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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Youngs Lake Army Housing Units
Renton, Washington

November 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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SUMMARY

The Youngs Lake housing area located near the city of Renton, Wash., 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, therefore, are warranted for the site.

Although this property was originally developed in support of a Nike missile battery, all available documentation and circumstantial evidence suggest that the housing property was wholly independent of the battery's operational activities. No Nike-related wastes were delivered to this property for management or disposal. Furthermore, since this property was independent of the Nike missile operations with respect to all necessary utilities, there is no possibility of missile-related wastes migrating to the housing area along buried utility lines.

Of environmental concern are the underground fuel-oil storage tanks located at the housing area. Although there is no documentation reporting a failure or suspected leak in any of these tanks, real property records indicate that they are more than 30 years old and therefore at or near the end of their effective lives. Removal and replacement of these tanks would be a prudent and justified action. Prior to release of this property, therefore, underground heating-oil tanks at all units on the property should be removed and replaced, and soils in all portions of the tank excavations should be sampled to confirm the absence of petroleum contamination.

This recommendation assumes that 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 Youngs Lake 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 Renton, Wash.

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 located at Fort Lewis, Wash., on August 21, 1989. A site visit was conducted on August 22, 1989, at which time additional information was obtained through direct observation and interviews with personnel familiar with the property and its operations and history. 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 Army personnel at Fort Lewis.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

The Youngs Lake housing area is located in King County, approximately 5 miles south of Renton, Wash. The housing area consists of 9.42 acres of fee-owned real estate. The stand-alone housing site consists of 28 separate housing units of two designs, some with attached carports and storage areas. A playground and bus passenger waiting shelter are also located on the property. Currently, military personnel and their dependents occupy the houses. The site is a square-shaped property with 116th Avenue as its western boundary.² Private residential properties are located on the other three sides of the housing area. The general slope of the area is to the west. The surrounding land is gently rolling to flat.

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 housing area consists of 9.42 acres and 28 separate family housing units of two designs. The area has a playground and bus passenger waiting shelter. All Capehart units have attached carports and storage areas. The housing units include the following: three three-bedroom houses with 1,384 square feet each; five three-bedroom houses with 1,188 square feet each; four two-bedroom houses with 1,090 square feet each; four three-bedroom houses with 1,688 square feet each; and 12 three-bedroom houses with 1,484 square feet each.³ The buildings are constructed on concrete foundations with concrete slab floors that are overlaid with asphalt floor tile. Outside wall construction is of 5/8-inch vertical plywood with built-up tar paper and gravel roofs.⁴ Carports are covered with asbestos shake siding for fire retardation.

All units have separate fuel-oil forced-air heating facilities that are adequate for the climatic conditions for the area. Window air-conditioners are also provided.

Utilities

Electric service for the housing units is furnished by a public utility which also owns the three electrical transformers located on the property. Water and sanitary sewage facilities have been provided by the town of Renton, Wash., since 1967. Prior to that time, the units used individual septic tanks. No details on the abandonment of those septic systems were located during the site visit. Refuse pickup is furnished by a privately owned company.

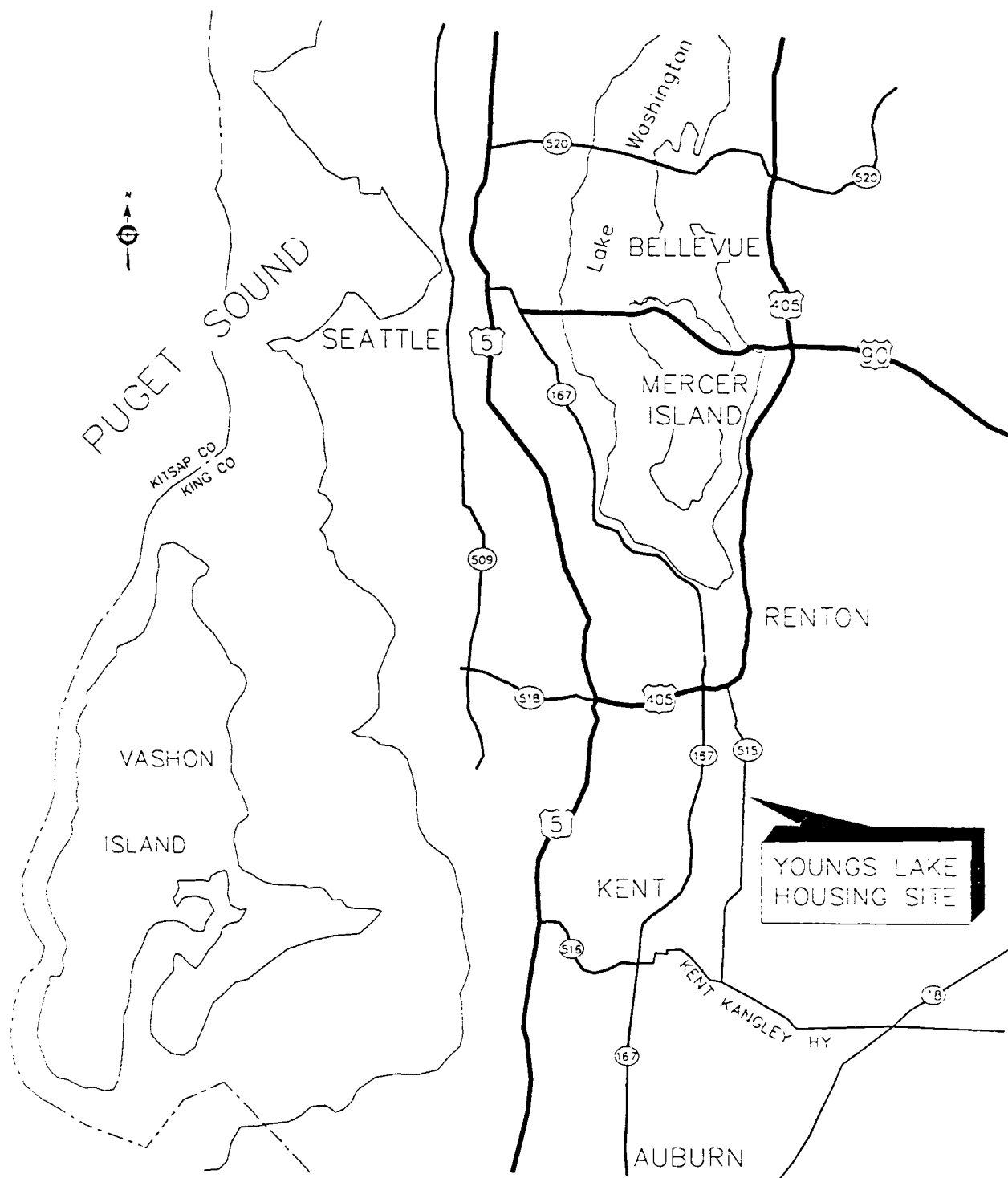


FIGURE 1 Location Map of Washington Army Housing Facilities



The housing units presently have a total of 28 500-gallon underground storage tanks for the storage of fuel oil for the oil-fired forced-air furnaces.

Storm drainage for the housing units is to open ditches by surface runoff.

Also included on the property is a bus passenger waiting shelter and a small playground area that is equipped with typical playground equipment. All units were taken off original septic sewage systems and connected to city sewers in 1967. Fiberglass attic insulation and weather stripping were added to each unit by Ft. Lewis personnel during the fall of 1985.

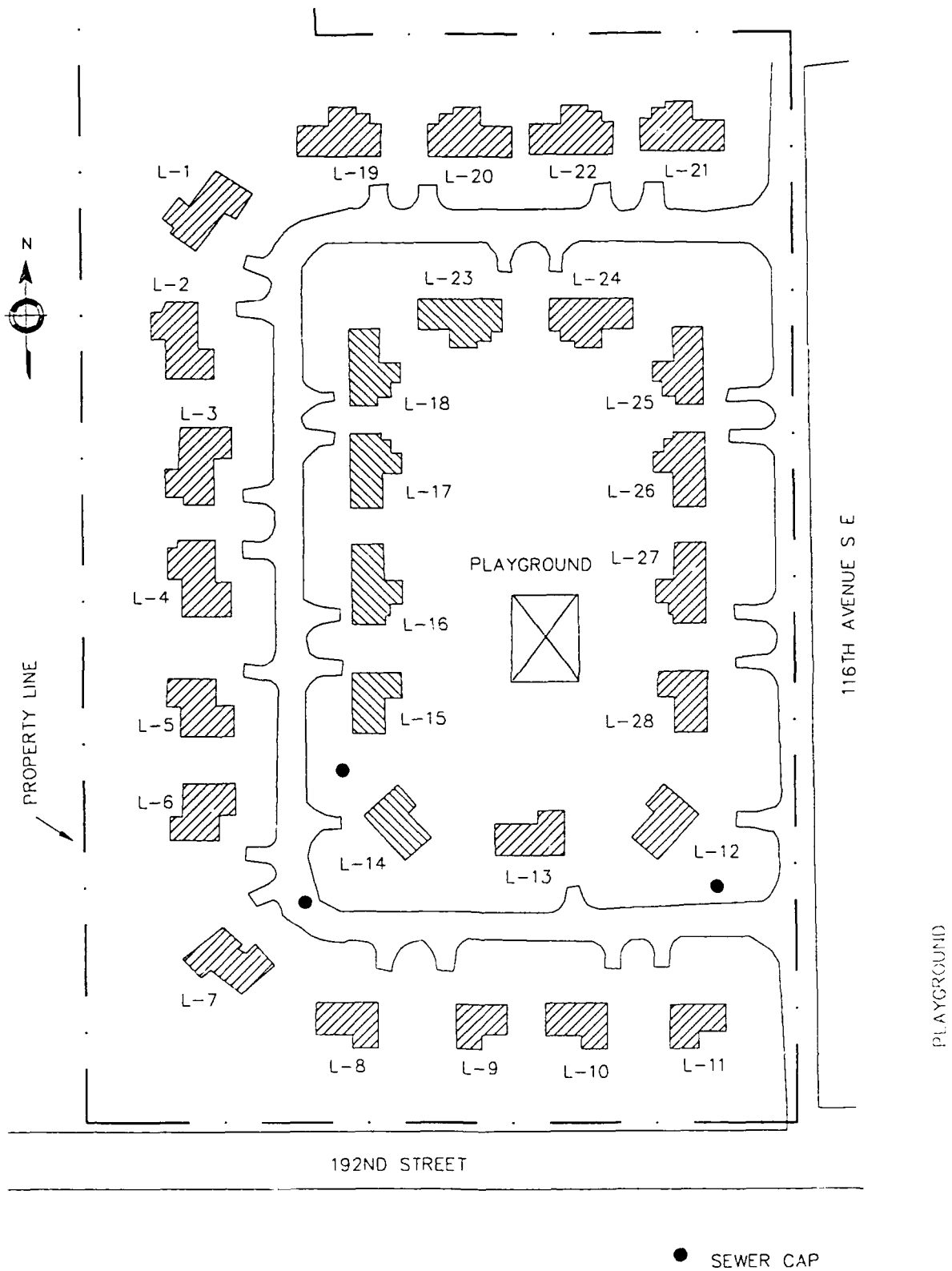


FIGURE 3 Site Plan Map of Youngs Lake Army Housing Units

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 Engineers⁵ and the other by the U.S. Army Toxic and Hazardous Materials Agency.⁶ 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 Youngs Lake Housing Units

The Youngs Lake housing area consists of 9.42 acres of fee-owned land acquired in 1956 and 28 housing units built in 1958.⁴ This facility was originally acquired and developed to support a Nike missile battery providing antiaircraft defense for the Seattle area. After deactivation of the U.S. Army Defense Command Mission in the Puget Sound area, these quarters were occupied by military personnel from all branches on active duty in the Seattle area.

No documentation indicates that Nike missile-related wastes were ever delivered to or managed at this property. Furthermore, this housing area operated independently of the Nike battery with respect to water, sewer, and electrical utilities.

The housing area consists of 28 housing units, a playground, and a bus passenger waiting shelter. Currently the units are occupied by enlisted personnel and noncommissioned officers and their dependents. No industrial activities have ever occurred on this site.

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

The Youngs Lake housing area is located approximately 5 miles south of the city of Renton, King County, Wash. The Youngs Lake stand-alone family housing site is completely surrounded by residential areas. The Sunnycrest Elementary School is located nearby.

King County extends approximately 50 miles east-west and 40 miles north-south; its western boundary is Puget Sound. The greater Seattle metropolitan area, of which Renton is a part, lies within King County. Renton is on the southeastern edge of Seattle. The population of King County, as determined in the 1980 census, was 1,269,749.

The mean monthly temperature in the Seattle area varies from 38°F in January to 65°F in July. The prevailing wind direction in Seattle is from the south during most of the year, and southeasterly from October to December. King County and the Youngs Lake housing area lie within the lowlands area surrounding Puget Sound, and receive approximately 41 inches per year of rainfall. December is the wettest month, and July or August is normally the driest month. Thunderstorms are uncommon and average only about five per year.

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS⁷

The Youngs Lake stand-alone housing site is located on the Des Moines drift plain in the Puget Sound lowland. This drift plain merges eastward with glaciated foothills of the Cascade Range. The foothills are protruding parts of a Tertiary bedrock surface that descends westward beneath quarternary deposits more than a thousand feet thick. Rocks of the Tertiary age include sedimentary and volcanic rocks of the Puget Group, intrusive rocks, an assemblage of andesitic volcanic rocks, and the Homer Bluff Formation. Virtually all Tertiary rocks are either too fine-grained or too highly altered to yield groundwater at a rate higher than 50 gallons per minute (gal/min).

Quarternary deposits are the chief source of groundwater in the area. The Salmon Springs drift and Vashon advance outwash contain the most productive aquifers beneath the Des Moines drift plain. The Salmon Springs drift is a sequence of sand, gravel, clay, and till. The formation is nearly 400 feet thick beneath a large part of the Des Moines drift plain; its base is close to or slightly below sea level. Advance outwash underlying the Des Moines drift plain consists predominantly of sand, with some layers of pebble-cobble gravel. Both units occupy much of the subsurface between the overlying Vashon till and sea level. The individual water-bearing zones are irregularly distributed, both vertically and laterally, but most of them occur in the interval from slightly below sea level to about 200 feet above. Many wells less than 400 feet deep have obtained yields ranging from 300 to 2,000 gal/min. Pleistocene drift underlying the Salmon Springs drift yields less water. A sectional cut running generally east-west from Puget Sound to the Duwamish River Valley passes close to the Youngs Lake housing area.

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 UNDERGROUND FUEL-OIL STORAGE TANKS

There are presently 28 500-gallon underground fuel-oil storage tanks that contain diesel heating fuel for the forced-air furnaces of the 28 housing units.⁴ Although there is no documentation to indicate failures or suspected leaks in any of these tanks, records indicate that the tanks date back to construction of the units and are therefore more than 30 years old.

3.2 UNDERGROUND SEPTIC TANKS

There is no documentation to prove that the underground 750-gallon septic tanks that were located at each housing unit prior to 1967 were ever properly removed, sealed, or filled. Original piping from each housing unit was properly sealed and rerouted to connect to the local sewage system. No problems associated with the original septic tanks have ever been documented.

3.3 ASBESTOS CONSTRUCTION MATERIAL

Exterior siding on the carports of the houses may contain asbestos. This siding was found to be in good condition.

The floor tiles in the housing units also may contain asbestos. However, these floor tiles were all found to be in good condition. No other asbestos-containing insulation materials were found to be present inside the houses.

4 KNOWN AND SUSPECTED RELEASES

No major releases or impacts on the environment have occurred at the Youngs Lake housing area. No hazardous wastes or hazardous materials are stored on-site. Although the housing area was originally affiliated with a Nike missile battery, no missile-related activities are believed to have ever been taken to this property. The site has been used for housing active-duty military personnel and their dependents in the Seattle and Tacoma, Wash., area since the missile battery was deactivated in the early 1970s. No industrial activities have ever occurred on the site.

There is no documentation of spills or releases from any of the 28 underground fuel-oil storage tanks in service on the property.

The three electrical transformers on the property may contain PCBs. However, these transformers are owned by the public utility. There is no evidence of spills or leaks from any of the transformers.

Asbestos may be present in the floor tiles and exterior siding of the units. However, these tiles and siding were all found to be in good condition. No asbestos insulation is present on water pipes inside the units.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although these housing units were originally developed in support of a Nike missile battery, no wastes associated with the operation or maintenance of the battery were ever delivered to or managed at this housing property. Furthermore, the housing facility was completely independent of the battery's missile-launch and fire-control operations with respect to water, sewer, and electrical utilities. No documentary evidence was found of utility connections between this housing site and other properties composing the Youngs Lake Nike missile battery.

The aging underground heating-oil storage tanks represent a potential for environmental impact. The integrity of these tanks has not been determined, although there is no evidence of spills or leaks from these tanks. However, the tanks have been in service for over 30 years and are therefore at or near the end of their expected useful lives.

The original septic systems that serviced the housing area from 1958 to 1967 used 750-gallon septic storage tanks. There is no evidence or documentation to prove that these septic tanks were ever removed from the ground or properly filled when the changeover from the individual septic systems to the city sewer system occurred. Proper sealing of the old piping system is believed to have taken place during the changeover, however. No problems with the original septic systems have been documented.

It is not known whether the three pole-mounted transformers service the housing site have been tested for the presence of PCBs. The transformers are the property and the responsibility of the utility. No leaks were observed.

6 RECOMMENDATIONS

The Youngs Lake housing area 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, therefore, are warranted for the site.

There is no evidence that the underground tanks used for fuel-oil storage are deteriorating. However, all tanks are original equipment supplied at the time the housing units were built. It is therefore assumed that all the tanks are at least 30 years old and at or past their safe useful life expectancy. Consequently, it is recommended that all underground tanks be removed and replaced with new tanks. In addition, soil from all portions of the tank excavations should be tested to confirm the absence of petroleum contamination and any problems remediated.

This recommendation assumes that this property will most likely continue to be used for residential housing.

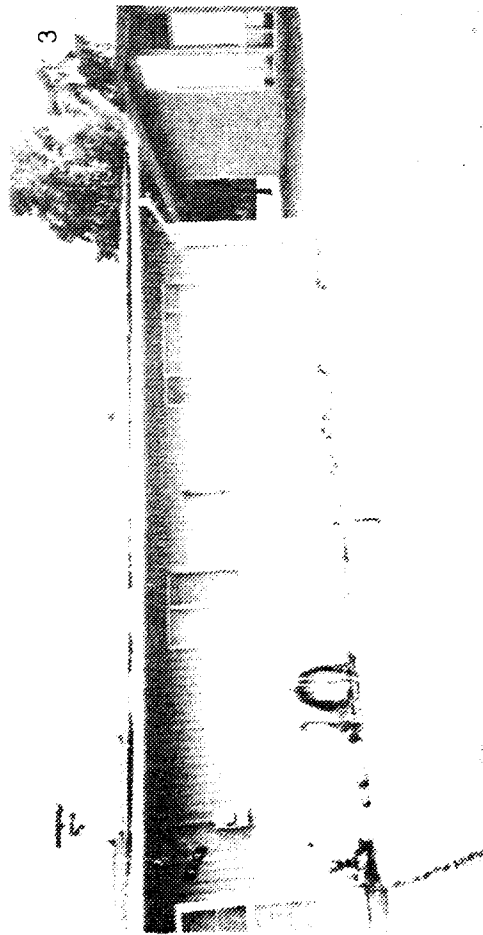
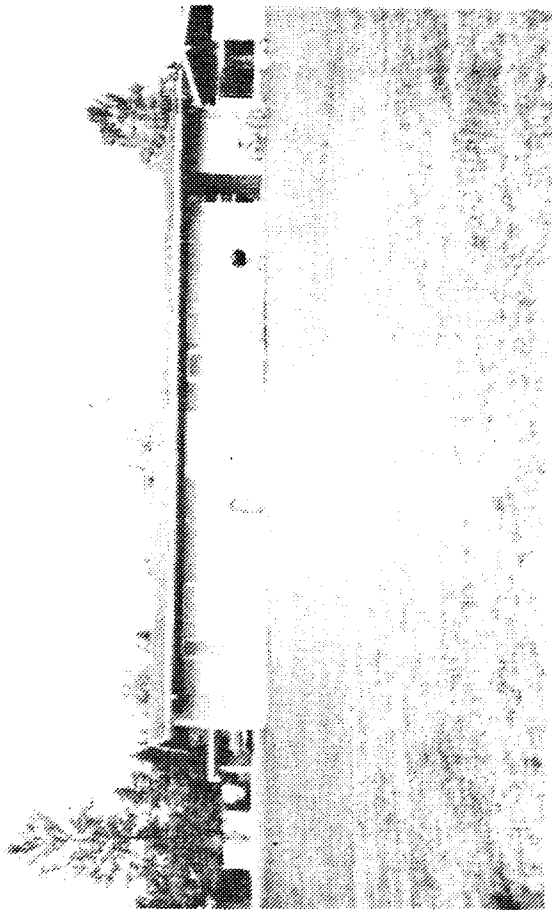
REFERENCES

1. *Base Realignments and Closures*, Report of the Secretary's Commission (Dec. 1988).
2. Corps of Engineers, U.S. Army, General Layout, Youngs Lake, Wash., Seattle Defense Area, Family Housing, Drawing No. 16-15-08 (May 18, 1956).
3. Memorandum to the Commander, U.S. Military District of Washington, Subject: Base Closure, Real Estate Coordinator, to Linda Baylor, Fort McNair, Washington, D.C. (April 28, 1989).
4. Real Property Record, Form AR 735-27 (undated).
5. 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).
6. 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).
7. Luzier, J.E., *Geology and Groundwater Resources of Southwestern King County, Wash.*, U.S. Geological Survey, Water Supply Bulletin No. 28 (1969).

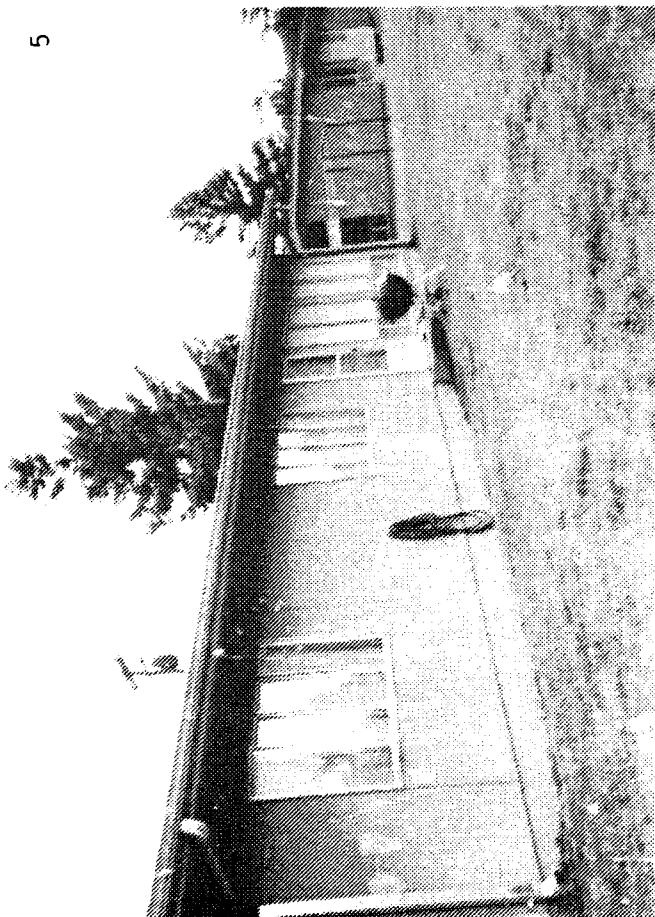


APPENDIX:
PHOTOGRAPHS OF YOUNGS LAKE HOUSING FACILITY
AND SURROUNDING LAND



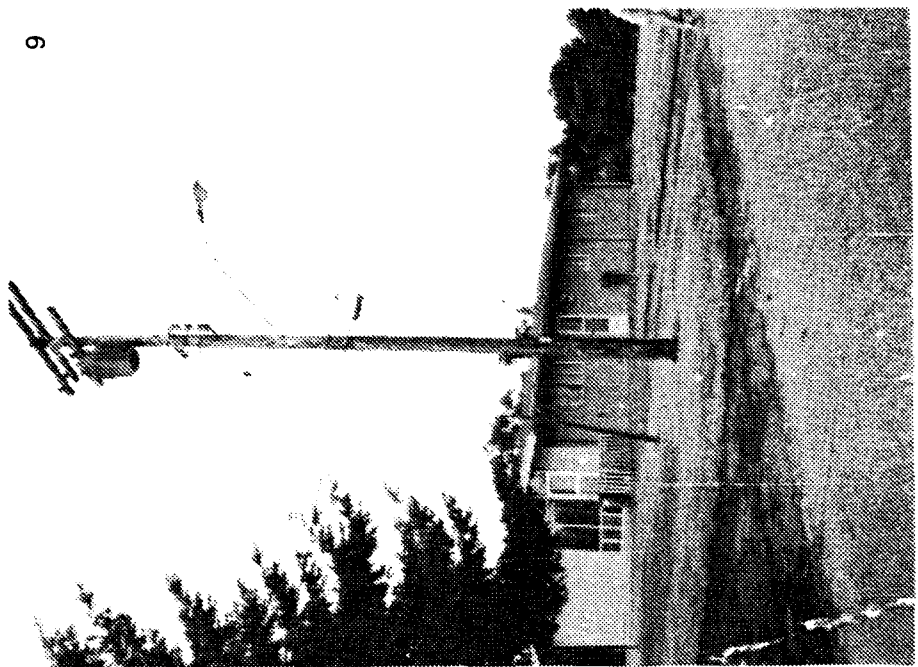


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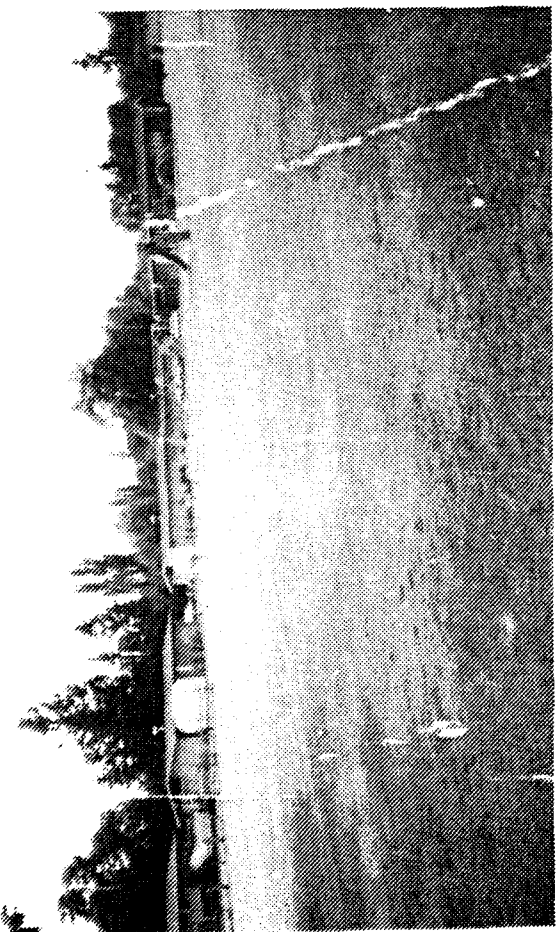


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IDENTIFICATIONS OF PHOTOGRAPHS

1. Front view of units L-20 and L-21; an attached carport can be seen at the extreme right of the view.
2. Rear view of unit L-23.
3. Front view of unit L-20; underground oil tank inlet pipe is seen protruding from ground in the front yard.
4. Front view of a unit with one of two typical styles at this area.
5. Rear of a house.
6. In the front yard of this house is an inlet pipe for the underground oil storage tank.
7. Wall of a house insulated with cellulose; the three round marks barely observable are inlet holes for the addition of insulation; the holes are closed with wooden pegs.
8. Play area, YL-1, in the center of the housing area; several homes surround the play area.
9. A utility pole with an electric transformer mounted at the top; transformers are the responsibility of the public utility company.
10. The fence is the border of the housing area; beyond the fence are private residences.