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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Tappan Army Housing Units Tappan, New York

November 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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Argonne National Laboratory has conducted an enhanced preliminary assessment of the Army housing property located in Tappan, NY. 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 Tappan housing facility does not present an imminent or substantial threat to human health or the environment. There is no evidence that hazardous or toxic materials have been released from the property. Therefore, no immediate remedial actions are warranted.

Although these housing units were originally developed in support of a Nike missile battery, documentation indicates that the housing property was wholly independent of the battery's operational activities. There is no documentation that Nike-related wastes were delivered to this property for management or disposal. However, a few hundred feet north of the housing property is the Tappan Army Reserve Center, formerly the battalion headquarters for Nike batteries in the general area. Vehicle maintenance activities for the Nike sites was formerly conducted here, and these activities are still carried out at the center. There is no documentation of release of hazardous constituents from that property.

Appropriate Army housing authorities have begun actions to address potential problems with asbestos and radon at the housing area. These actions should continue to completion.

Prior to the release of this property, each of the 12 on-site electrical transformers should be sampled for the presence of PCBs and the transformers labeled appropriately.

These recommendations assume that the 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 Tappan 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 near Tappan, New York.

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 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 at Fort Hamilton, N.Y., on August 7, 1989.[2,3] A site visit was conducted at the Tappan housing area near Tappan, N.Y., on August 10, 1989, at which time some of the unit interiors were inspected and additional information was obtained through personal observations of ANL investigators.[3] 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.

ANL investigators revisited the property on September 8, 1989, at which time the interiors of the remaining units were inspected. Additional information was obtained from a visit to the nearby Tappan Army Reserve Center, at which time information was provided by the shop foreman and local housing supervisor.[3]

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 military housing inspector stationed at Fort Hamilton in Brooklyn, N.Y.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

The Tappan military housing area is located on Western Highway in Rockland County in southeastern New York, approximately one mile north of Tappan and two miles south of Orangeburg. The property consists of 22.75 acres and 36 single-story residential buildings. North of the housing area is a 6-acre residential property. Beyond this is a 6-acre U.S. Army Reserve Center. The minimal distance between the housing property and the Reserve Center property is about 200 feet. The Army Reserve Center was originally developed as battalion headquarters for the former Nike missile battery and its sister batteries.

The former missile-launch area was located about one-half mile northeast, with the former fire-control area approximately 1 mile further northeast. Except for the Reserve Center property, land use surrounding the Tappan military housing area is predominantly residential. Orangetown, a small metropolitan area encompassing both Tappan and Orangeburg, has an estimated population in excess of 15,000.

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

The family housing units, now administered through Fort Hamilton, were constructed in the late 1950s.[2] No additional major construction has taken place on the property since that time. The buildings are occupied at full capacity by active-duty military personnel assigned primarily to recruiting duties in the area.[4]

2.2 DESCRIPTION OF FACILITY

Figure 3 presents the site plan of the housing property.

Housing Units

The Tappan housing area consists of 36 three-bedroom, "Capehart"-style homes. Capehart is the model name given to these houses by the builder, National Homes. Each has a living/dining room, kitchen, and utility or storage room. All units have one and one-half bathrooms.[5] A recent major fire inside unit #401 destroyed the interior.[3] It is not occupied. There are no plans for repair, although the building has not been razed.

Renovations to the homes include replacement of the roofs in 1982-1983, the addition of aluminum siding in 1985, and the replacement of existing furnaces with new oil-fired furnaces in 1986.[3]

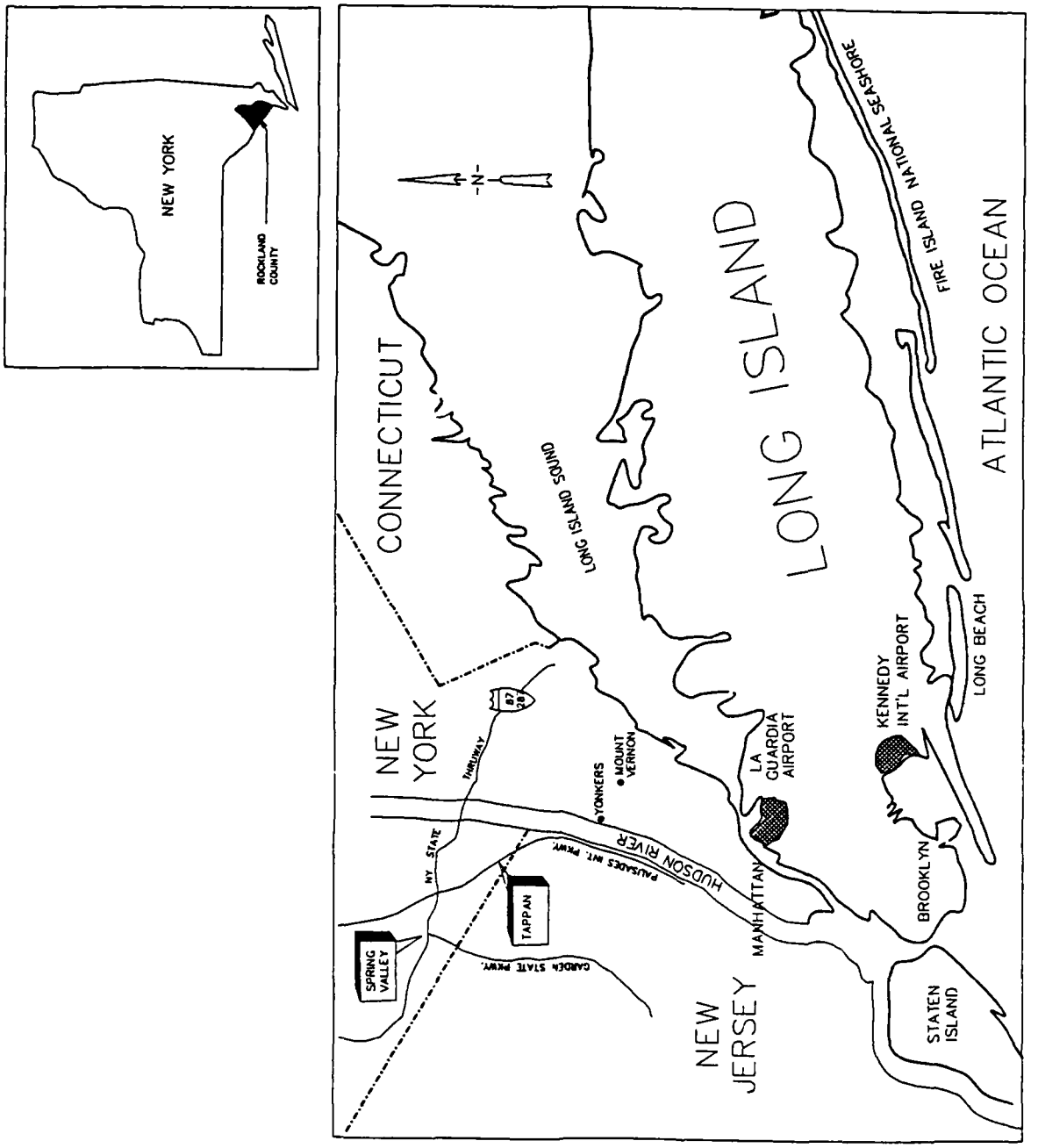

FIGURE 1 Location Map of Tappan Army Housing Facilities

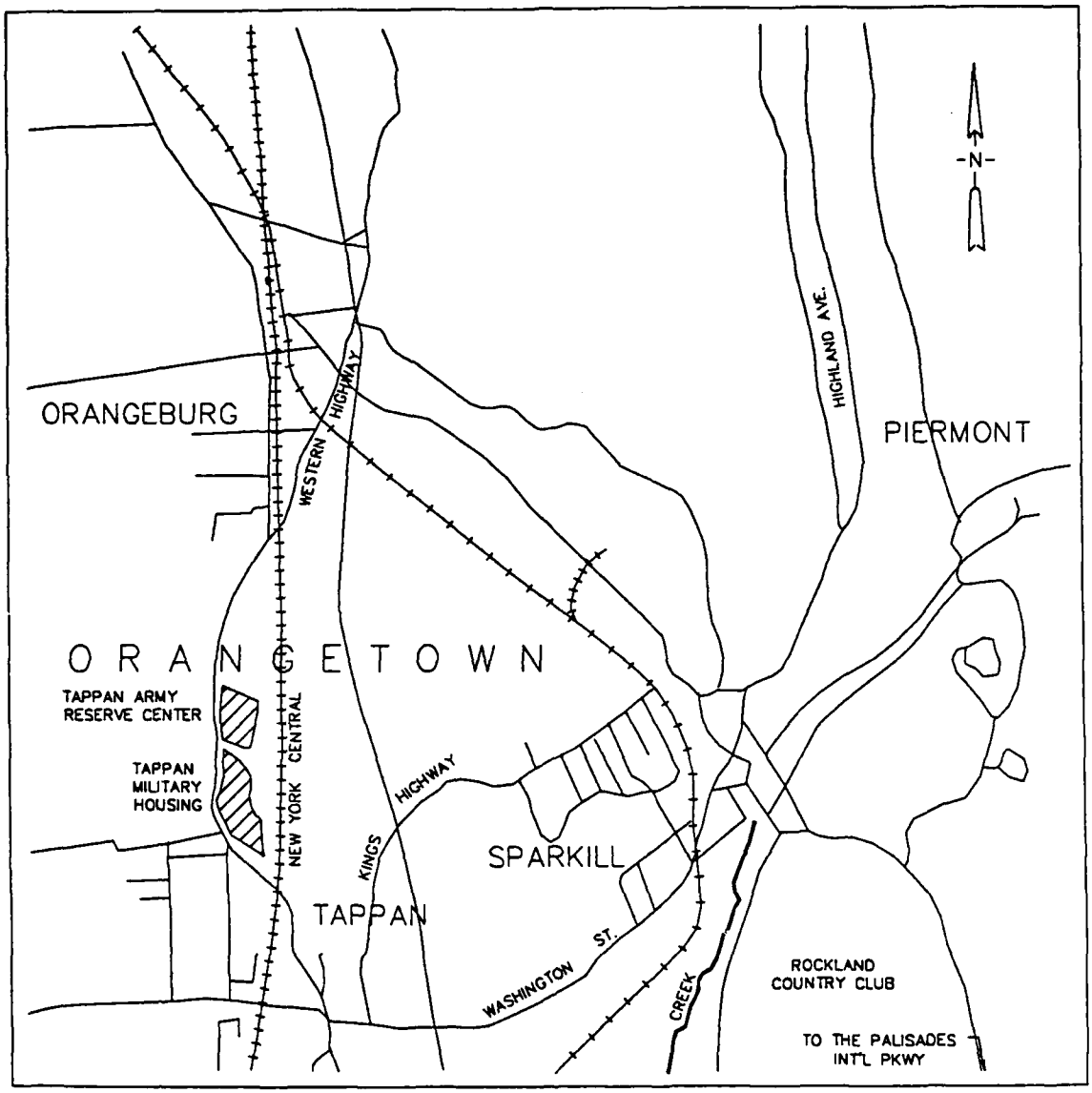

FIGURE 2 Vicinity Map of Tappan Army Housing Units

Utilities

Since development of the property, the housing units have been supplied with city water; no drinking water wells exist on the property. Also, gas for cooking and hot water is provided through the city distribution network.[3] The property receives electricity from Orange and Rockland Utilities, Incorporated. However, the lines and transformer equipment are owned by the Army and maintained by the nearby Tappan Army Reserve Center, Facility Engineer Shop.[6] Solid waste is removed by the local disposal service under contract with nearby Tappan.

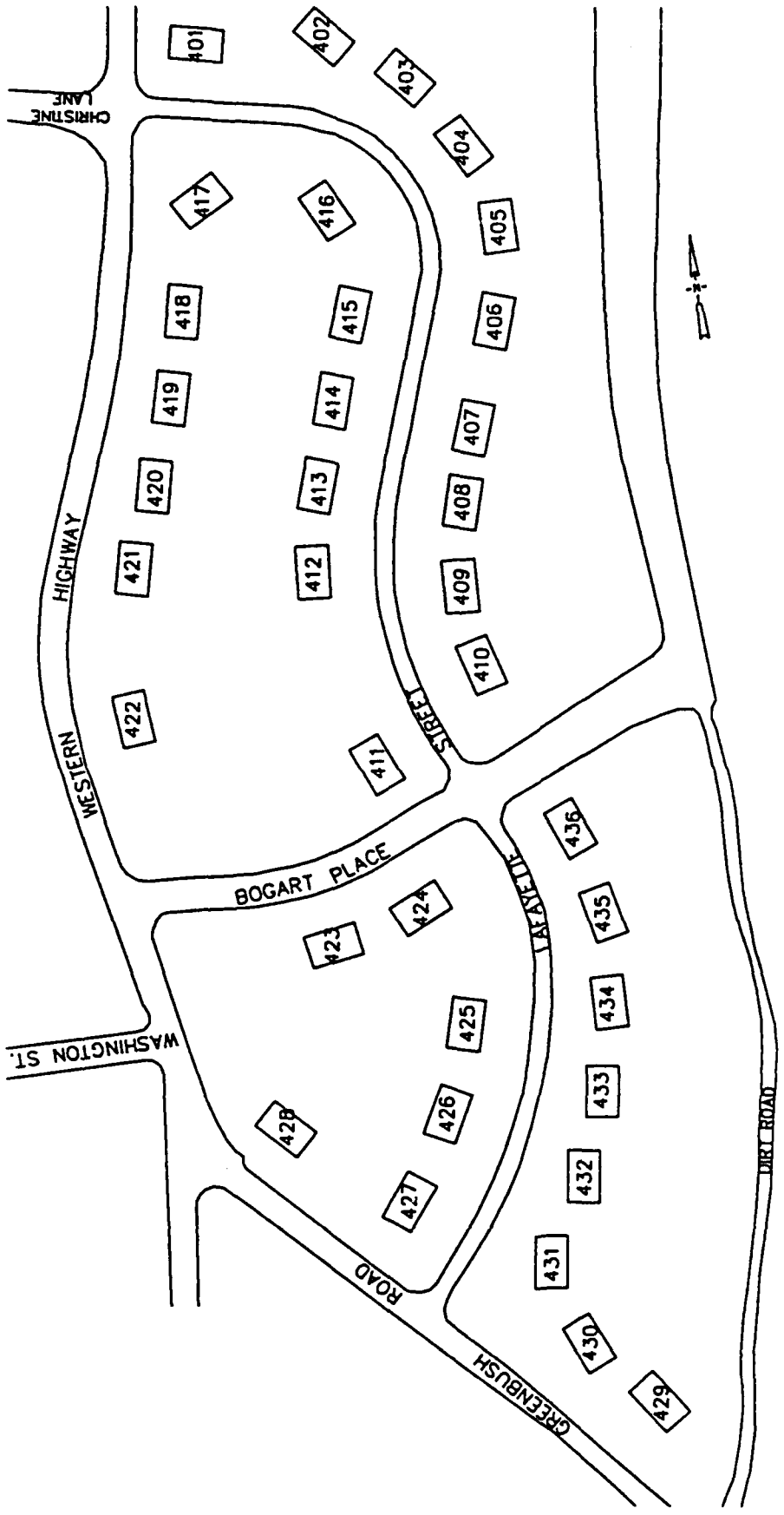

FIGURE 3 Site Plan Map of Tappan Military Housing Units

Sewage

The housing complex is linked to the Orange County Sanitary Sewage District through the local Town of Orange Sewage Department.[5] No on-site sewage treatment has ever been performed.[3]

Fuel Storage

Each home has an underground storage tank that holds 550 gallons of heating oil.[3,7] The underground storage tanks are located in the rear of each home. In the late 1970s, six of the housing units had their original underground storage tanks replaced with new, steel tanks. Then, in 1986, the remaining 30 housing units received replacement fiberglass tanks. The six housing units with the steel tanks are units #405, 417, 419, 420, 430, and 436.[3] There was no documentation of leaks from any of the original tanks. Instead, their replacement was a matter of good engineering practice, dictated by the tanks' advancing ages. There is no documentation of releases from any of the current tanks.

Storm Drainage System

Drainage problems are minimal. The property is relatively flat with a gentle slope toward the east. A well-developed road network directs much of the rainfall runoff.[4] Storm drainage for the region is directed toward Sparkill Creek, approximately one mile east of the housing property, which flows toward the Hudson River.[8]

Other Permanent Structures or Property Improvements

Building 400, a small, windowless, locked structure at the intersection of Western Highway and Lafayette Street, houses the gas meter for the property.

2.3 PROPERTY HISTORY

2.3.1 Camp Shanks Military Reservation

Acreage around what is now the Tappan military housing area and the nearby Tappan Army Reserve Center was acquired in 1943 by the Department of the Army for the World War II (WWII) Camp Shanks Military Reservation. The WWII facility was constructed in and around the area now occupied by the Reserve Center. The Department of the Army held jurisdiction over the property only until August 1946, at which time the property was declared to be surplus and transferred to the U.S. General Services Administration.[9] Land to the east of the housing and Reserve Center properties, which included two air landing strips and a helicopter pad constructed for the WWII facility, was sold to the New York Central Railroad (now a part of Conrail) to serve as a buffer zone between the railroad and the remaining military facilities.[4] Then, in

preparation for the start of the Nike missile program, the remaining property, approximately 30 acres, was transferred back to the Department of the Army in December 1959.[9]

2.3.2 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[10] and the other by the U.S. Army Toxic and Hazardous Materials Agency.[11] 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.

2.3.3 Tappan Military Housing

The Tappan military housing area was developed in the late 1950s to provide housing for military personnel assigned to the Nike missile site. Fort Hamilton assumed responsibility for the property in 1969.[12] Since decommissioning of the Nike battery in 1969, these buildings have been occupied by the families of active-duty military personnel assigned primarily to recruiting duties in the area. Housing occupancy is at capacity. One unit (#401) is unusable because of fire damage. Except for periodic renovations, no other permanent structures have been added.[3,4]

The nearby Army Reserve Center originally served as battalion headquarters for this and other Nike batteries. Figure 4 shows the relative locations of the battalion headquarters (which was later subdivided into the Army Reserve Center and the Tappan military housing facility) and the missile-launch and fire-control areas of the former Tappan Nike battery.

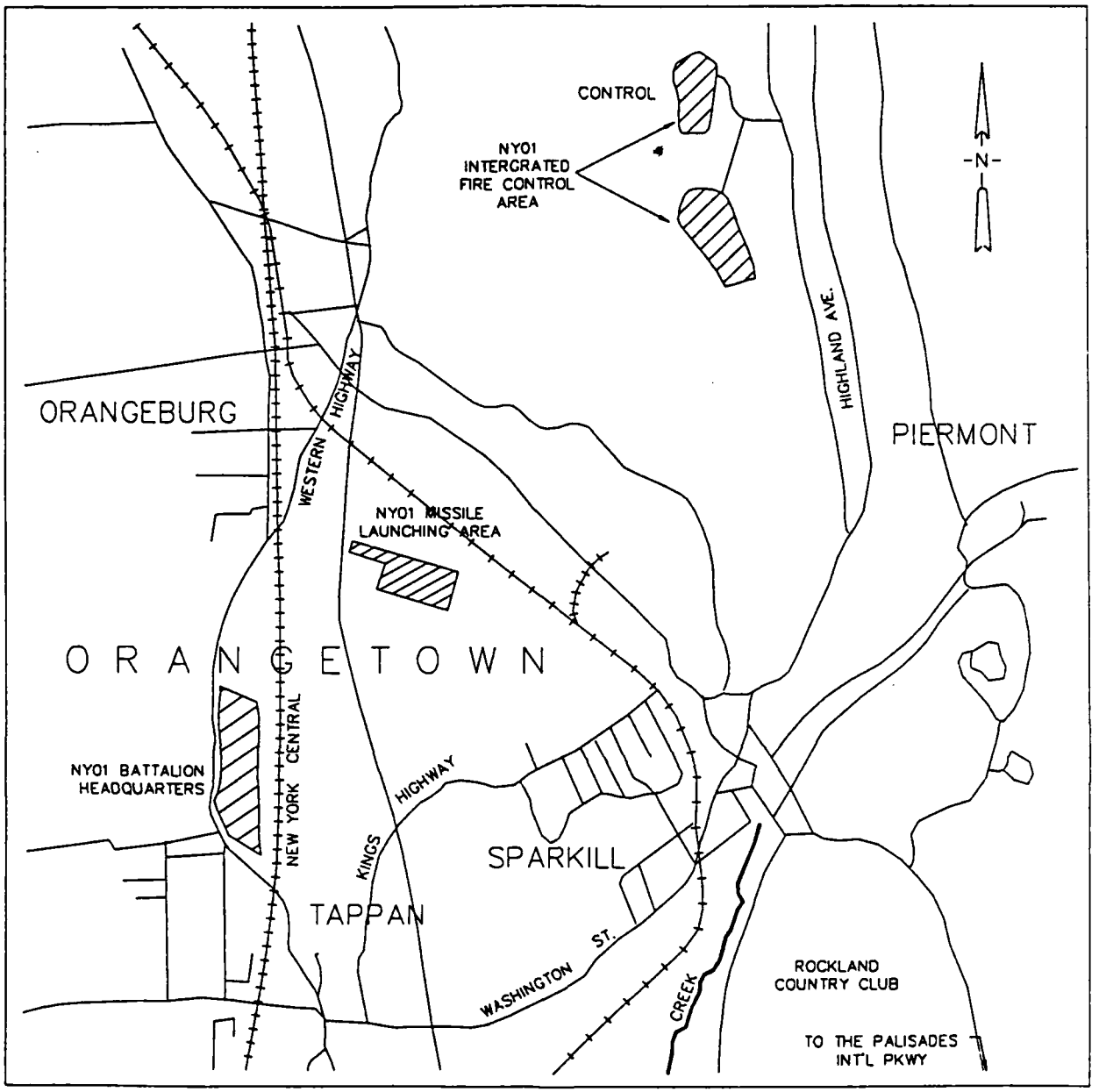

FIGURE 4 Vicinity Map of Tappan Nike Missile Site (NY101)

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

The Tappan military housing facility is located on Western Highway about one mile north of Tappan, N.Y. It is approximately one mile south of the Western Highway intersection with the Palisades Interstate Parkway, considered the major north-south vehicular route in the area. The New Jersey Garden State Parkway, also running north-south, is approximately six miles to the west. The area immediately surrounding the facility is residential with single-family homes on 1/2- to 1-acre lots.

East of the facility approximately 100 yards, running north-south, are tracks for the New York Railroad. North of the housing facility, separated by a few acres of residential property, is the approximately 6-acre Tappan Army Reserve Center. The minimal distance between the housing and Reserve Center properties is about 200 feet. The primary activity at the Reserve Center is vehicle maintenance and service performed as one aspect of personnel training. The center is government-owned and derives its engineering support from Fort Hamilton.[4] A 12-acre commercial trucking site is located north of the Reserve Center. Vehicle maintenance is performed on that site.[4]

There are no known endangered or threatened animal or plant species in the area affected by the proposed closure action. No structures on-site are considered to be of historical significance. No cemetery (private or military) is situated on the housing property.[3,12]

Vehicle maintenance and service is the primary operation at the Army Reserve Center located north of the Tappan military housing area (see Fig. 5). Underground storage tanks containing fuel oil, ranging in size from 550 gallons to 1,500 gallons, are at five locations. A 275-gallon above-ground tank is also present. Two wash racks, draining to oil/water separators, are frequently used. Waste oil and other fluids are accumulated in 55-gallon drums.

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

Rockland County, a 180-square-mile area in southeastern New York State, is bounded on the east by the Hudson River (flowing north-south), on the north and northwest by Orange County, and on the south and southwest by New Jersey. Principal physiographic features are the Hudson River, numerous small lakes, the Palisade Mountain Range extending north of Tappan along the Hudson River, and the Ramapo Mountain Range in the western portion of the county.[8]

Rockland County is situated within the Coastal Plain Province of the mid-Atlantic area and consists of crystalline bedrock mantled by unconsolidated materials. Geology and topography are largely the result of glaciation and the subsequent processes of glacial melting and outwashing of the glacially transported materials.[8]

The soil cover includes three types of deposits: local stream and lake deposits of sand, gravel, silt and clay; stratified deposits of sand and gravel, distributed primarily along the major stream valleys of the county; and an unstratified and poorly sorted

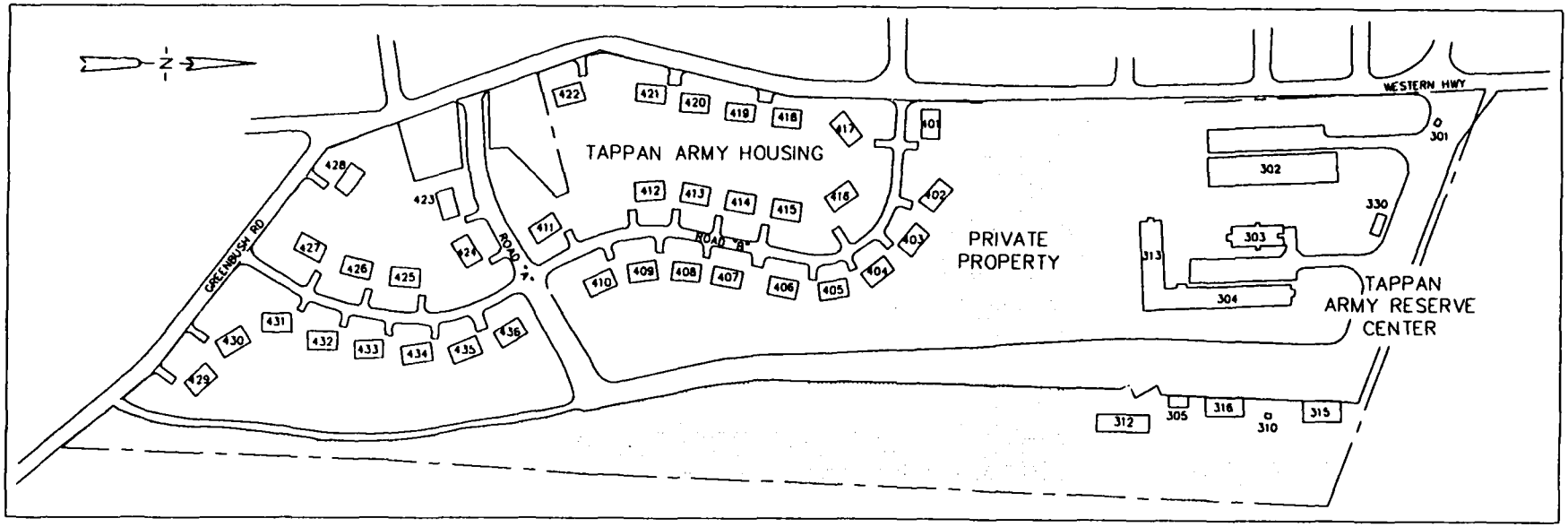

FIGURE 5 Location of Tappan Army Reserve Center

mixture ranging from clay particles to large boulders. This unstratified and poorly sorted material forms the soil cover in most of the county.

Approximately one-third of Rockland County is drained by eastward-flowing streams tributary to the Hudson River; the remainder is drained by southward-flowing streams entering the Hackensack and Passaic River systems of New Jersey. Sparkill Creek, east of the Tappan military housing area, first flows in a southerly direction then turns east toward the Hudson River.[8]

The climate of the area is the humid continental type. A warm, humid summer and cold, snowy winter are typically separated by a mild spring and fall. Average annual precipitation is 48 inches with fairly uniform distribution throughout the year. Coastal storms occur throughout the year, and severe thunderstorms are common during the summer.[8] The average annual temperature is about 12°C, ranging from approximately 0°C in January to 25°C in July.

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 ASBESTOS

In July 1989, Fort Hamilton issued a request for proposals to do a comprehensive survey of all military housing under its administration, including those units at the Tappan housing area.[13] The objective is to identify those buildings with friable and nonfriable materials containing asbestos. The materials to be sampled include suspended ceiling tile, floor tile, asbestos siding, plaster-gypsum wallboard, and dust accumulated inside ductwork. The proposal also requires that the recipient contractor/laboratory doing the asbestos analysis be a participant in the Environmental Protection Agency Bulk Sample Quality Assurance Program at Research Triangle Park, N.C., and in the National Institute of Occupational Safety and Health Proficiency Analytical Testing Program. At the time of the ANL site visit, however, no contract had been awarded to do the asbestos sampling and testing at the Tappan housing area.

Unit #415, representative of the Tappan housing units, was inspected during the site visit. There is no insulation on the heating pipes extending from the furnace. The floor tiles do not appear to be made of asbestos-containing materials. Aluminum siding covers the outside frame.

3.2 RADON

The New York Area Command (NYAC) instituted a radon surveillance program in February 1989.[14] The radon monitoring program is to consist of two parts: (1) radon measurement and (2) radon mitigation, if necessary.

On March 7, 1989, radon detector kits were distributed by the foreman of the nearby Tappan Reserve Center to all residents of the Tappan military housing area.[3,5] After 90 days, in early June, the detector kits were retrieved and returned to the Directorate of Engineering and Housing at Fort Hamilton. It is not clear whether radon testing for a period of one-year as originally planned will be performed at the housing complex. Analysis results of the 90-day radon monitoring were not available.

In September 1989, ANL investigators installed radon monitors in the housing units in a separate monitoring effort conducted under the Base Closure program. Monitoring will last for 90 days.

3.3 UNDERGROUND STORAGE TANKS

A 550-gallon underground storage tank for heating fuel is located in the back of each residence.[3,7] Inspection of the area surrounding the nearby fill pipe at several of the residences showed minor soil stains probably resulting from spills during tank refilling. In 1986, 30 of the underground storage tanks were replaced with new, fiberglass tanks (underground piping is black wrought iron painted with asphaltum).[3,15] Prior to this, within the last 10 years, the other six underground storage tanks were

replaced by new, steel tanks. No documentation was found to indicate that failure or suspected leaks prompted the replacement. There is no documentation that soil sampling was performed during the tank replacement operation.[3]

3.4 PCB TRANSFORMERS

Twelve Army-owned transformers are scattered throughout the Tappan housing area.[3,5] The transformers and electric lines are Army-owned and maintained by the nearby Tappan Reserve Center Engineers Shop.[6] Manufacture date of the transformers is unknown. The transformers are scheduled to be tested for the presence of PCBs in FY 90.[5] None of the poles holding transformers were labeled with PCB identification tags. There was no sign of oil leakage around the transformers or poles.[3]

3.5 WASTEWATER DISPOSAL

The sanitary sewer line runs behind each residence where the kitchen and bathrooms are located. The housing complex is linked to the Orange County Sewage District. On-site sewage processing has never been performed.[3]

4 KNOWN AND SUSPECTED RELEASES

Because of the nature of the facility, no major releases or impacts to the environment have occurred at the Tappan military housing area. Minor soil stains of fuel oil are evident at several residences probably resulting from small spills during tank refilling. No other hazardous materials or hazardous wastes are stored on-site.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although this property was originally developed as part of a Nike missile battery located north of Tappan, N.Y., no wastes associated with the operation or maintenance of the battery are known to have been delivered to or managed at the housing property. Furthermore, the housing facility was completely independent of the battery's missile-launch and fire-control operations and battalion headquarters area with respect to water, sewer, and electrical utilities. No documentation was found regarding utility connections between the housing site and those other properties.

Battalion headquarters for this and other Nike missile batteries was located just north of the housing complex. Vehicle maintenance was performed at that location during its years of operation and previously, as well, when the property was utilized during WWII as the Camp Shanks Military Reservation. Today, as the Tappan Army Reserve Center, vehicle maintenance continues as a primary activity, along with the necessary storage of fuels and waste fluids. A narrow residential area now separates the Tappan military housing area from the Army Reserve Center. Minimum distance between the two properties is approximately 200 feet. North of the Reserve Center is a private trucking firm that also performs vehicle maintenance. No releases of hazardous contaminants from the Reserve Center or the trucking firm have been documented.

There is no documentation that the 12 Army-owned transformers, while they show no signs of leakage, have been tested for the presence of PCBs.

6 RECOMMENDATIONS

The Tappan housing area does not present an imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic materials have ever been released from the property. No immediate remedial actions, therefore, are warranted for the site.

Appropriate Army housing authorities have begun actions to address potential problems with asbestos and radon at the housing area. These actions should continue to completion.

A further action is recommended prior to release of this property: dielectric fluids of all 12 Army-owned electrical transformers on-site should be sampled for the presence of PCBs and the transformers labeled accordingly.

These recommendations assume that this property will continue to be used for residential housing.

REFERENCES

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

2. Property File Cards, dating from July 30, 1958, to Jan. 29, 1960, as prepared by Camp Shanks, previous owner of property.

3. New York Military Housing Site Visit, notes by ANL investigators (Aug. 7-11, 1989).

4. Memo from U.S. Army Reserve Command Headquarters, Fort Totten, N.Y., to Commander, U.S. Army, Fort Meade, Md., *Long Range MCAR Program* (Dec. 2, 1981).

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6. U.S. Army New York Area Command Headquarters, Fort Hamilton, N.Y., to U.S. Army District Headquarters, Corps of Engineers, New York City, *Overhead Electric Lines, Tappan Housing Site and U.S. Army Reserve Center, Tappan, N.Y.* (July 8, 1985).

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8. *Evaluation of Rainfall-Runoff Data Network, Rockland County, New York*, U.S. Geological Survey (1982).

9. Memo from U.S. Army Corps of Engineers, New York District to Commander, Fort Hamilton, N.Y., *Disposal of 0.16 acre of land in fee U.S. Army Reserve Center, Tappan, N.Y.* (July 27, 1976).

10. 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).

11. 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).

12. Fort Hamilton statement to the Commanding General, First U.S. Army, Fort Meade, *Report of Excess Status, Site 01*, Tappan, N.Y. (Jan. 31, 1969).

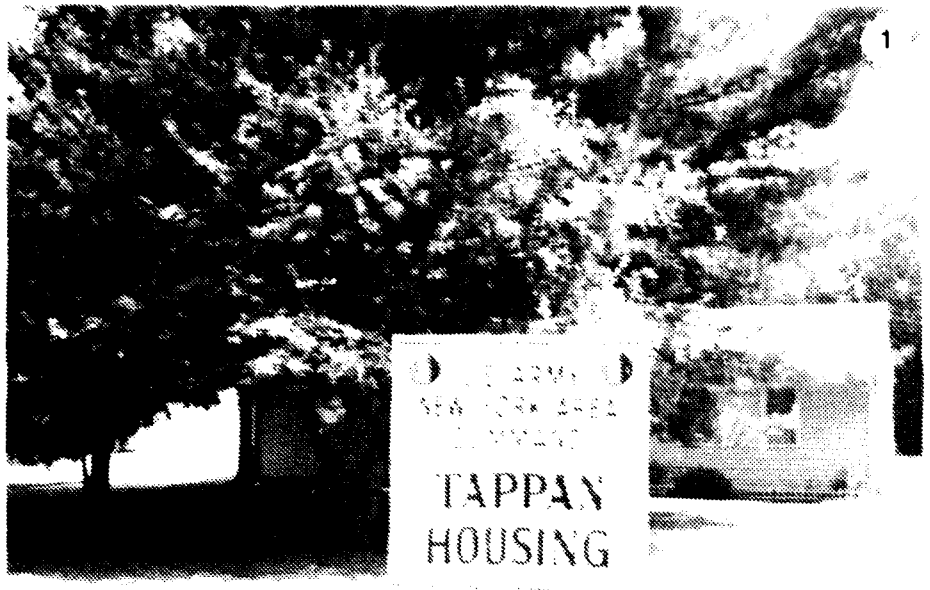
13. Work order for a comprehensive survey of asbestos at Fort Hamilton, N.Y., and housing units under its administration (July 1989).

14. Radon Surveillance Program order from the Department of Engineering and Housing, New York Area Command (Feb. 1989).

15. U.S. Army Corps of Engineers, New York District, Brodsky & Adler, Inc., New York City, *Replacement of 12 Fuel Tanks, Family Housing Area, Tappan, N.Y.* (Aug. 1, 1983).

APPENDIX:

PHOTOGRAPHS OF TAPPAN HOUSING FACILITY AND SURROUNDING LAND



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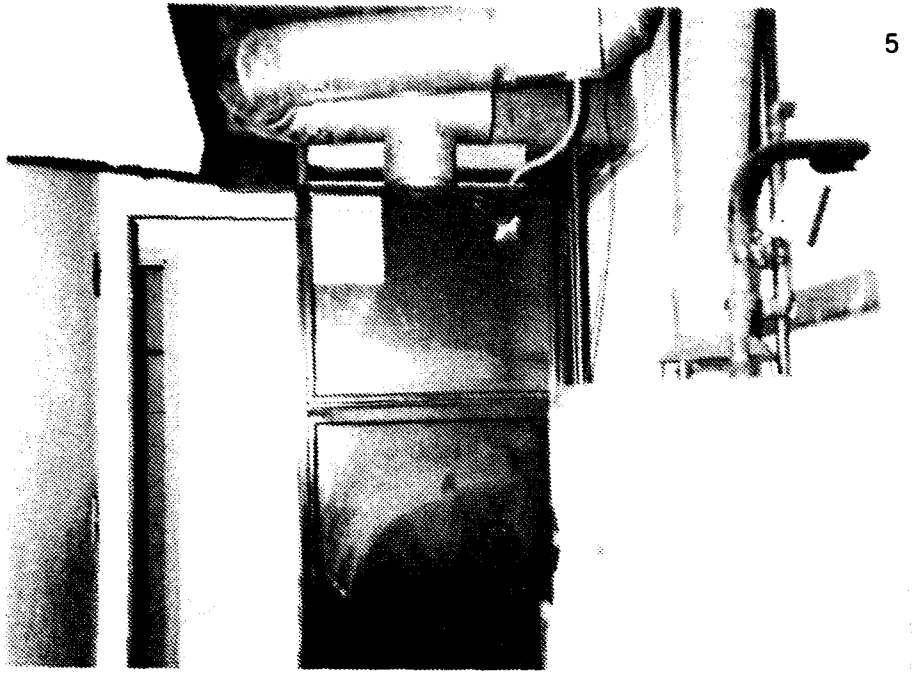

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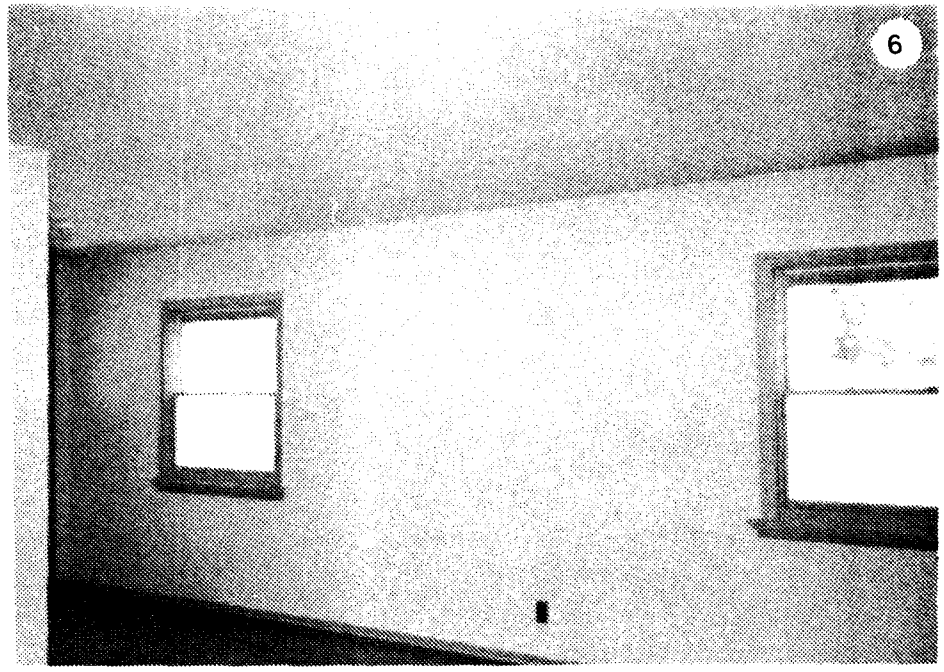

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IDENTIFICATIONS OF PHOTOGRAPHS

1. Sign at entrance to Tappan housing area.

2. View looking south along Lafayette Street at unit #415.

3. Rear of unit #415.

4. Rear of unit #415; note underground storage tank vent pipe and fill port in foreground; underground storage tank made of fiberglass.

5. Furnace and water heater typical of Tappan housing units.

6. Living room of vacant unit #415; note floor heating ducts.

7. Underground storage tank vent pipe at unit #417; one of six units at Tappan with a steel underground storage tank.