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U.S. Army Toxic and Hazardous Materials Agency

## Enhanced Preliminary Assessment Report:

### Hull Army Housing Units Hull, 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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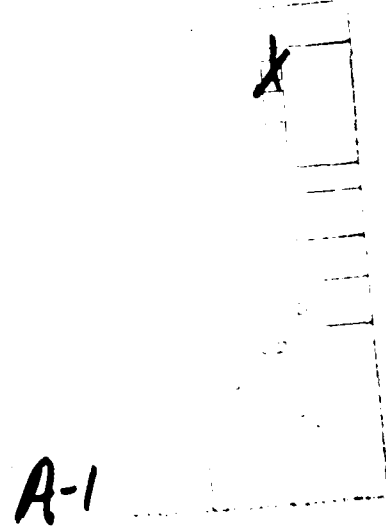
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**Enhanced Preliminary  
Assessment Report:  
Hull Army Housing Units  
Hull, Massachusetts**

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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## CONTENTS

SUMMARY .....	1
1 INTRODUCTION .....	3
1.1 Authority for the PA .....	3
1.2 Objectives .....	4
1.3 Procedures .....	5
2 PROPERTY CHARACTERIZATION .....	6
2.1 General Property Information .....	6
2.2 Description of Facility .....	6
2.3 Property History .....	10
2.3.1 Nike Defense Program and Typical Battery-Level Practices .....	10
2.3.2 Hull Housing Units .....	11
2.4 Environmental Setting and Surrounding Land Use .....	12
2.5 Geologic and Hydrologic Settings .....	12
3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS .....	14
4 KNOWN AND SUSPECTED RELEASES .....	15
5 PRELIMINARY ASSESSMENT CONCLUSIONS .....	16
6 RECOMMENDATIONS .....	17
REFERENCES .....	18
APPENDIX: Photographs of Hull Housing Facility and Surrounding Land .....	19

## FIGURES

1 Location Map of Massachusetts Army Housing Facilities .....	7
2 Vicinity Map of Hull Army Housing Units .....	8
3 Site Plan Map of Hull Army Housing Units .....	9



## SUMMARY

The Hull housing facility located in Hull, Mass., presents no imminent or substantial threat to human health or the environment.

Originally developed as a housing area associated with a Nike missile battery located in Hull, Mass., the property inherited no wastes associated with the operation and maintenance of the missile-launch and tracking systems. No evidence suggests that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions are therefore warranted for the site.

Storm drainage is hindered by poorly maintained catch basins, which at the time of inspection were filled with gravel and landscaping debris. Household garbage has been dumped on private property adjacent to the west side of the housing area. Garbage has also been dumped down the hillside behind condominiums located on private property south of the housing. Water pipe insulation inside each of the two units inspected was badly deteriorated and may contain asbestos.

Three actions are recommended prior to release of this property:

- Clean out all storm drains, removing debris hindering proper flow.
- Remove accumulated trash from behind the houses.
- Remediate any deteriorating pipe insulation that may contain asbestos.

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 Hull 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 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 Hull, 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 Hull, Mass., on May 19, 1989, at which time additional information was obtained through personal observations of ANL investigators. ANL investigators revisited the site on August 3, 1989, at which time the interiors of two units (1155 and 1159 Nantasket Ave.) were inspected for the possible presence and condition of asbestos-containing insulation materials. 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.

## 2 PROPERTY CHARACTERIZATION

### 2.1 GENERAL PROPERTY INFORMATION

Hull family housing units are located on a land parcel of 1.86 acres in the town of Hull, county of Plymouth, in east-central Massachusetts. Hull had an estimated population in 1988 of 7,000.<sup>2</sup>

Routine maintenance of the facility is the responsibility of the Directorate of Engineering and Housing, Fort Devens, Mass. 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.

#### Housing Units

The Hull family housing facility, built in 1958, consists of eight "capehart" style houses situated along Stony Beach on Nantasket Avenue, in Hull, 0.1 kilometer from Massachusetts Bay.

"Capehart" is the model name assigned to these houses by the builder, National Homes. The capehart style houses include three bedrooms and a family unit, with carport and storage room. The houses are built on concrete slabs with walls of wood frame and asbestos shingle.<sup>3</sup> Water lines and air conditioning ducts are imbedded in the foundation slab.

#### Utilities

The facility uses the town sewer system. Storm drains pass through the property behind the houses. Earlier reports indicate abandoned water and sewer lines also cross the rear of the property; there is no additional documentation regarding these lines, however.<sup>3</sup> Maintenance personnel could add no information regarding these lines. The facility receives municipal city power, with all poles, overhead lines, and transformer boxes owned the city of Hull. Locations of nearby municipal or private drinking water wells are not known. Solid wastes (garbage) are collected by a local contractor for disposal off-site.

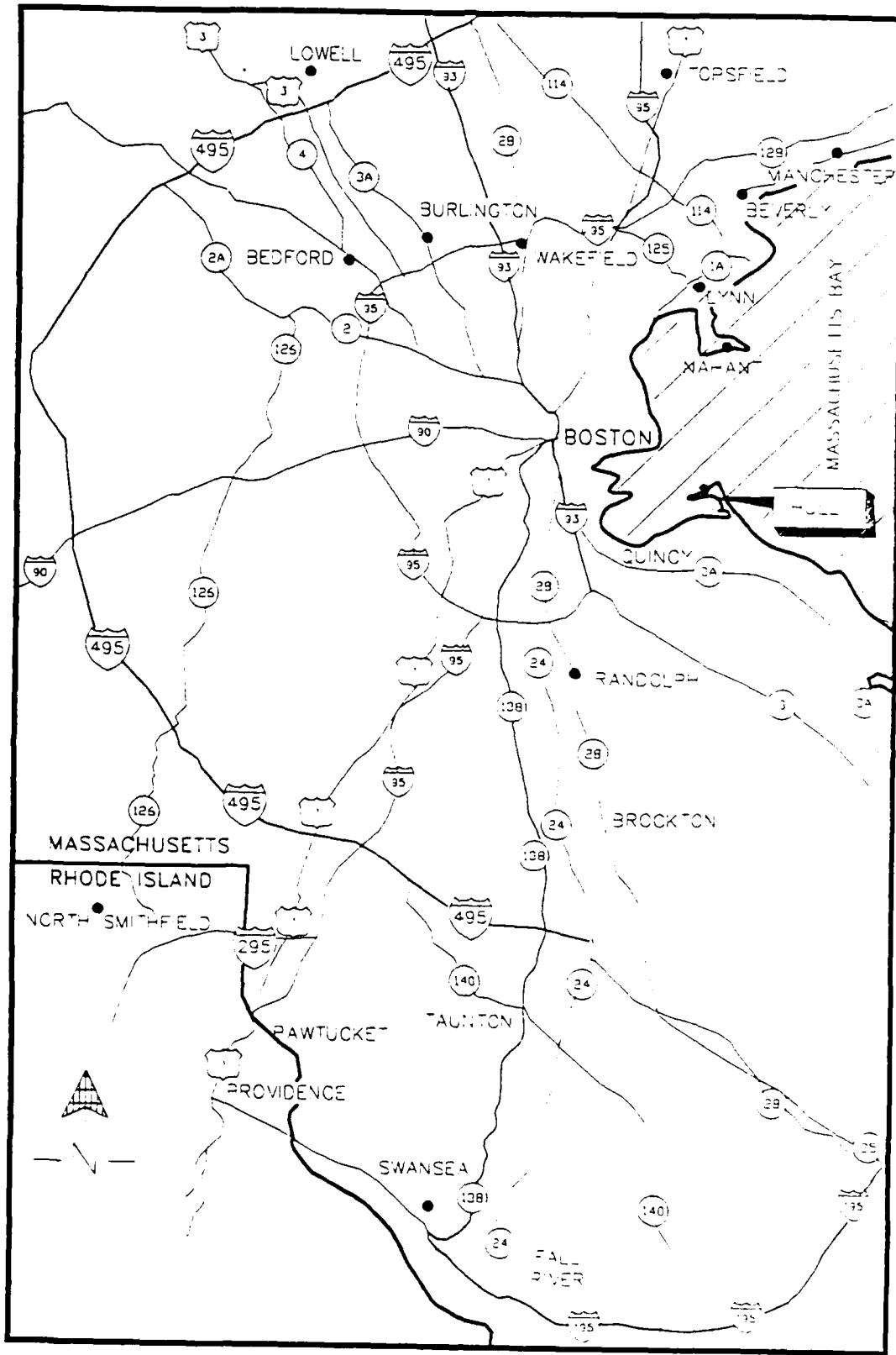
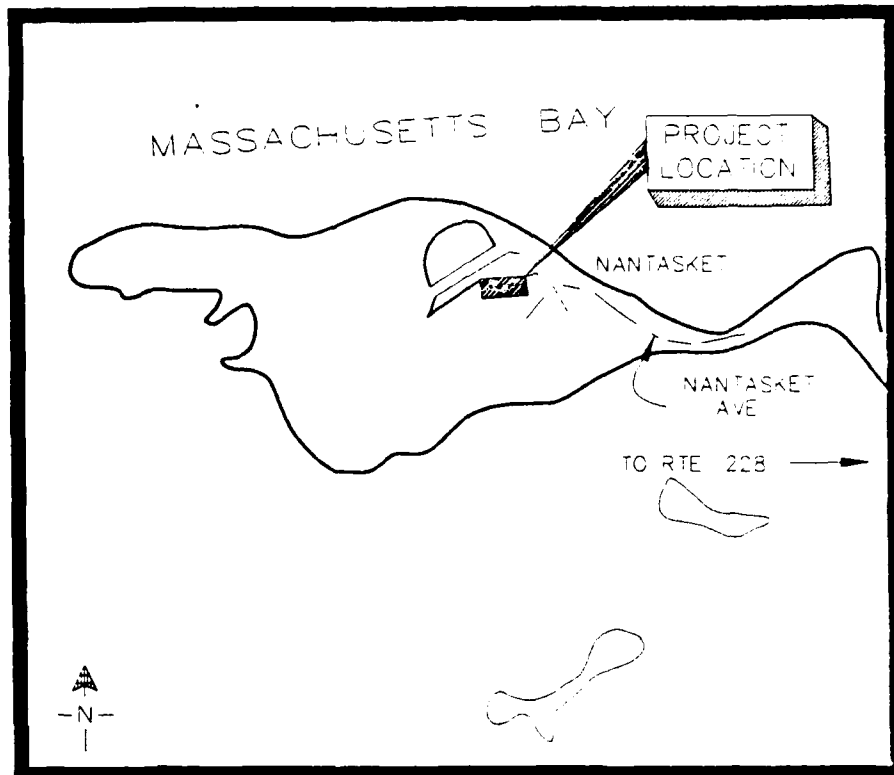


FIGURE 1 Location Map of Massachusetts Army Housing Facilities



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

#### **Sewage**

Sanitary service is provided by the city of Hull. No septic tanks or leach fields exist on the property.

#### **Fuel Storage**

In October 1986, after all underground fuel oil tanks for the housing units had been removed, new 275-gallon above-ground tanks were installed at the rear of each of the houses.<sup>4</sup> There is no record of any prior environmental problem associated with the underground tanks. No leakage has been reported. However, no soil tests were made at the time of tank removals. A local contractor scrapped the old steel underground tanks in July 1986.<sup>5</sup> The Refrigerated Air Co. retains the heating maintenance contract for the Hull housing facility and is responsible for fuel oil deliveries as well.<sup>6</sup>

#### **Storm Drainage Systems**

The property is drained by open ditches and culverts to Massachusetts Bay.

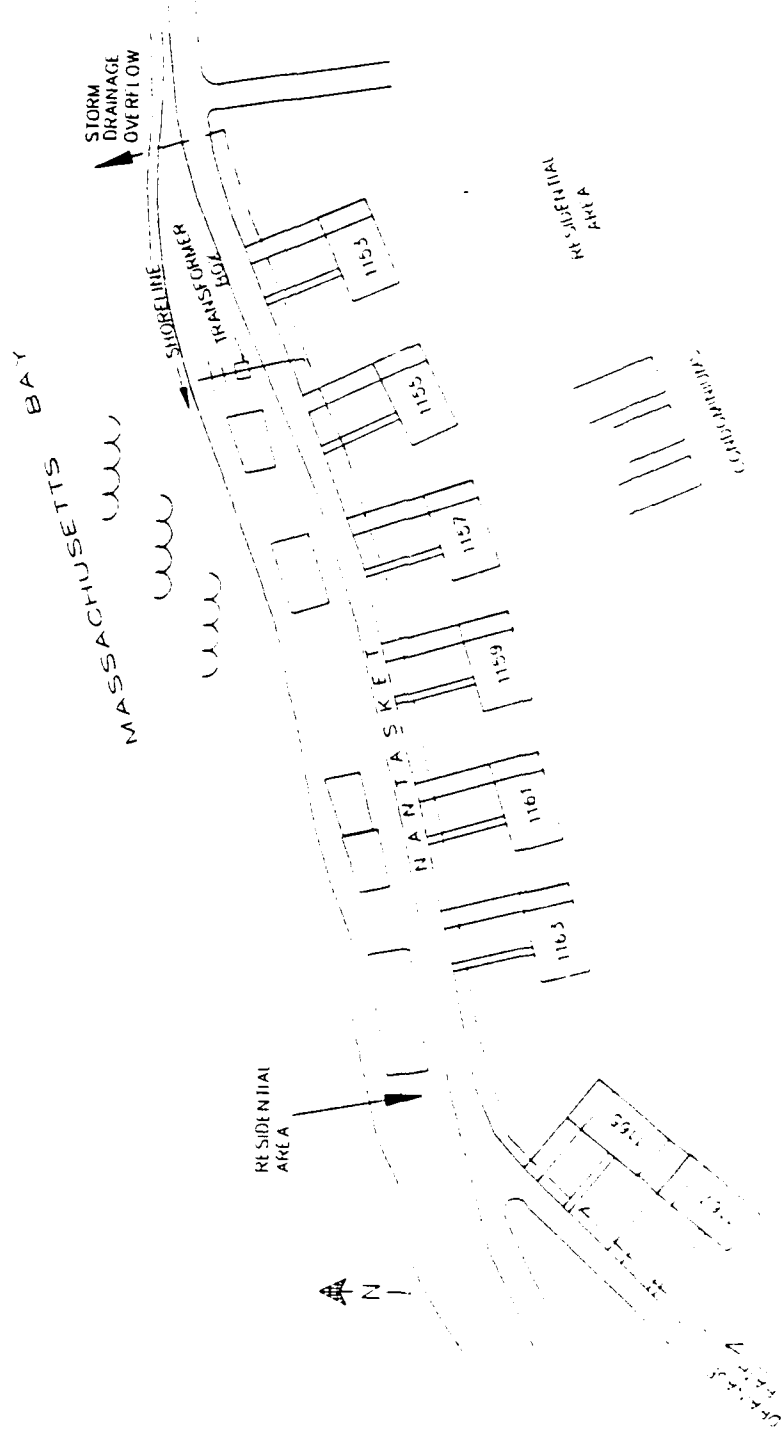


FIGURE 3 Site Plan Map of Hull Army Housing Units

SCALE  
1" = 20'

## Other Permanent Structures or Property Improvements

No such structures or improvements exist.

## 2.3 PROPERTY HISTORY

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

Generic information on the national Nike anti-aircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers<sup>7</sup> and the other by the U.S. Army Toxic and Hazardous Materials Agency.<sup>8</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 Nike 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 launch 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 Hull Housing Units

Constructed in 1958, the eight capehart houses consist of two different styles of front window, but nothing suggests that the eight differed in their original construction. One housing unit, #1153, next to Duck Lane, has an indentation in the front siding to accommodate the surfacing of an underground fill pipe. None of the other housing units has this indentation, which suggests this house had a later addition built, although no confirming records were found. No documentation indicates any Nike-related wastes were delivered to or managed at the Hull housing area. Furthermore, this housing area operated independently of the Nike battery with respect to utilities.

The site investigation revealed that vinyl siding was installed over the original asbestos siding of each house. The date of this action is not documented, but the Fort Devens Area Engineer's Office, Brockton, Mass., confirmed that this happened. It is

assumed that the siding was added for cosmetic reasons and that the original siding was still in good condition and left in place.

Since the initial property development in 1958, no other permanent structures have been added, and none of the original structures has been razed. Renovations include installation of smoke and heat detectors in February 1979.<sup>3</sup>

#### 2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

A recreational suburban seacoast community, Hull developed from a small fishing town in the 18th and 19th centuries. The relatively flat area contains sandy and gravelly soils. The only significant elevations are glacial drumlins.<sup>9</sup> Two historic sites are within 2 kilometers of the facility, Telegraph Hill and the Point Allerton Lifesaving Station, both listed by the National Register of Historic Places.<sup>9</sup>

The facility occupies graded and terraced land bounded by condominium complexes to the north and south, an undeveloped lot to the west, and a private road to the east.<sup>9</sup>

#### 2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

Hull is located in the Neponet River Basin of the Massachusetts-Rhode Island coastal region 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 48 inches per year, of which 28 inches evaporates. 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. The crystalline bedrock aquifer beneath the unconsolidated deposits is of secondary importance.

The crystalline-bedrock aquifer consists primarily of igneous and metamorphic rocks, including the Dedham grano-diorite of Devonian age, the 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.

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.

### 3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

Because of the nature of this facility, no environmentally significant operations exist. The facility has always functioned as a housing area, and no industrial operations took place here. No hazardous waste or hazardous materials are stored on the property. No landfills exist on the property. Three items of concern are noted below.

First, the drainage pathway runs downslope, west to east, along Nantasket Ave., and empties into the ocean. This is aided by the graded land sloping toward the east and the location of each house on a step-like terrace. The first storm drain in this pathway, in front of unit #1165, was discovered full of gravel. This obstruction hinders proper drainage.

Second, the condominium complex behind the housing facility, to the south, has built a rock wall, which is littered with miscellaneous debris. The rock wall backs up to the housing facility's property line and provides easy access for condominium garbage to flow into the housing area. Although this debris appears to be household trash, the area needs better policing to prevent future unauthorized dumping. Similarly, household trash has been dumped on vacant land west of the housing area. Material now present in both locations should be removed and disposed in an acceptable fashion.

Third, inspection of the interiors of two of the units on August 3, 1989, revealed badly deteriorating insulation on water pipes in the utility rooms of both houses. This insulation, which may contain asbestos, should be removed and replaced. It is assumed that insulations in the remaining units are in a similar state of deterioration.

#### 4 KNOWN AND SUSPECTED RELEASES

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

The condominium neighbors to the south of the facility have disposed of miscellaneous trash and waste on a rock wall sloping down to the housing property. Household trash has also been dumped on vacant land west of the housing area. Although none of this debris is expected to have the potential for serious environmental impacts, such unauthorized dumping should be discontinued.

Badly deteriorated water pipe insulation may contain asbestos, which may have been released to the inside air space of the units.

## 5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although the Hull 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.

Real property records indicate asbestos-containing materials were used in the original siding of the housing units, but those records give no indication of asbestos-containing materials being used in the interiors of the units. However, visual inspections on August 3, 1989, suggest that pipe insulation in the utility rooms of the units may contain asbestos. The insulation in both units inspected was badly deteriorated.

Household trash which has been discarded along the south and west property boundaries poses no serious environmental threat, but such practices may constitute health and nuisance problems.

Poorly maintained storm drains on the property hinder rapid precipitation run-off and may invite local flooding during and after significant precipitation.

## 6 RECOMMENDATIONS

The Hull housing facility presents no 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.

Three actions are recommended, however, prior to exessing the property.

- All storm drains should be cleaned out, and any material blocking the proper flow of drainage should be disposed of. This might be the responsibility of the town of Hull, since the facility has a license from the town for drainage across Nantasket Ave.<sup>12</sup> The appropriate individual should be contacted and alerted about the problem.
- Solid wastes accumulated behind the housing units should be removed and properly disposed.
- Finally, deteriorating water pipe insulations in the utility rooms of the units should be removed. Such action should be preceded by a determination of whether this insulation contains asbestos, and the removal should be conducted in accordance with accepted practice if this is found to be the case.

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

Upper Left-hand Photo

Upper Right-hand Photo

Lower Left-hand Photo

Lower Right-hand Photo

## HULL, MASSACHUSETTS

(All photographs for this housing area were taken 5/19/89.)

### Page 1:

Upper left-hand photo:  
Storm drainage overflow to Massachusetts Bay.

Upper right-hand photo:  
View east along Nantasket Ave.

Lower left-hand photo:  
Hillside between housing units and condominiums.

Lower right-hand photo:  
Rear view of house with 275-gallon aboveground heating oil tank.

### Page 2:

Upper left-hand photo:  
Shoreline north of housing units.

Upper right-hand photo:  
Capehart house on terrace.

Lower left-hand photo:  
View west along Nantasket Ave.

Lower right-hand photo:  
Land surrounding housing unit area.

## HULL, MASSACHUSETTS

(All photographs for this housing area were taken 5/19/89.)

### Page 3:

Upper left-hand photo:  
View northeast from housing units.

Upper right-hand photo:  
Housing units in front of Island View Condominiums.

Lower left-hand photo:  
Housing units terraced along Nantasket Ave.

Lower right-hand photo:  
View west along Nantasket Ave.

### Page 4:

Upper left-hand photo:  
Front view of a typical housing unit.

Upper right-hand photo:  
Front view of new siding and window casements.

Lower left-hand photo:  
Front view of typical housing unit showing carport.

Lower right-hand photo:  
Front view of new siding and window casements.

### Page 5:

Upper left-hand photo:  
Housing units terraced along Nantasket Ave.

Lower right-hand photo:  
Front view of new siding and window casements.

