NPS Form 10-900
(Oct. 1990)

OMB No. 10024-001

VLR- 6/19/96

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name U.S. Army Package Power Reactor

other names/site number Building #372; SM-1 Plant

DHR File No. 29-193

2. Location

street & number U.S. Army Fort Belvoir, 5995 Wilson Road N/A not for publication

city or town Fort Belvoir N/A vicinity

state Virginia code VA county Fairfax code 059 zip code 22060

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this X nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property X meets ___ does not meet the National Register criteria. I recommend that this property be considered significant X nationally ___ statewide ___ locally. (___ See continuation sheet for additional comments).

Signature of certifying official /Title Date

State or Federal agency and bureau -

In my opinion, the property ___ meets ___ does not meet the National Register criteria. (___ See continuation sheet for additional comments).

[signature] 12/30/96

Signature of certifying official /Title Date

State or Federal agency and bureau - Virginia Dept. of Historic Resources

4. National Park Service Certification

I hereby certify that the property is:

___ entered in the National Register.
___ See continuation sheet.
___ determined eligible for the National Register.
___ See continuation sheet.
___ determined not eligible for the National Register.

Signature of the Keeper Date of Action

5. Classification

Ownership of Property
(Check as many boxes as apply)

___ private
___ public-local
___ public-State
_x_ public-Federal

Category of Property
(Check only one box)

_x_ building(s)
___ site
___ structure
___ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
5	0	buildings
0	0	sites
2	0	structures
0	0	objects
7	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

DEFENSE: military facility
INDUSTRY/PROCESSING/EXTRACTION: energy facility

Current Functions
(Enter categories from instructions)

DEFENSE: military facility
EDUCATION: research facility

7. Description

Architectural Classification
(Enter categories from instructions)

NO STYLE

Materials
(Enter categories from instructions)

foundation CONCRETE
walls METAL
roof CONCRETE
other METAL

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- x A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ___ B Property is associated with the lives of persons significant in our past.
- ___ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ___ D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ___ A owned by a religious institution or used for religious purposes.
- ___ B removed from its original location.
- ___ C a birthplace or grave.
- ___ D a cemetery.
- ___ E a reconstructed building, object, or structure.
- ___ F a commemorative property.
- x G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

MILITARY
ENGINEERING
EDUCATION
INDUSTRY

Period of Significance
1955-1973

Significant Dates
N/A

Significant Person
(Complete if Criterion B is marked above)
N/A

Cultural Affiliation
N/A

Architect/Builder
Stone and Webster/ALCO Products, Ltd.

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ___ preliminary determination of individual listing (36 CFR 67) has been requested
- ___ previously listed in the National Register
- ___ previously determined eligible by the National Register
- ___ designated a National Historic Landmark
- ___ recorded by Historic American Buildings Survey #_____
- ___ recorded by Historic American Engineering Record #_____

Primary location of additional data:

- ___ State Historic Preservation Office
- ___ Other State agency
- x Federal agency
- ___ Local government
- ___ University
- ___ Other

Name of repository:
Directorate of Public Works, Ft. Belvoir; Directorate of Plans, Mobilization, and Training, Ft. Belvoir, Office of History, COE

10. Geographical Data

Acreage of Property 30

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	18	313300	4282860
2	18	313480	4282830
3	18	313410	4282920
4	18	313390	4282740

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Amy Friedlander, Historian; Sheryl N. Hack, Preservation Planner & Judith Rosentel, Preservation Aide

organization Soil Systems, Inc.; MAAR Associates, Inc. date August 1983; February 1992

street & number 711 Pendleton St; 9 Liberty Plaza, P.O. Box 655 telephone (703) 548-1883; (302) 368-5777

city or town Alexandria; Newark state Virginia; Delaware zip code 22308; 19715-0655

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

USGS Fort Belvoir Quad map (7.5 minute series) indicating the location of U.S. Army Package Power Reactor (SM-1 Plant).
Sketch map of U.S. Army Package Power Reactor and structures.
Floor plans & elevations of Building #372 (SM-1 Plant).

Photographs

Representative **black and white photographs** of the property.

Additional Items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name Department of the Army, U.S. Army Fort Belvoir

street & number _____ telephone _____

city or town Fort Belvoir state VA zip code 22060

Summary Description

The U.S. Army Package Power Reactor compound is an approximately 30-acre fenced lot that lies on a narrow terrace between the open waters of Gunston Cove to the southwest and the steeply sloping hillside running toward the upland hilltops to the northeast. The compound consists of the SM-1 Plant, the nuclear power generating station, and its support structures, which include a sewage pump station, sentry station, pumphouse, waste retention building, electronic equipment facility and an emergency siren. In addition, there are a pipeline and pumphouse platform extending approximately 125' from the shoreline out into Gunston Cove, a part of Accotink Bay. The buildings on the compound lie at an elevation of 30' to 45' above sea level.

The compound grounds consist of a cleared grass lot and paved parking areas. Sections of the facility were graded in the 1950s to provide level building sites for the U.S. Army Package Power Reactor, also known as the SM-1 Plant, and its support structures, with no intrusive structures built after the period of significance.

The property retains excellent integrity with regard to location, design, setting, materials, workmanship, feeling, and association. Its setting at the secluded southern end of the base suggests the classified nature of early nuclear research, development, and training. The location is paramount to the overall purpose and function of the facility because its proximity to the waters of Accotink Bay provide an unlimited source of coolant for the reactor.

Detailed Description

Building #372: SM-1 Plant
Built in 1957, the 2-story, domed, rectangular SM-1 Plant is built of steel frame construction, covered by corrugated metal walls, and sits on a concrete foundation. The building measures approximately 90' x 93' and features a flat concrete roof. A tall cylindrical vented dome extends above the roofline. The fenestration includes a steel-frame doorway with sidelights, a wooden door, steel frame ribbon windows with fixed sash units, an unsupported window in the northeast corner of the building, and a large, steel frame 21-light window in front of the central turbine room. The structure houses electrical circuitry and reactor-related piping on the lower level, while classrooms, offices, a control room, and support facilities are located on the upper level. The core containment unit, which is now enclosed by cement, extends through both levels.

Despite the deterioration of its exterior walls, the interior damage caused by a leaking roof, the presence of a rear addition to the classroom section, the enclosure of the storage tanks to the rear of the vapor container, the concrete block additions to the spent fuel pit, and the rearrangement of its interior space to accommodate modern office use, the structure retains its basic formal integrity as well as its integrity of design, setting, materials, feeling, and workmanship.

The SM-1 Plant nuclear power generating station prototype, designed under the auspices of the Atomic Energy Commission and the Department of Defense, is not significantly compromised in integrity by the removal of the nuclear reactor's core, core elements, and spent fuel. The concrete containment building has been sealed and the roof coated with concrete because of small amounts of lingering radioactivity. [Contributing structure]

Detailed Description cont.

Building #350: Sewage Pump Station
Built c. 1962, single-story brick utility building with flat roof and concrete base. Located northwest of building #372. [Contributing building]

Building #373: Sentry Station
Built c. 1960, 9' x 10' corrugated metal sentry booth with shed roof and 6-pane industrial windows on four sides. Located in the southeast corner of the fenced compound, it is the only sentry post leading into the SM-1 Plant facility and is no longer in use. [Contributing building]

Building #375: Pumphouse
Built c. 1961, 12' x 8' single-story rectangular metal structure with large metal boom and wooden planked walkway. The pumphouse, located along the Gunston Cove shoreline of Accotink Bay, is no longer in use. [Contributing building]

Building #376: Waste Retention Building
Built c. 1961, 25' x 20' single-story concrete block structure with shed roof and single metal door. Located north of the SM-1 Plant, it is now used as a storage shed. [Contributing building]

Building #384: Electronic Equipment Facility
Built c. 1964, single-story, 2-bay corrugated metal structure with shed roof and metal industrial door at loading dock on front facade with small louvered window on both sides of building. Located north of the SM-1 Plant and parallel to building #376, it once housed the back-up generator, but is now used for storage. [Contributing building]

Emergency Siren
c. 1960, emergency siren installed on large wooden pole adjacent to building #373, Sentry Station. Significant exterior warning device in case of power reactor malfunction. [Contributing structure]

Section 8

Statement of Significance

The U.S. Army Package Power Reactor, constructed in 1957, is eligible for listing in the National Register of Historic Places under Criterion A because it is associated with events that have made a significant contribution to the broad patterns of our history. The compound is of national historic significance for its role as the first prototype nuclear power plant developed as a training facility for military personnel. It also represents the first water-pressurized reactor to be brought on-line in the United States. Significant strides in advanced engineering by the U.S. military in the early 1950s set the tone for ongoing nuclear energy developments throughout the industrial sector. The effects of the education offered by the Army at the Package Power Reactor and subsequent nuclear reactors throughout the country are of considerable importance in today's private nuclear energy industry.

The property is not architecturally significant in style, but the steel and concrete SM-1 Plant main reactor building makes a statement of strength and containment. The Package Power Reactor and its contributing buildings lack aesthetic appeal and artistic style, but are undeniably functional and practical military buildings designed by plan.

Historical Background and Significance

Although less than fifty years old, the U.S. Army Package Power Reactor possesses exceptional national significance as the Army's first nuclear-powered generating station, as well as because it was the first water-pressurized reactor to be brought on line in the United States. The "first prototype of a family of nuclear power plants under development by the Atomic Energy Commission and the Department of Defense for use by the three military services at remote installations," the "Stationary, Medium power" model number 1, or SM-1 Plant, began operation on April 15, 1957. Although the plant was deactivated, with its core removed and reactor sealed in 1973, the facility retains the majority of its original operating equipment as well as interpretive models and panels that explain how it functioned and present the history of its development.

The construction of the U.S. Army Package Power Reactor in 1957 was the first major accomplishment of the Army's Nuclear Power Division (NPD), formed in 1952. The Secretary of the Army assigned responsibility of military control of atomic and nuclear power development to the NPD through the Office of the Chief of Engineers. The Corps of Engineers, representing the Army, began development of the non-nuclear portion of the plant in 1953. A year later, Alco Products Incorporated was awarded the contract to complete the design, construction, and testing of the nuclear power plant. The term "packaged" refers to the capability of this prototype to be sent to a facility in component form and assembled on location. This feature proved revolutionary to facilities in remote stations like Greenland, which previously depended on long supply lines and large fuel storage sites vulnerable to attack. Although the U.S. Army Package Power Reactor remained in operation less than two decades, it accomplished its mission in training nuclear power plant operators as well as achieving success in research and development procedures. While similar facilities were set up elsewhere, including Alaska and Greenland, the U.S. Army Package Power Reactor was located at Fort Belvoir because Fort Belvoir was the U.S. Army Engineer Center and a premier facility for Department of Defense training. It is reported by Army officials to have been the first military nuclear power plant in the country to produce power on a commercial grid, but this is seldom recognized because of the hesitation by the Department of Defense in releasing pertinent information early in 1957.

In addition to its importance as the Army's first nuclear power plant, the Package Power Reactor possesses exceptional national significance because it served as the national nuclear training facility for military personnel from 1955 to 1973. The design was based on a pressurized-water reactor operating at a thermal level of ten megawatts. Functioning much the same as a conventional power plant, steam was produced to rotate a turbine which spun a generator, resulting in the formation of electricity. Inside the reactor core, heat was generated by the nuclear fission of Uranium 235.

The pressurized reactor heated the water, which traveled to the steam generator. The reactor water was cooled somewhat, leaving the steam generator, then recycled back to the reactor to be heated again. Steam from the steam generator then traveled through the secondary system to the turbine, where it was converted from thermal energy to mechanical energy (spinning the turbine), and through a reduction gear, drove the main generator to produce electric power. Lower energy steam was cooled with water from Accotink Bay, and thereby condensed.

A separate device called the Boron Injection System was an integral element in safeguarding operations by supplying a backup cooling system. A Spent Fuel Pit (25.5' deep, 11' long, and 9' wide), located adjacent to the reactor unit, was filled with water to provide adequate shielding from the radiation emitted from the spent fuel elements it stored. The preservation of all of the SM-1 Plant instruments as well as its associated structures within the compound contribute to the overall integrity and significance of the property.

No longer utilized for training purposes, the facility currently provides office space.

Bibliography

Connerley, Sgt. William, U.S. Army Sargeant and avocational historian, Fort Belvoir, Interview (January 1991).
Directorate of Engineering and Housing, Fort Belvoir, Virginia Plans & Files.
National Register of Historic Places Registration form, prepared by Amy Friedlander (1986).
SM-1 Plant, Files.
Soil Systems, Inc., Cultural Resource Survey and Evaluation of Fort Belvoir, Virginia (1983).
Suid, Lawrence H. The Army's Nuclear Power Program: The Evolution of a Support Agency. Greenwood Press, New York. (1990).
U.S. Army Corps of Engineers History Office, Kingsman Bldg., Fort Belvoir, VA archives.

Verbal Boundary Description

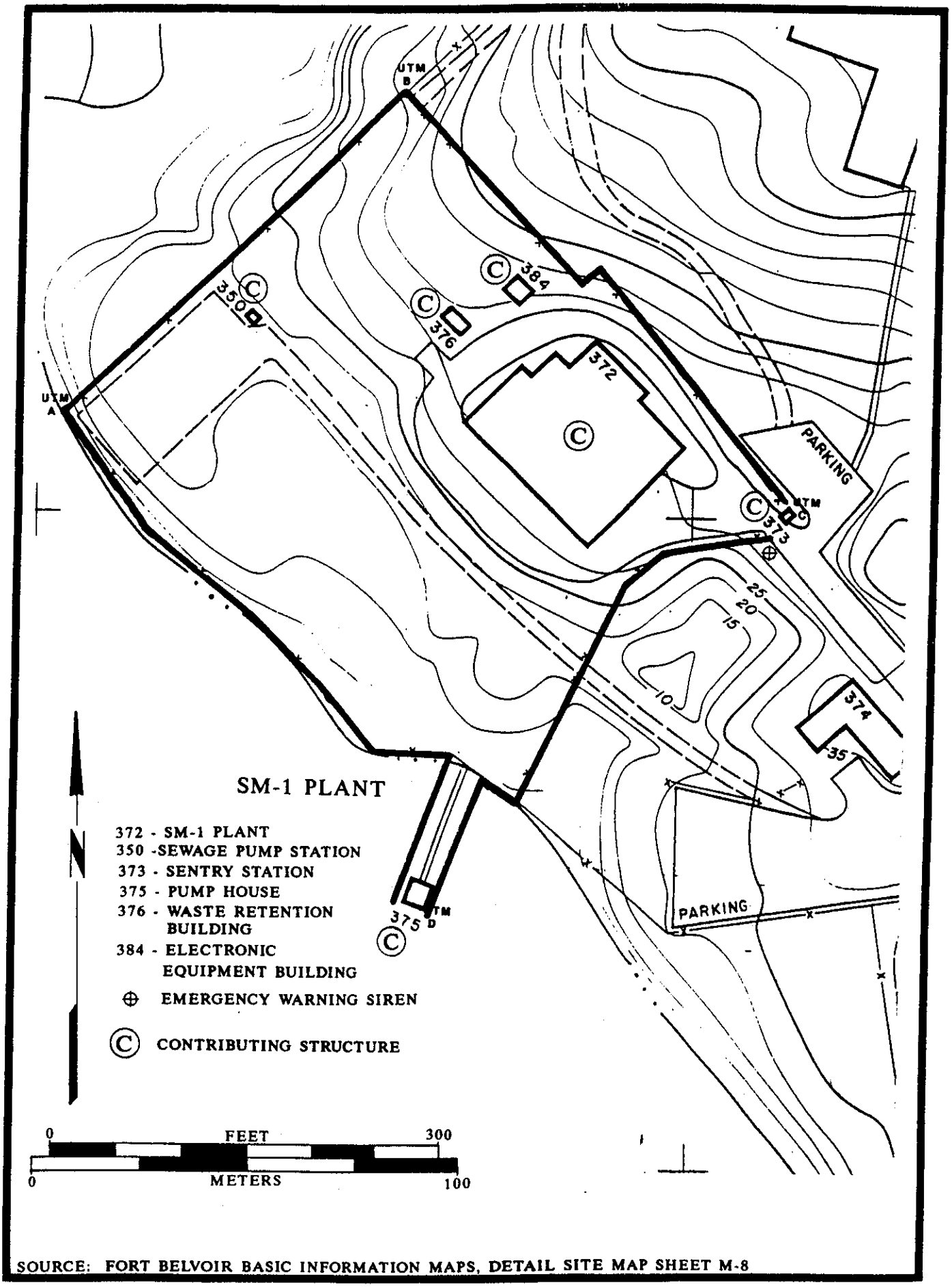
The U.S. Army Package Power Reactor compound at the southern end of Fort Belvoir U.S. Army base in Fairfax County, Virginia is bounded by the following UTM references:

A: 18/ 313300/ 4282860 C: 18/ 313480/ 4282830
B: 18/ 313410/ 4282920 D: 18/ 313390/ 4282740

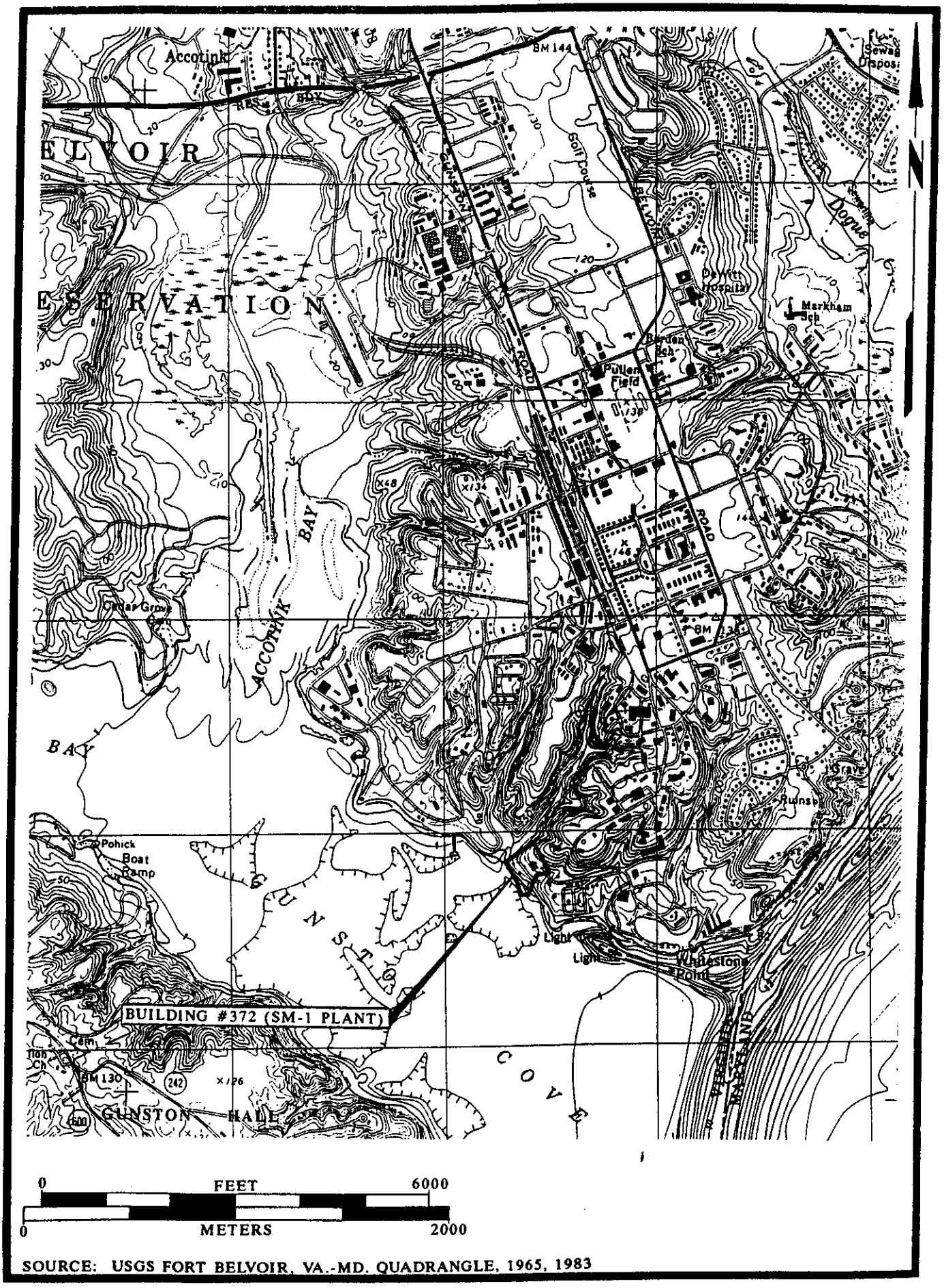
UTM A begins with the northwest point, continues clockwise to UTM B , the northernmost point), to UTM C at the gate and sentry post, extends to UTM D which lies 125' offshore into Accotink Bay to include the dock and pumping facility, and northwest along the shoreline to point A.
(UTM points are labeled on enclosed detail site map from the USGS Fort Belvoir quad.)

Boundary Justification

The boundaries are drawn to include all of the resources related to the production of nuclear power at the U.S. Army Package Power Reactor. All of the recorded resources are enclosed within a chain-link fence except Building #375, which lies 125 ft offshore in the Gunston Cove area of Accotink Bay. The boundaries are drawn to include all of the resources related to the production of nuclear power at the Package Power Reactor.



SOURCE: FORT BELVOIR BASIC INFORMATION MAPS, DETAIL SITE MAP SHEET M-8



SOURCE: USGS FORT BELVOIR, VA.-MD. QUADRANGLE, 1965, 1983

Original
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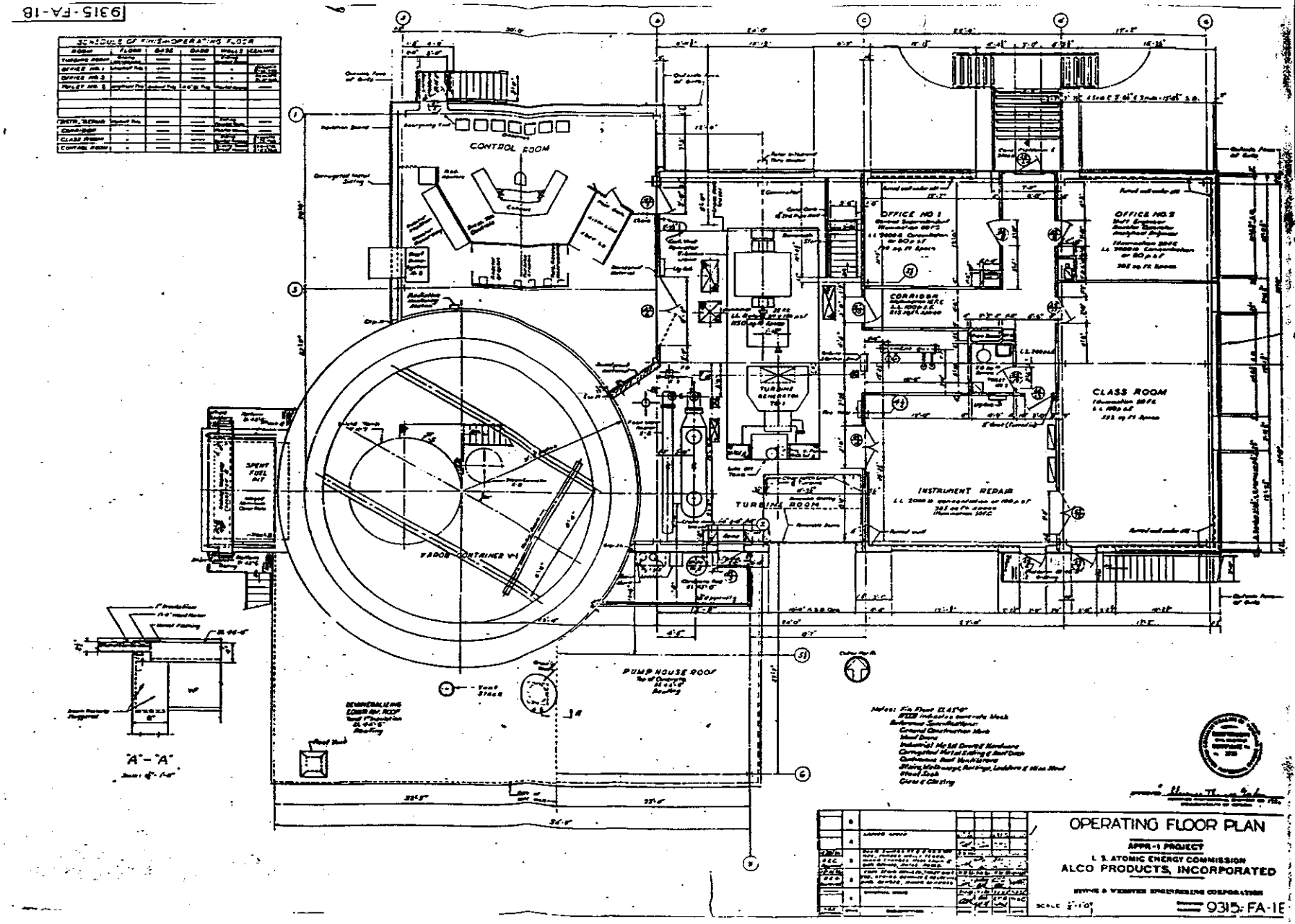


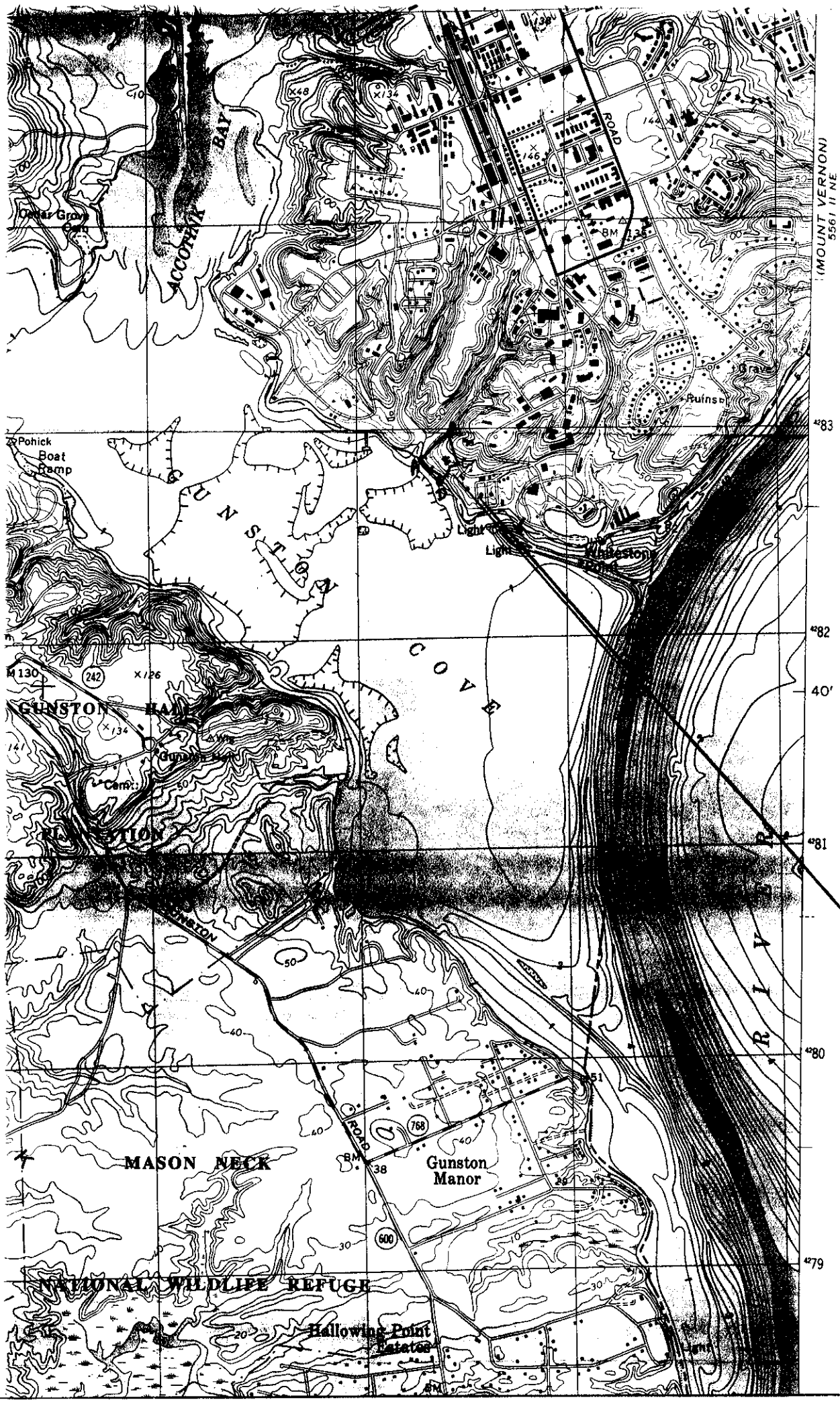
OPERATING FLOOR PLAN

APPR-1 PROJECT

U. S. ATOMIC ENERGY COMMISSION

ALCO PRODUCTS, INCORPORATED

9315-FA-1E



Feet	Meters
1	.3048
2	.6096
3	.9144
4	1.2192
5	1.5240
6	1.8288
7	2.1336
8	2.4384
9	2.7432
10	3.0480

To convert feet to meters multiply by .3048

To convert meters to feet multiply by 3.2808

US. Army Package 7
Fairfax County, Virg
A 18/313300/428
B 18/313480/428
C 18/312410/428
D 18/313390/428

Exposed at low tide

Meters 0 — DEPTH GRADIENT

5 — 16

10 — 32

15 — 49