 show the general location of the facility.

### 2.2 DESCRIPTION OF FACILITY

Figure 3 presents the site plan of the housing property.

The property consists of 3.35 acres of land and 0.16 acre in easements.<sup>2</sup> Permanent structures include 12 MCA-style houses, built in the 1950s as part of the Nike anti-aircraft defense program.

#### Housing Units

The Nahant housing area consists of 12 MCA style houses, each with three bedrooms and a family room. MCA is the model name assigned to these houses by the builder, National Homes. The houses have a concrete slab foundation and walls of wood frame and asbestos shingle.<sup>3</sup>

#### Utilities

Underground water, sewer, and electric lines parallel the access road, with feeder lines extended to each house. An existing water line lies to the northeast of the houses on Gardner Road. The facility is supplied with city water; no wells exist on-site. Electrical service is provided by the town of Nahant. Solid wastes (garbage) are collected by local contractor for disposal off-site. Small in-ground trash receptacles are located behind each house, but these are no longer in use. There are many drainage ditches along the street and between the houses. The nearest water surface is Nahant Harbor, 0.2 kilometer to the southeast.<sup>4</sup>

#### Sewage

The city of Nahant has provided sanitary service to these units since their initial construction. No individual septic tanks or leach fields are on this property.

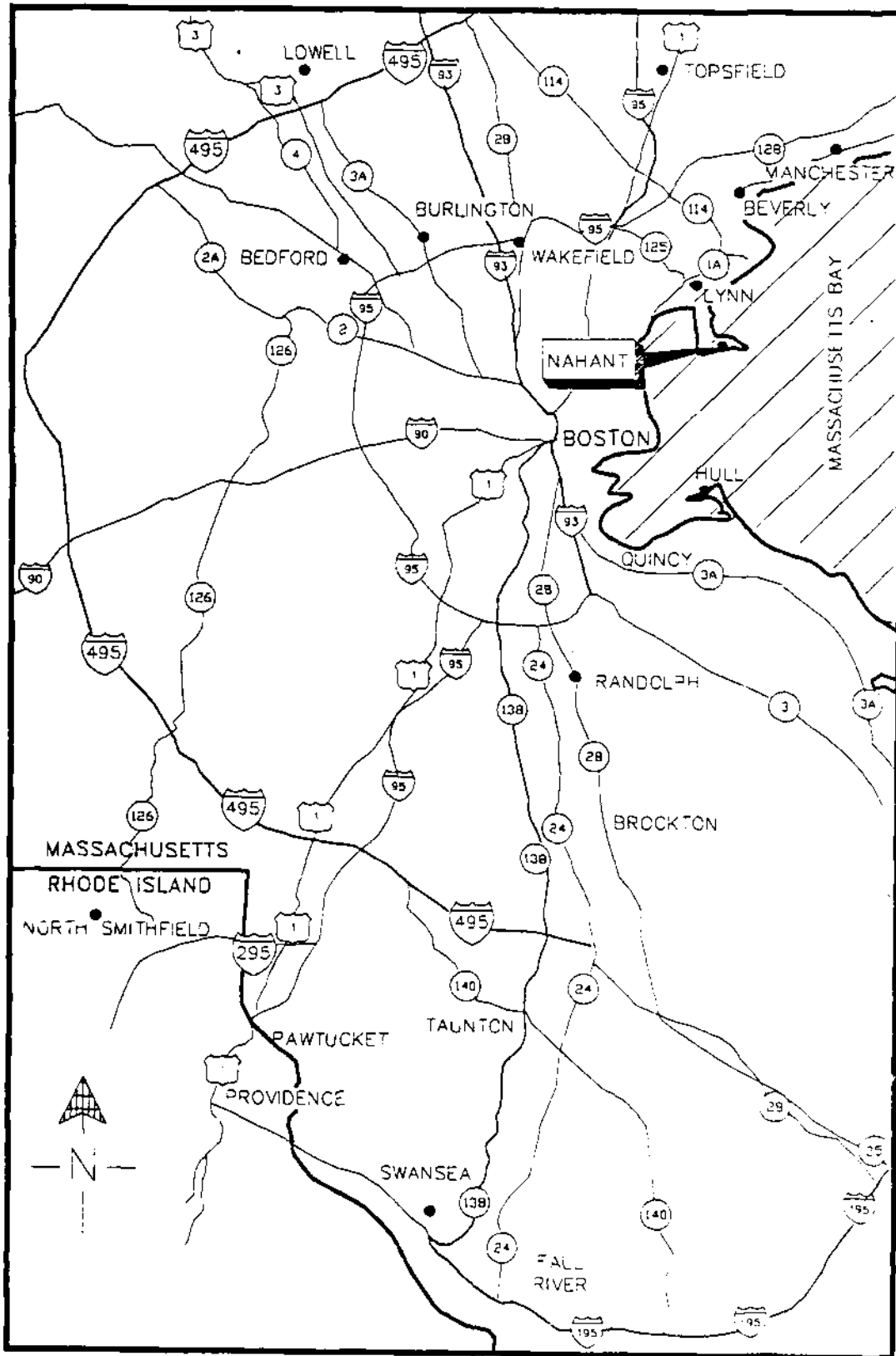
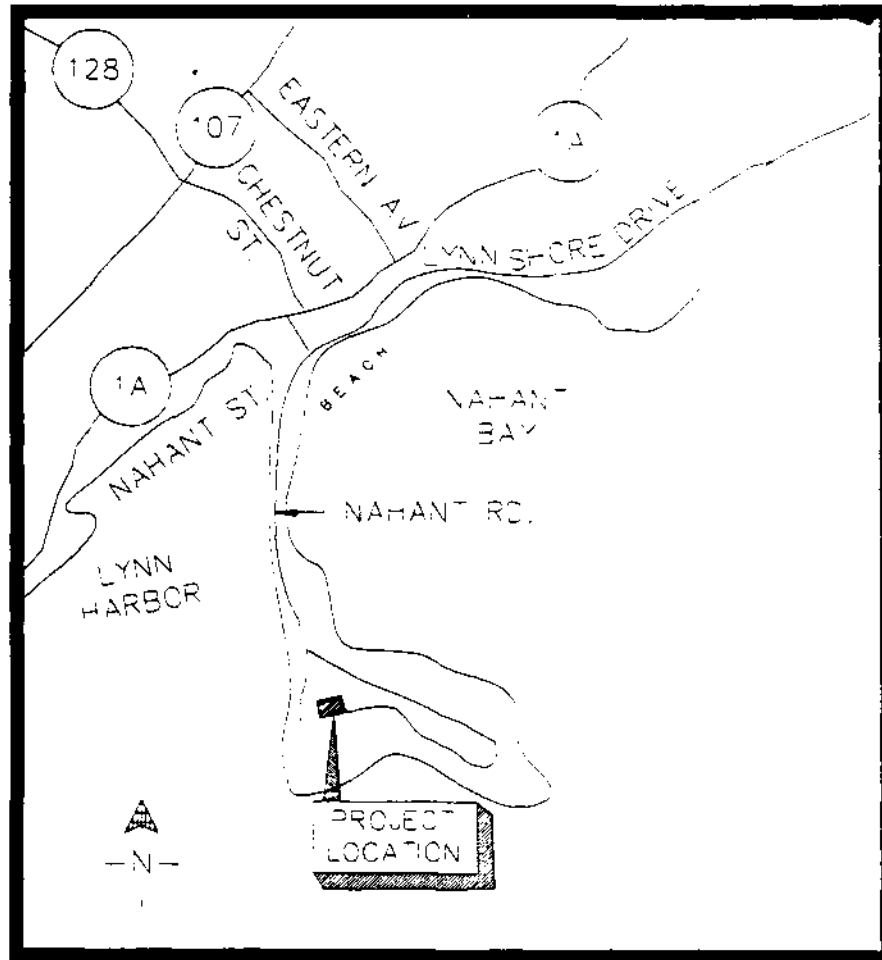


FIGURE 1 Location Map of Massachusetts Army Housing Facilities



**FIGURE 2 Vicinity Map of Nahant Army Housing Units**

#### **Fuel Storage**

Each unit has a 275-gallon underground heating oil tank located behind the house. Glenmark Heating supplies the fuel for the Nahant housing units.<sup>5</sup>

#### **Storm Drainage Systems**

The property is drained by open ditches or surface run-off. The terraced land aids the drainage pathway.

#### **Other Permanent Structures or Property Improvements**

No such structures or improvements exist.

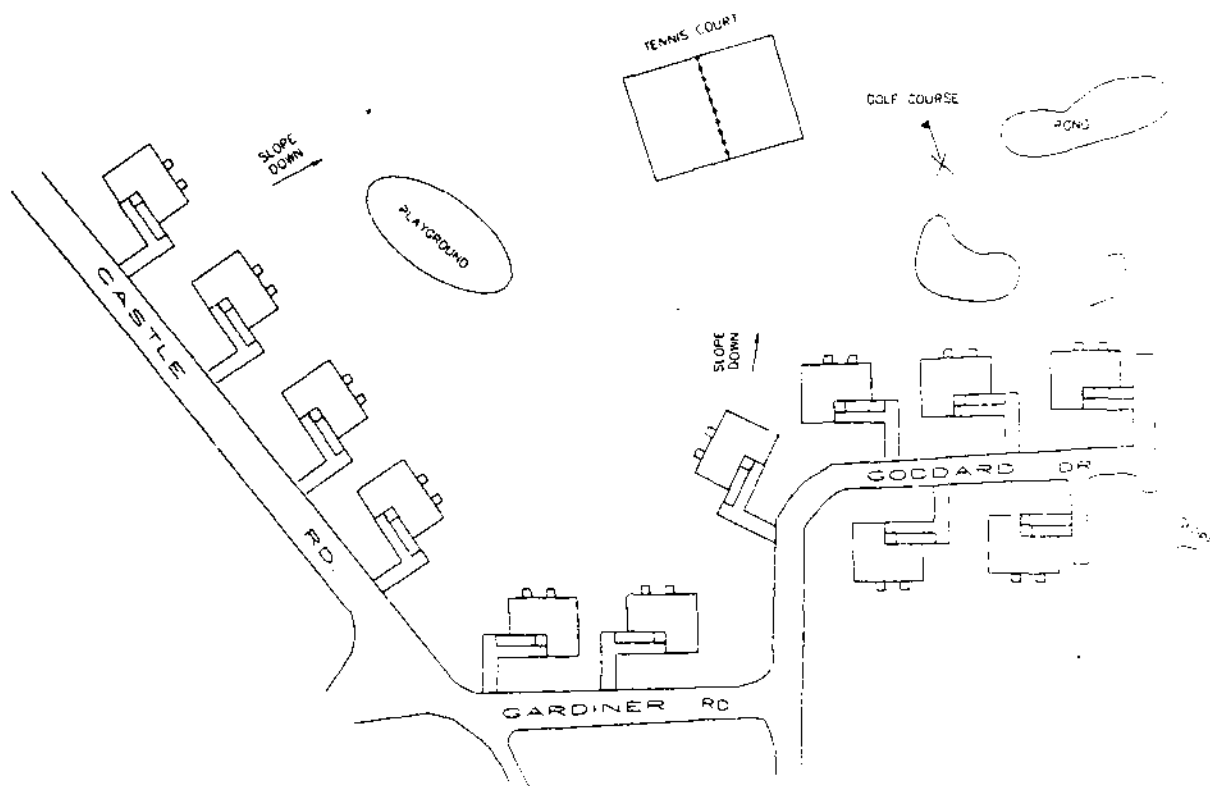


FIGURE 3 Site Plan Map of Nahant Army Housing Units

## 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<sup>6</sup> and the other by the U.S. Army Toxic and Hazardous Materials Agency.<sup>7</sup> 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 Nahant Housing Units

Although this housing area was originally developed to provide family housing for military personnel assigned to the Nike missile battery located in Nahant, Mass., no missile-related wastes have ever been delivered to or managed at this property. Furthermore, the area operated independently of the rest of the battery with respect to water, electrical, and sewer utilities.

The documentation provided to the ANL investigative team indicates that there have been no changes or renovations in the 12 Nahant houses themselves since their original construction in the 1950s. A contract estimate dated September 28, 1987, lists a change from underground tanks to above-ground fuel-storage tanks.<sup>8</sup> The seven other Massachusetts housing units listed on the contract had their tank replacements completed in October 1986. A USATHAMA Property Report in 1988 lists the underground fuel tanks as replaced.<sup>9</sup> Although the site visit to the property found the tanks still underground, the Army Corps of Engineer's office in Waltham, Mass., confirms that fuel oil tanks were indeed replaced at the Nahant housing area in 1986. Local ordinances prohibited installation of above-ground fuel tanks, so the original underground tanks were replaced with new underground tanks. No incidents of tank leaks or soil contamination were reported at the time of tank replacements. Visual inspection of one of the units revealed no insulation surrounding the visible portions of water pipes. It is presumed that similar conditions exist in the remaining housing units.

Real property records indicate that asbestos materials were used in the original housing shingle. An aluminum shingle was installed over the original shingle. It is assumed that this was done for cosmetic reasons and that the original siding was still in good condition and left in place.

## 2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

Nahant, Mass., lies within the New England seaboard lowland, a relatively flat area with a few hills. Nahant was a "common lands" area used for fishing, farming, and woodcutting before its development as a resort town.<sup>4</sup> The 1988 population for Nahant was estimated at 5,000.<sup>9</sup> No known historic sites exist within 2 kilometers of the family housing area.<sup>4</sup> The housing units are situated on the north side of a drumlin overlooking Nahant Harbor to the southeast. Each house sits atop a step-like terrace.<sup>4</sup>

To the north and east of the facility is a low area with small ponds, which may have been a salt marsh before and is now a golf course. The slope from the golf course is

relatively steep (about 30 feet). Behind the houses at the western end, is a playground on a lower terrace.<sup>4</sup> An elementary school is less than a mile from the facilities west border. Across Nahant Bay, in the town of Lynn, heavy industry is present.

## 2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

Nahant is located in the Coastal Drainage Basin of the Seaboard Lowland Section of the New England Physiographic Province. The topography of the area is typified by low, rounded hills rising out of the swampy lowland and by a number of lakes, ponds, and creeks. Lowlands range in elevation from sea-level to approximately 350 feet at the tops of many small rolling hills. Lowlands lack a clearly defined drainage pattern and are poorly drained.<sup>10</sup>

Mean annual temperature is about 50°F. Mean annual precipitation in the area is about 44 inches per year, of which 28 inches evaporates and transpires. Part of the remainder travels overland directly to streams and, during or immediately after storm periods, makes up a large part of the increased streamflow. However, most of the water not evaporated or transpired percolates through the ground to the water table and then moves to streams, where it becomes the major component of annual streamflow. Groundwater discharge may be as much as two-thirds of the average annual runoff and, in unregulated streams, is commonly the sole supply for streamflow during low-flow periods. The 1-year 24-hour rainfall is about 2.5 inches in this area.

Soils of the study area have formed since the retreat of the Wisconsin ice sheet.<sup>11</sup> Soil development reflects the influence of glaciation. Generally, the Paxton-Hollis-Canton and the Canton-Paxton-Merrimac soil associations have formed on the upland hills and ridges that are mantled with glacial till. The Hinckley-Windsor-Much association has formed on glacial outwash deposits and the Dune Land-Tidal Marsh-Beaches association has formed along the coast.

Unconsolidated glaciofluvial deposits of sand and gravel constitute the principal aquifers in the area. A crystalline bedrock aquifer beneath the unconsolidated deposits is of secondary importance. The crystalline-bedrock aquifer consists primarily of igneous and metamorphic rocks, including Dedham grano-diorite of Devonian age, a Pre-Cambrian Marlboro formation, and Carboniferous-age metamorphic rocks. The rocks have been folded, fractured, and faulted. Bedrock exhibits low porosity, specific yield, and hydraulic conductivity. Wells drilled in bedrock for domestic water supplies are commonly 100 to 300 feet deep and generally yield a few gallons per minute.

The unconsolidated deposits are composed of till, stratified drift, wind-laid, wetland, alluvial, and beach and dune sediments. The till is of two types, an upper till and a lower one. Generally, lower till has a high content of silt and clay and is dense, compact, fine-grained, and poorly sorted. Upper till usually contains larger amounts of sand, cobbles, and boulders, a wider range of grain sizes, and is less compact. Both tills are unfavorable for development of municipal water supplies. Stratified drift consisting of glaciofluvial deposit of ice-contact, outwash, and marine sediments overlies most of the till. Ice-contact and outwash deposits are major water-bearing units in the basin. Ice-contact deposits are predominantly sand and gravel, with a small percentage of silt

and clay. Outwash deposits are composed mostly of sand, with small amounts of silt, clay, and gravel. Wetland deposits are found overlying outwash in the lowlands, till in the upland depressions, and tidal flats along the coast. They consist of peat and muck intercalated with silt and sand. Porosity of wetland deposits is large, but the vertical hydraulic conductivity is very low. Wind deposits, alluvium, and beach and dune deposits comprise only a small portion of the basin.<sup>12</sup>

Precipitation is the principal source of recharge to the groundwater aquifer. Direct infiltration of rain and snow melt into outcrops of outwash, ice-contact, and wetland deposits acts as the primary recharge mechanism; because of low hydraulic conductivity and steeper slopes, recharge through till and bedrock outcrops is minimal. Discharge of groundwater in the basin is mainly from well pumping, evapotranspiration, and seepage to ponds, springs, wetlands, and streams. Water-table levels are generally highest in the late winter and spring and lowest in the late summer and fall.

Water supply in Nahant comes from the Metropolitan District Commission. The total water use in the Nahant was about 149 million gallons in 1974.<sup>12</sup>

### 3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

Because the Nahant housing area has always been used for that purpose, without any industrial activity, no environmentally significant operations occur there. No hazardous waste or hazardous materials are stored on the property. No landfills exist at the facility.

One concern came from discovering that the facility still uses underground storage tanks. The filler pipe caps for a number of tanks were missing, allowing precipitation and surface run-off to enter the tanks.

A second concern is the accumulated trash at the bottom of the facility's western border, below the playground terrace. The residents had assembled to clean up their property, and the majority of the large amount of trash was put in garbage bags and piled in one area. This pile of refuse rests on land owned by the city. It is unknown if any environmental impacts result from the waste pile.

#### 4 KNOWN AND SUSPECTED RELEASES

Because of the nature of the housing facility, no major releases or impacts on the environment have occurred at Nahant. No hazardous wastes or hazardous materials are stored on-site, and no evidence of contamination from housing activities has been documented.

No records suggest any leakage from the underground tanks. The fill pipes are about 1-1/2 inches above ground, and some of the caps are missing. Thus, excessive amounts of precipitation or surface run-off entering these tanks can cause displacement of fuel oils. However, there have been no reports of such incidents occurring, and none of the areas surrounding the filler pipes show evidence of fuel-oil contamination.

Although it is very unlikely that any of the miscellaneous trash heaped below the playground area poses a serious environmental threat, this situation is a potential health threat to the children who play in the area.

## 5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although these housing units were originally developed in support of a Nike missile battery, all available documentation and circumstantial evidence support the conclusion that this housing property was completely independent of the Nike battery's operational activities.

A 1988 report indicates that the original heating oil tanks installed at each unit had been removed and replaced in 1986 with above-ground tanks. Instead, however, the original underground tanks were replaced with new underground tanks. Because of their age, these tanks are presumed to be in good condition. However, missing filler pipe caps for a number of the tanks invite rain-water infiltration (especially since many of the filler pipes are at or near grade) and the subsequent displacement of stored fuels from the tanks. Filler pipe caps need to be replaced and kept in good condition.

## 6 RECOMMENDATIONS

The Nahant housing facility does not present an imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions are warranted for this site. Nevertheless, environmental impacts from this property have been identified, and two remedial actions are ultimately warranted.

First, it is recommended that missing caps for the filler pipes of the newly replaced underground fuel storage tanks be replaced as soon as possible.

Second, because of the possible health hazard to children playing in the area, the accumulated trash adjacent to the playground area should be removed and disposed of properly.

The recommendations assume this property will most likely continue to be used for residential housing.



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**APPENDIX:**  
**PHOTOGRAPHS OF NAHANT HOUSING FACILITY  
AND SURROUNDING LAND**

## NAHANT, MASSACHUSETTS

(All photographs for this housing area were taken 5/16/89.)

Page 1:

Upper left-hand photo: Land surrounding the housing area, including golf course, private residence, and Massachusetts Bay.

Upper right-hand photo: Underground storage tank's fill pipe at the rear of a house.

Lower left-hand photo: A typical MCA-model house on the relatively flat land of the surrounding area.

Lower right-hand photo: A typical row of MCA-style houses found at the housing area.

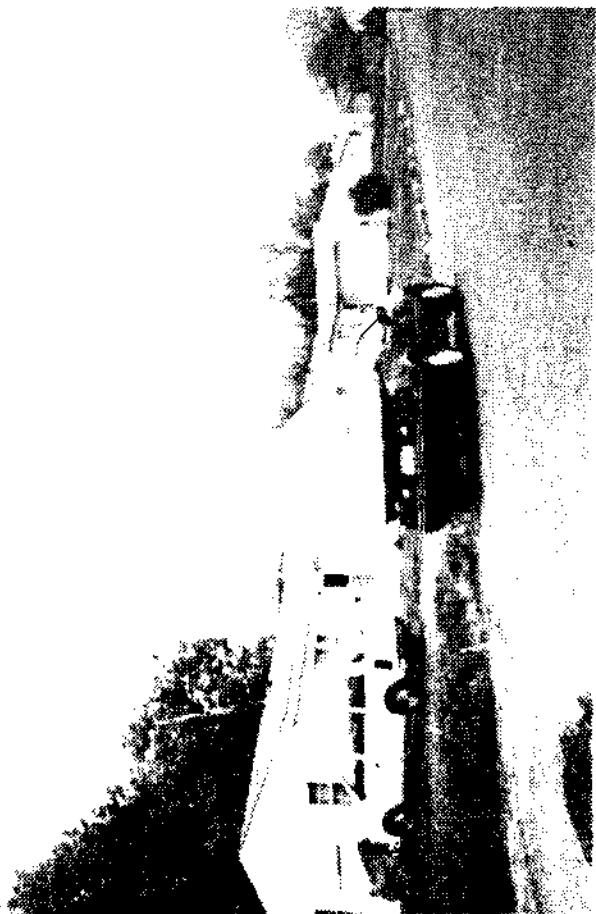
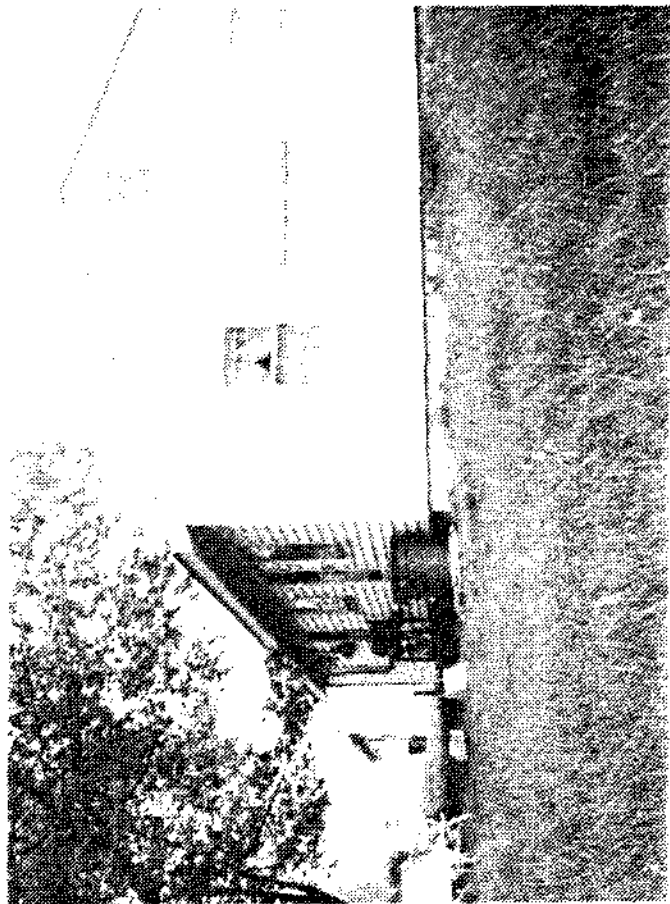
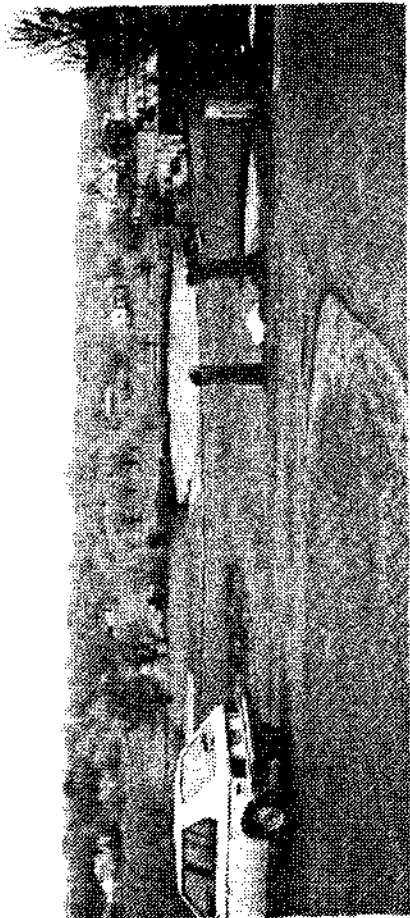
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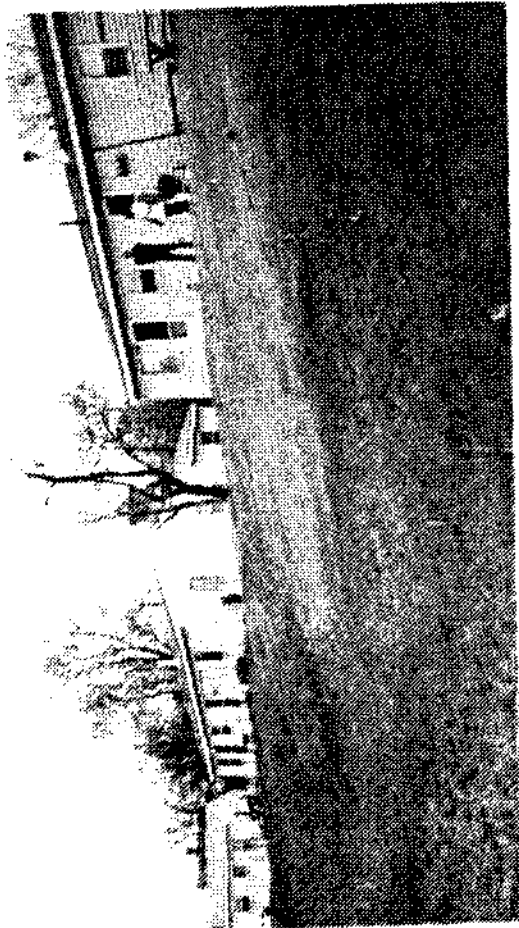
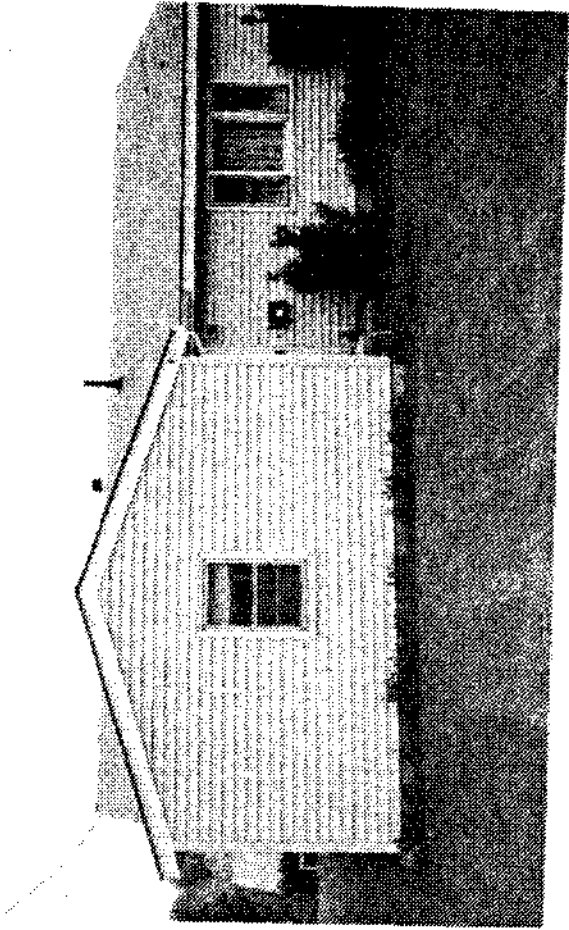
Upper left-hand photo: Frontal view of a typical MCA-style house found at this housing area.

Upper right-hand photo: Land surrounding the housing area, including a school, golf course, and private residence.

Lower left-hand photo: Land sloping steeply downward to the playground area.

Lower right-hand photo: The miscellaneous garbage pile at the northeast corner of the housing area.







Upper Left-hand Photo

Upper Right-hand Photo

Lower Left-hand Photo

Lower Right-hand Photo