Survey No. HA-1963
Magi No.
DOE ___yes ___no

Maryland Historical Trust
State Historic Sites Inventory Form
Maryland Inventory of Historic Properties

1. Name

Historic Name Shell Dump (Building 309)

Common Name and Building Number Building E5179

2. Location

Street and Number Aberdeen Proving Ground - Edgewood Area

City, Town Aberdeen

Congressional District

State and Zip Code MD 21005

County Harford

3. Classification

Category	Ownership	Status	Present use	
X District	X Public	X Occupied	__ Agriculture	__ Museum
__ Building(s)	__ Private	__ Unoccupied	__ Commercial	__ Park
__ Structure	__ Both	__ Work in Progress	__ Educational	__ Private Residence
__ Site	Public Acquisition	Accessible	__ Entertainment	__ Religious
__ Object	__ In Process	__ Yes: Restricted	__ Government	__ Scientific
	__ Being Considered	__ Yes: Unrestricted	__ Industrial	__ Transportation
	__ Not Applicable	X No	X Military	X Other: Storage

4. Owner of Property

Name U.S. Army Aberdeen Proving Ground Support Activity (STEAHP-DIC)

Street & Number Building 310

Telephone No.: (410) 278-6755

City, Town Aberdeen Proving Ground

State and Zip Code MD 21005-5001

5. Location of Legal Description

Courthouse, Registry of Deeds, etc.

Liber# _____ Folio# _____

Street & Number

City, Town

State and Zip Code

6. Representation in Existing Historic Survey

__ Yes __ No

Title

Date

__ Federal __ State __ County __ Local

Depository for Survey Records

City, Town

State and Zip

7. Description

Survey No. HA-1963

Condition

__ Excellent	__ Deteriorated	X Unaltered	X Original Site
X Good	__ Ruins	__ Altered	__ Moved
__ Fair	__ Unexposed		

Overview

Building E5179, one of several Shell Dumps, was built in 1918 as part of Edgewood Arsenal's chemical munitions plant. When the United States entered World War I, it had already been two years since the Germans had initiated the use of chemical warfare. With little knowledge or experience, the government established the U.S. Filling Plant at Edgewood, Maryland. This facility rapidly became one of the foremost production plants, producing all four of the major chemicals used during the war. The Shell Dump played a mundane but necessary role in the process of preparing munitions for shipment overseas. Building E5179 was connected to the operations of Filling Plant No. 2. After the shells had been filled, they were transported by rail to the Shell Dump. There, the filled shells would be stored for 24 hours to test for leaks, painted to indicate the substance contained within, and readied for storage or shipment overseas.

Architectural Description

Building E5179, a Shell Dump, was originally known as Building No. 309. Covering an area of 32,000 square feet, the building was begun on March 22, 1918, and completed on July 15, 1918, for a total cost of $117,810.84. It was one of three such structures built as part of the chemical warfare production center at the fledgling Edgewood Arsenal.

Covered in corrugated metal siding, the building is an immensely long, one-story building with a shed clerestory monitor roof. Building E5158 nearby has been less altered and serves as a visual reminder of what Building E5179 probably looked like. The building is dominated by windows, which line the monitor roof as well as the lengths of the facades.

The building was identical to the Shell Dump constructed in conjunction with Filling Plant No. 1, except that the reinforced concrete slab floor was constructed on steel beams and girders rather than on concrete beams and girders. The machinery in Building E5179 was only partially installed at the time of the end of the war.

The building appears to have undergone major renovations during the 1960s.

8. Significance

Survey No. HA-1963

Period	Areas of Significance			
__ Prehistoric	__ Archeology-Prehistoric	__ Community Planning	__ Landscape Architecture	__ Religion
__ 1400-1499	__ Archeology-Historic	__ Conservation	__ Law	__ Science
__ 1500-1599	__ Agriculture	__ Economics	__ Literature	__ Sculpture
__ 1600-1699	X Architecture	__ Education	X Military	__ Social/Humanit
__ 1700-1799	__ Art	__ Engineering	__ Music	__ Theater
__ 1800-1899	__ Commerce	__ Exploration/Settlement	__ Philosophy	__ Transportation
X 1900-	__ Communications	__ Industry	__ Politics/Govemment	__ Other (specify)
		__ Invention		

Specific Dates	Architect	Builder	Area

Applicable Criteria:	X A	__B	__C	__D			
Applicable Exception	__A	__B	__C	__D	__E	__F	__G
Level of Significance	X National	__State	__Local				

SEE CONTINUATION SHEETS

Overview

Building E5179, a Shell Dump, was part of the first wave of construction at the Edgewood Arsenal. It played an integral part in the site's activities. One of an original grouping of three, the Shell Dump or warehouse was located across the street from the No. 1 Shell Filling Plant (E5126). At the warehouse, 75mm chemical-filled shells, which were prepared in the Shell Filling Plant, were tested for leaks, painted, and readied for shipping.

The Edgewood Arsenal was begun in 1917 for the purpose of producing, assembling, storing, and shipping chemical weapons. Located on Gunpowder Neck, a peninsula created by the Bush and Gunpowder rivers, the land was part of the Aberdeen Proving Ground, which had been established less than a year earlier by the government for large-scale testing and acceptance of weapons. The buildings constructed at the Edgewood site were for the most part permanent ones, due to the dangers inherent in the production. Following World War 1, the site became the headquarters of the Chemical Warfare Service, including a school which trained Army and Navy personnel. Energy was directed towards research and peacetime uses for chemicals. Since its establishment, the Edgewood area of Aberdeen Proving Ground has remained the center of the Army's chemical research program.[1]

World War I

In 1918 the Chemical Warfare Service (CWS), responsible for all facilities and functions relating to toxic chemicals, was officially established by the War Department. All major countries involved in World War 1 were already using chemical warfare by the time that the United States entered the war in 1917. It had already been more than two years since the Germans' widespread use of poison gas, such as the chlorine attack on the French at Ypres, despite the international law adopted in 1907 prohibiting the use of poison. The United States government had little or no experience with chemical warfare, no training, and no equipment. The primary function of the newly-established Arsenal was to be the production of chemicals and the loading of them into shells. With little interest shown by commercial manufacturers in the production of chemical warfare components, the government had elected to erect its own chemical production plant. Despite a lack of knowledge on the subject, by the conclusion of the war the United States became a leader in the field of chemical warfare. During the course of one year, four major plants were constructed, creating the largest chemical production facility in the United States and the only one of the countries involved to produce all four major chemicals used during the war.

At the recently established Edgewood Arsenal, three shell filling plants and four chemical production facilities -- for chlorine, phosgene, chloropicrin, and mustard gas -- had been constructed during 1917-18. Chloropicrin, a lethal tearing agent, and mustard gas, a blistering agent, were both in production by June 1918. Phosgene, a lethal choking agent that was responsible for eight of every ten

[1]Mariani & Associates Architects with Robinson & Associates, Inc. (dba Traceries). "Department of Army: Study/Survey of Historically Significant Army Family Housing Quarters," September 1988, p. 16.

chemically-caused deaths during the war, was in production a month later. Although chlorine was already produced by the private sector before the war, it was not being generated in adequate quantities; the production of chlorine at Edgewood was begun two months before the end of the war.[2]

In June of 1917, an experimental filling plant for gas shells was proposed; it fell under the Ordnance Department until the Chemical Warfare Service was established in June 1918. The original elements of construction that were identified included: filling plants, chemical plants, a chlorine plant, an additional power installation, cantonments, a hospital, and storehouses. The plan also proposed a gas-shell proving ground with a laboratory and animal farm.

Shell Filling Process[3]

The gas shells were made of steel or semi-steel and machined inside and out. They were threaded at the point, to receive the plug, which was called a booster. The plug sealed the gas in the shell and also contained the high explosive that would open the shell when the fuse was operated. In filling the shells with poison gas, the gas -- reduced to liquid form -- had to be kept below zero in order to prevent any noxious fumes from being emitted during the process. The danger to workers was immense, as anything that came into contact with the gas would be contaminated. Consequently, an elaborate system of mechanized handling was created for the shell-filling process.

The No. 2 Filling Plant, which E5179 supported, was the second filling station constructed at Edgewood. It consisted of four wings, each containing two filling tunnels. Three of the tunnels were equipped with cooling conveyors to handle 155mm shells; the fourth wing contained an apron-type conveyor which could take any size shell. The apron conveyor wing, reserved primarily for 8" or 9.2" shells, was not completed before the Armistice.

Both the No. 2 and the No. 3 Filling Plants had special features that differed from the first filling station that had been erected (No. 1). Nos. 2 and 3 were outfitted to handle mustard gas, which did not require refrigeration. The No. 2 plant was designed with cooling conveyors to handle 155mm shells in three wings and an apron-type conveyor in one wing that could handle any size shell. The apron-type conveyor wing, reserved for 8" or 9.2" shells, was not completed before the end of the war.[4]

Mustard gas had been introduced by the Germans in July 1917. The gas had been recognized as a serious and extremely effective weapon, but England and France were slow to develop manufacturing capacity. It was not until April 1918 that enough information had been gathered to begin production of a large-scale plant. With assistance from various experimental units run by the government and by

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[2]Sterling, Keir. "Aberdeen Proving Ground: The Early Years," p. 67.

[3]R.C. Marshall, "Method of Filling Shells with Poison Gas," Report on Construction of Filling Plants.

[4]R.C. Marshall, *Report on Construction of Filling Plants at Edgewood Arsenal*. March 1919.

private sector operations such as the Dow Chemical Company, the United States was producing mustard gas by June of 1918. By the end of the war, in fact, the United States was capable of producing some sixty tons of mustard gas a day, ten times the amount the Germans facilities could produce. The total amount of mustard gas produced at Edgewood was 711 tons, of which approximately 300 tons went into shell. Because it was believed that toxic gas could not be stored in large quantities, bulk shipments of gas were sent overseas to be loaded into shells.[5]

For those chemicals -- including mustard gas, chlorine, chloropicrin, and phosgene -- that were loaded into shells at Edgewood, an elaborate process was required for filling. First, the empty shells, with a corresponding number of boosters (the plugs used to close the shells), would arrive at the Arsenal by truck. The trucks were then pulled by Edgewood's system of electric locomotives to the filling stations, where the employees lifted them by hand onto conveyor belts. For those shells to be filled with phosgene and chlorine, the conveyor belt moved very slowly through a refrigerated room which, although only 70 feet in length, took over 30 minutes for the shells to transverse. Unlike mustard gas, these chemicals had very low boiling points and thus, to ensure that they remained in liquid form for filling, the shells had to be adequately cooled.

Once the cooling process was completed, the shells were loaded in groups of six onto smaller trucks. These trucks were connected to a chain haul which guided them through a filling tunnel in which the chemicals were automatically loaded into the shells. Once the filling process was finished, the shells continued through the tunnel to a second point at which the workers reached in through an isolated opening to insert the booster into the nose of the shell. The air in the tunnel was constantly recirculated through the use of powerful ventilators, which drew the toxic fumes into adjoining stone towers in which the contaminated air was neutralized. At the end of the tunnel, the filled shells were finally sealed by automatic motors. The process for filling shells with mustard gas was similar to this method of loading shells with phosgene. However, refrigeration was not required for mustard gas and thus, parts of the filling process were different.[6]

Shell Dumps

After being filled with chemicals, the shells arrived via rail to one of the shell dumps, such as Building E5179. They were classified and stored for 24 hours, nose down, to test for leaks. After this test period, the shells were transferred to the far end of the shell dumps. There they were painted with stripes to indicate the nature of the filling material used, and stenciled by an airbrush [see Figure 000]. Finally, they were packed in boxes and transported to storage magazines, ready for shipment overseas [see MHT Form on Building E1958].

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[5]Crowell, The Armies of Industry, pp. 493-502. The amount produced was significantly less than the filling capacity of the Arsenal, primarily because the supply of boosters and shells was not adequate.

[6]Benedict Crowell and Robert Forrest Wilson, The Armies of Industry: Our Nation's Manufacture of Munitions for a World in Arms 1917-18, p. 504-506.

Building E5179, which served as the shipping shell dumps, and Building E5178, its corresponding receiving shell dumps, were part of Filling Plant No. 2. E5178, a smaller loading dock building was situated next to E5179, and used for receiving. It would prepare the shells for the filling station. The larger E5179 was used to process the shells after they had been filled.

Operations at Edgewood, including all activities related to the filling stations, were carried out by enlisted men. Troops were called out to operate many of the military's manufacturing plants, especially dangerous ones such as Edgewood, "where military discipline alone could ensure the maximum of industrial safety, and where it was impossible to retain civilian workmen."[7]

These filling stations did not operate at full capacity. Built in an astonishingly short period of time, the plants were nonetheless hampered by a limited supply of shells and boosters. These elements were manufactured elsewhere and shipped to Edgewood. Despite these limitations, several thousand tons of gas were shipped to England and France in bulk. Before the signing of the Armistice, 450,000 75mm shells with poison gas; 400,000 hand grenades with gas or phosphorous; 18,600 Livens projectiles with poison gas; 3,800,000 pounds of chlorpicrin in bulk; 840,000 pounds phosgene in bulk; and 380,000 pounds of mustard gas in bulk were all shipped out of Edgewood.

Subsequent Use of Building

During the interwar years, the Shell Dump building housed the office of the Inspection and Safety Division. This function was removed from the building in 1937.

As the possibility of America's involvement in war increased between 1939 and 1941, the Edgewood Arsenal was put on standby. New chemical plants were constructed and the older equipment repaired and updated. When America entered the war, Edgewood Arsenal's facilities enabled ... New plants generally supplanted the older buildings, such as Building E5179.

At the end of World War II, Building E5179 served as a storehouse and office for the Ordnance Department. In planning for the postwar permanent peacetime operations, Building xxx (old building #73) was transformed into the supply headquarters for the post. For two years, between 1950 and 1952, all general stock was removed from warehouses such as Building E5179, and transferred to Building (original # 73). Building E5179 appears to have been substantially altered in 1955-56, and by 1962, references show the Shell Dump in use again as a general storage building.[8]

[7]Crowell, Road to France, p. 71.

[8]Vertical Files, Office of the Edgewood Historian.

9. Major Bibliographical References

Survey No. HA-1963

SEE CONTINUATION SHEETS

10. Geographical Data

Verbal Boundary Description

The Shell Dump, Building E5179, is bounded on all sides by roads. Blackhawk Road borders the building on the northeast, 15th Street on the southeast, Webster Road on the southwest, and Hoadley Road on the northwest.

11. Form Prepared by

Name/Title Heather Ewing and Judith Robinson, Architectural Historians

Organization Robinson & Associates, Inc. Date March 20, 1996

Street & Number 1909 Q Street, NW Telephone (202) 234-2333

City or Town Washington, D.C. State 20009

Concurrence of State Preservation Officer

The Maryland Historic Sites Inventory was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

Return to: Maryland Historical Trust
DHCP/DHCD
100 Community Place
Crownsville, Maryland 21032-2023
(410) 514-7600

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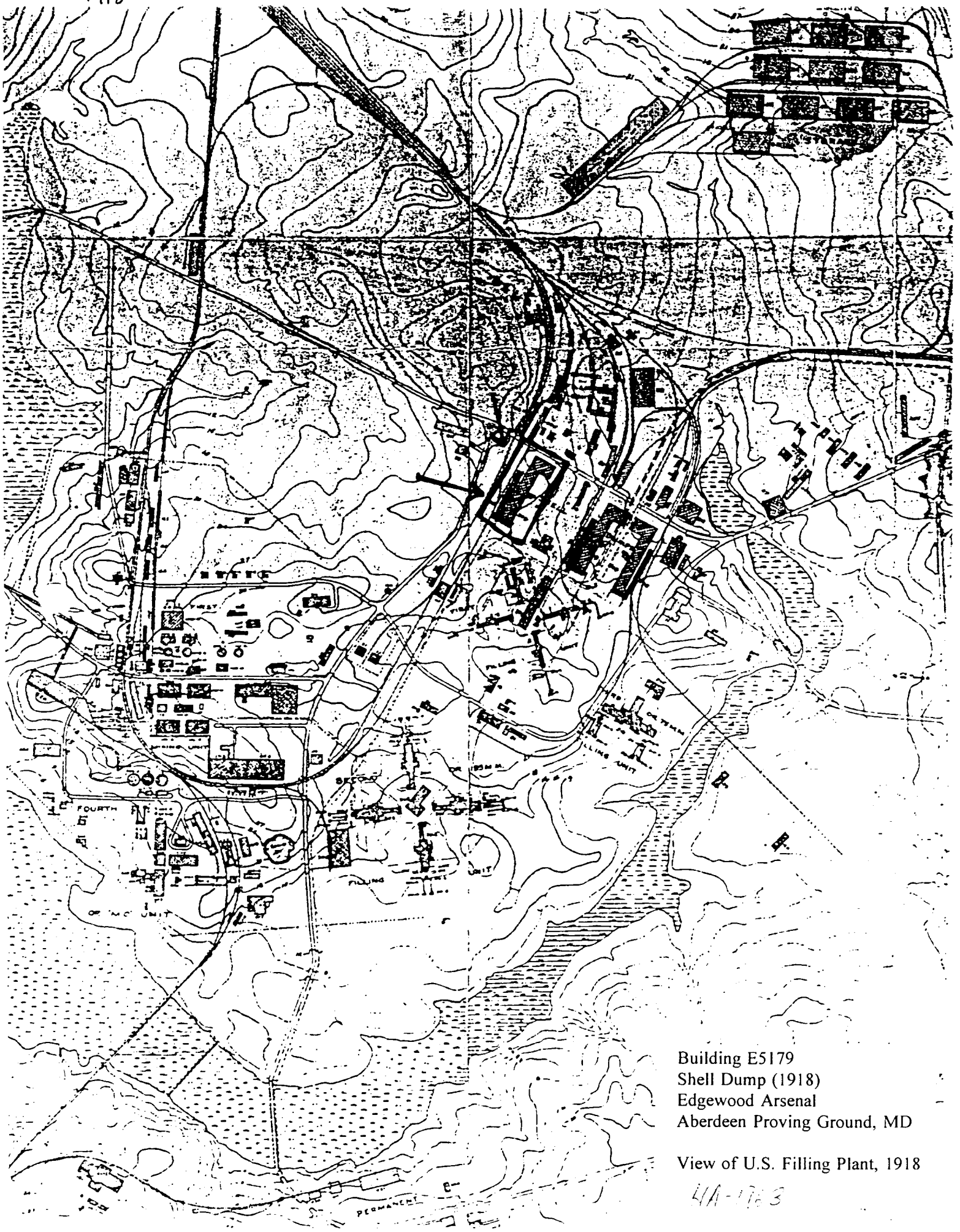
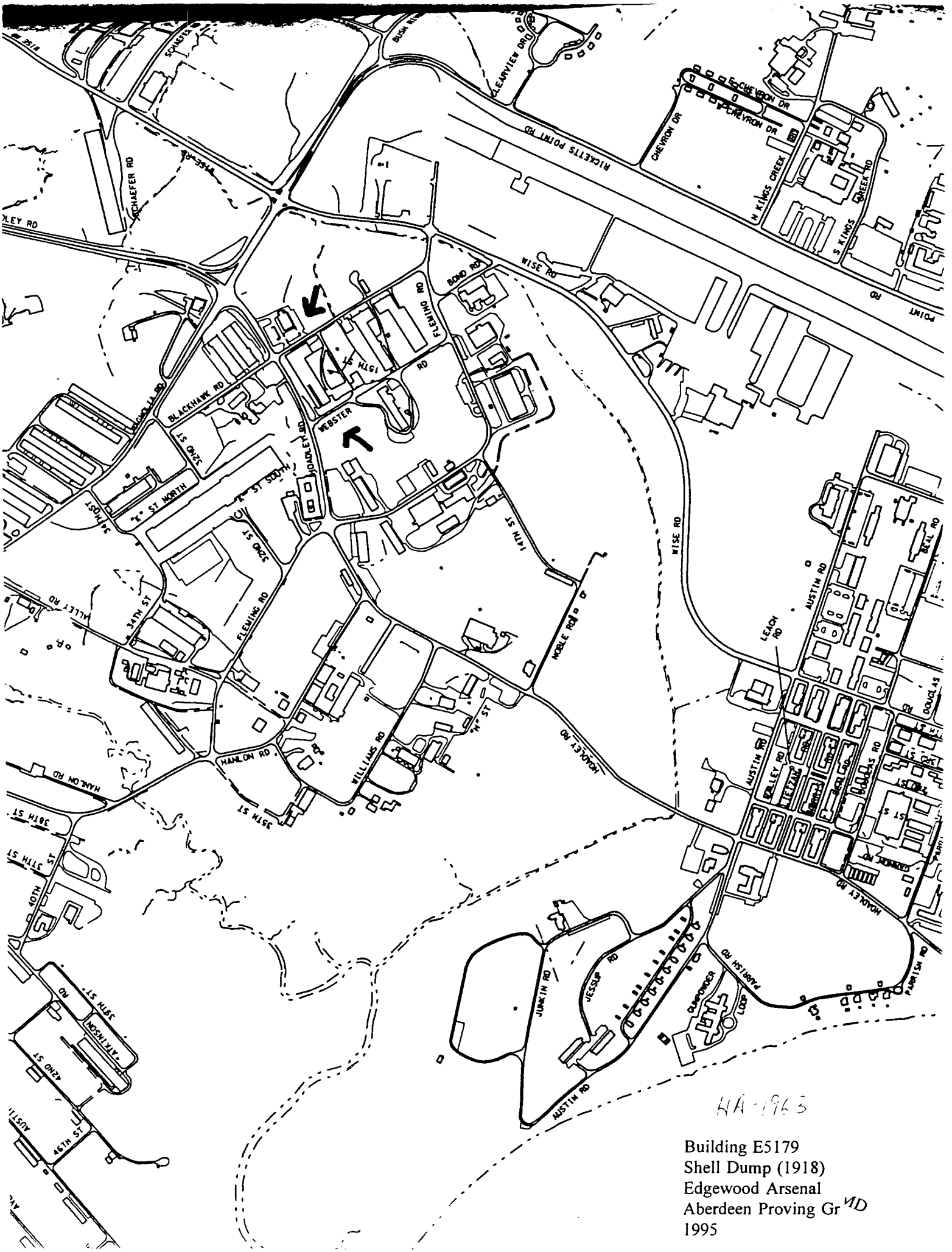
1918 1918



Building E5179
Shell Dump (1918)
Edgewood Arsenal
Aberdeen Proving Ground, MD

View of U.S. Filling Plant, 1918

4A-1763



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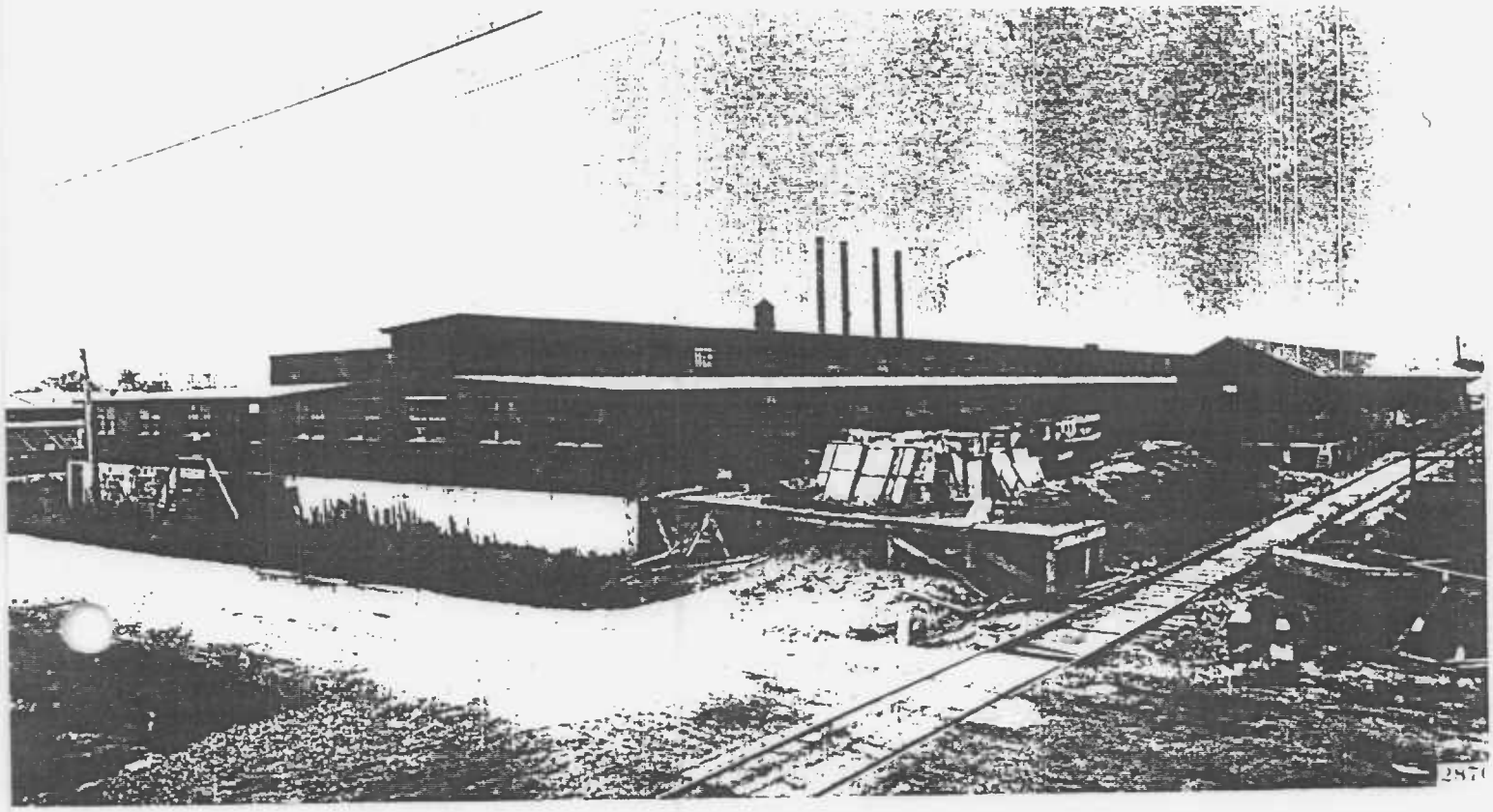
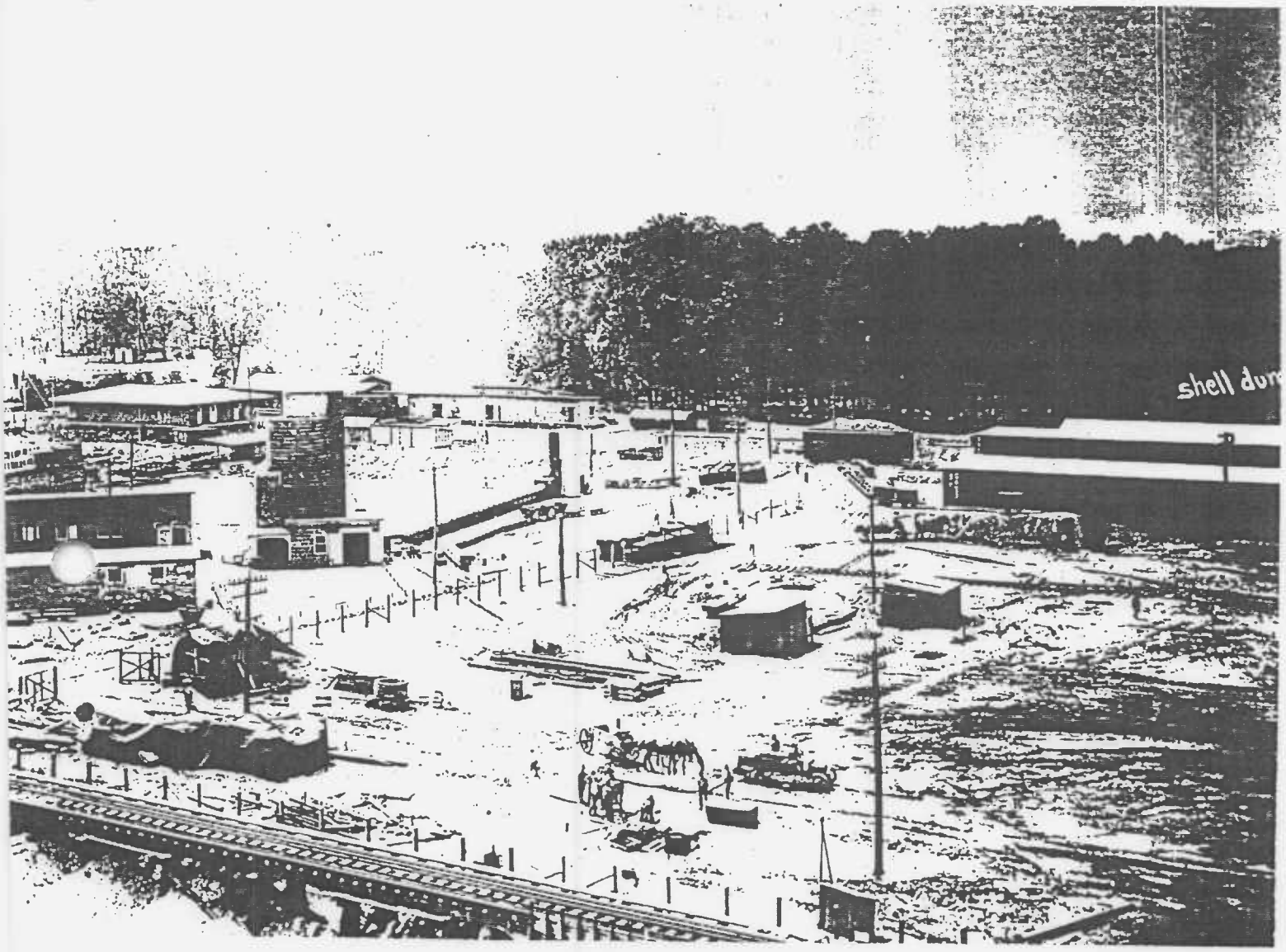
Aberdeen Proving Gr ND
1995

HA-1963



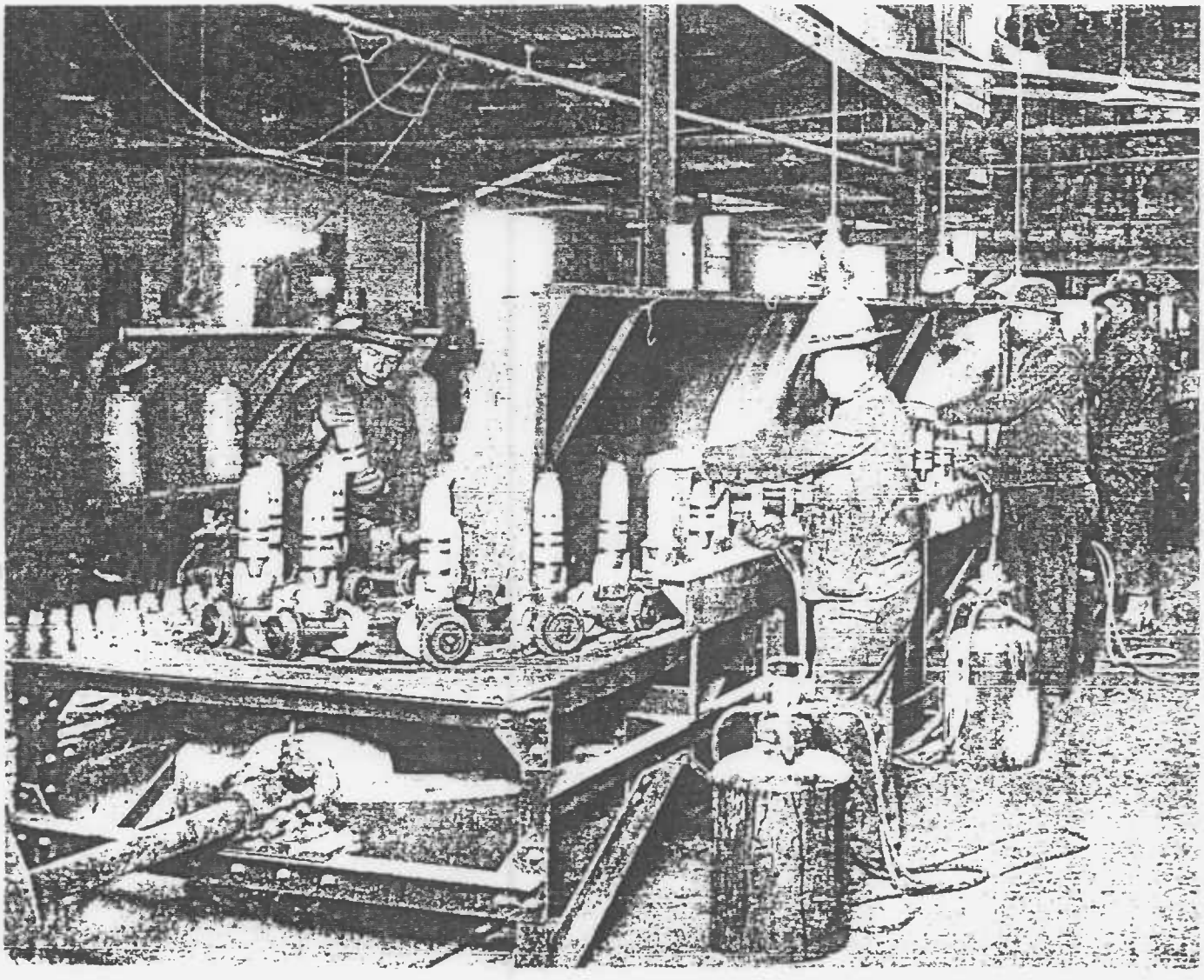
Building E5179
Shell Dumps (1918)
Edgewood Arsenal
Aberdeen Proving Ground, MD
c. 1918

HA-1963



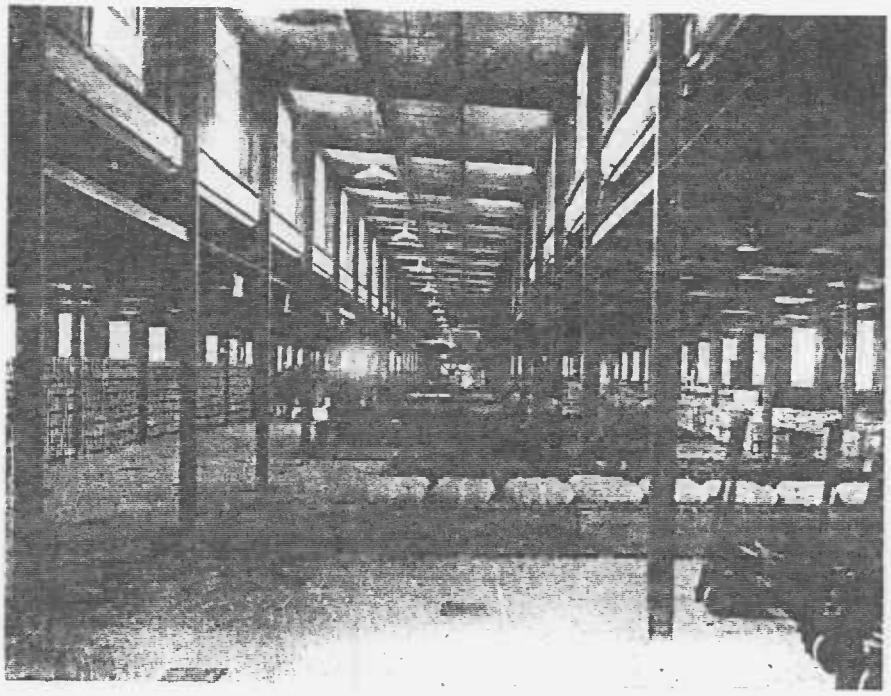
Building E5179
Shell Dumps (1918)
Edgewood Arsenal
Aberdeen Proving Ground, MD
c. 1918

View of part of the U.S. Filling Plant, Edgewood Arsenal



Interior View of Typical Shell Dump

Painting and Striping Shell and Liven Drums



Interior View of a Typical Shell Dump

Building E5179
Shell Dumps (1918)
Edgewood Arsenal
Aberdeen Proving Ground, MD
1995