

United States Helium Production Plant No. 1
(Federal Aviation Administration Southwest Regional Office)
4400 Blue Mound Road
Fort Worth
Tarrant County
Texas

HABS No. TX-3487

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDING SURVEY
Southwest System Support Office
National Park Service
P.O. Box 728
Santa Fe, New Mexico 87504

HISTORIC AMERICAN BUILDINGS SURVEY

UNITED STATES HELIUM PRODUCTION PLANT No. 1 (Federal Aviation Administration Southwest Regional Office)

HABS No. TX-3487-A Office and Laboratory (Building No. 1) HABS No. TX-3487
HABS No. TX-3487-B Separation Building (Building No. 2)
HABS No. TX-3487-C Compression Building (Building No. 3)
HABS No. TX-3487-D Helium Cylinder Storage Building (Building No. 7)
HABS No. TX-3487-E Pressure Reducer House (Building No. 11)
HABS No. TX-3487-F Pump House, Sluiceway, and Pond

LOCATION: 4400 Blue Mound Road, Ft. Worth, Tarrant County, Texas

USGS: Haltom City Quadrangle

UTM COORDINATES: 14.655350.3632730

DATE OF
CONSTRUCTION: 1918

ARCHITECT, BUILDER: United States Navy, Bureau of Yards and Docks

PRESENT OWNER: Federal Aviation Administration

PRESENT USE: Vacant

SIGNIFICANCE: The complex is historically significant for its use as an early twentieth century helium production plant. A total of twenty-two buildings and structures remain extant within the complex. Of these twenty-two buildings and structures, six are original to the helium production facility. These six buildings and structures are the Office and Laboratory (Building 1), the Separation Building (Building 2), the Compression Building (Building 3), the Helium Cylinder Storage Building (Building 7), the Pressure Reducer House (original Building 11), and the Pumphouse/Sluiceway/Pond. The complex, constructed immediately after World War I, became the first facility in the world to extract helium from natural gas in commercial quantities. The United States Helium Plant No. 1 was a key component of the United States Strategic Materials Program.

HISTORICAL INFORMATION

A. PHYSICAL HISTORY

Date of erection: Construction of the United States Helium Production Plant No. 1 began in 1919 and was completed in 1921 (Navy Department 1921).

Architect: The United States Helium Production Plant No. 1 was built according to plans and specification drawn up by the United States Navy Bureau of Yards and Docks.

Original and subsequent owners:

1921 United States Department of the Navy.

1925 United States Bureau of Mines, H. R. 5722 (March 3, 1925).

1929 United States Department of Commerce, Lighthouse Service, Airways Division

1947 United States Civil Aeronautics Administration.

Builder, contractor, suppliers: Unknown

Original plans and construction: The United States Helium Production Plant No. 1 was built according to designs supplied by the United States Navy Bureau of Yards and Docks. As-built drawings are located at the National Archives and Records Administration, Record Group 71, Washington, D.C. Correspondence concerning the facility may be found in Record Groups 70, 72, and 80.

Alterations and additions: Several buildings were added to the facility in the years since its original construction. Building 4 was added in 1953; Buildings 5 and 9, World War II temporary wooden buildings, were probably moved to this location from elsewhere; Building 6 was added in the 1950s; Building 8 was constructed in the 1950s in the area where the gas holding tanks were formerly located; a number of storage sheds and a carport are of recent vintage. Two entry guardhouses were built in the 1960s.

B. HISTORICAL CONTEXT

Historical Development: North Fort Worth, Texas, where the first helium-extraction facility in the United States was built in 1917, was established after the Mexican War in 1849. Until about the end of the nineteenth century the area was home to scattered farmsteads. These farmsteads were linked to Fort Worth by the first permanent crossing of the Trinity River in the late 1860s or early 1870s. Fort Worth was a major stopping point for the cattle drives along the Chisholm Trail from southern Texas to Abilene, and cattle became an important industry for the town. The last quarter of the nineteenth century saw the arrival of a number of railroads, which marked the town as a primary rail center while it ended the cattle drives along the Chisholm Trail. Fort Worth turned to dressed beef, which it could ship out on the railroads to cities in the north, east, and west.

In the early twentieth century oil became an important commodity in Fort Worth. In 1910 the Lone Star Gas Company began providing natural gas, a by-product of petroleum, to the Fort Worth area from their Petrolia gas fields in Wichita Falls, Texas. The Lone Star Gas Company continues in operation today, providing natural gas to Fort Worth consumers. By 1910 also, the city had grown in size to thirty square miles, having annexed numerous suburban communities, including the large, incorporated community of North Fort Worth. In 1911 and 1915 two oil refineries, Gulf Oil and Magnolia Petroleum Company, started operations in Fort Worth. Fort Worth was centrally located with excellent rail facilities so pipeline and refinery companies flocked to the city. Fort Worth was a logical site for the future location of the United States helium extraction facility when it was discovered that the natural gas at the Petrolia gas fields, owned by the Lone Star Gas Company, contained such large amounts of helium.

Helium, as a separate element, was first identified by J. Norman Lockyer, an English astrophysicist, through use of a spectroscope while conducting research on sun spot light (Stewart 1933:7). Lockyer called the new element helium after the Greek word *helios*, meaning sun. A second, independent identification of helium was made at about the same time by the French astronomer, Pierre Janssen, while observing an eclipse from India in 1868 (Stewart 1933:8). This knowledge was of only academic interest until Sir William Ramsey discovered helium on earth while conducting experimental research on argon at the University of London in 1895 (Stewart 1933:11). Even then, for many years no practical use for helium was found. Helium is relatively rare on earth, occurring in only a few locations. It is an ideal agent for use in lighter-than-air craft because of its inert properties and its specific gravity, which is lighter than any other element except hydrogen.

Hydrogen-filled balloons were first used as observation posts by the Union forces in the American Civil War, where they were seen by the German military attache, Count Ferdinand von Zeppelin. Zeppelin conceived the idea of rigid lighter-than-air craft, and when he returned to Germany, he built such a ship that was capable of travelling thousands of miles at a speed of fifty to seventy-five miles per hour (FAA 1994:1). The disadvantage of hydrogen-filled dirigibles was their vulnerability to fire because hydrogen is so highly flammable, a single spark could bring the ship crashing to the ground in a fiery mass. Helium has ninety-two percent of hydrogen's buoyancy and is non-flammable, making it an excellent commodity for use in lighter-than-air craft. Its only disadvantage was its scarcity.

Germany built and used hydrogen-filled zeppelins, as they were called, in World War I in bombing raids over London and as advanced observation posts for sighting enemy ships at sea. Both sides in the war recognized the advantage of using lighter-than-air craft, and both recognized equally the disadvantage of using hydrogen. However, neither the British nor the Germans had access to supplies of helium. Early in the war, the British had approached the United States, requesting assistance in locating supplies of helium that would be sufficient for use in dirigibles. Although scientific experiments were being performed on helium at the University of Kansas, the United States was not at war and was required to maintain a neutral stance in the European conflict. Not until the Americans entered the war in 1917 would large-scale efforts be made in the United States to extract helium from natural gas (Seibel 1968). At last the academic interest in helium production found a practical use for the element.

Within a week of the United States entry into the war, plans were advanced and funds appropriated to build three experimental helium extraction facilities, using three different extraction processes. Fifty thousand dollars each were given by the Departments of War and the Navy to the United States Bureau of Mines to build the facility. Since helium for military purposes would be a strategic material, great secrecy would have to surround its production. During the war, helium was first called "X" gas, then referred to as "argon" lest the Germans learn that the United States had developed the means to produce the gas in large quantities.

Helium is extracted from natural gas by a process of liquifying the other gases, which liquify at temperatures higher than that of helium, and recovering the helium in gaseous form. The process developed by the Linde Air Products Company at their experimental plant No. 1 was chosen as the most promising of the three. Basically, this process consisted of compressing and cooling the natural gas as it came in from the pipeline. Hydrocarbons, oxygen, and nitrogen condense under the alternate compression and refrigeration, and can be removed. Carbon dioxide is removed when limewater is sprayed into the incoming gas. The helium that remains as a gas is not affected by the compression and refrigeration that liquifies the other gases, and can be recovered and stored in high-pressure cylinders. Until the construction of the experimental extraction

facilities in 1917, there was only about one-half of one cubic foot of helium in the United States, valued at approximately \$2,500 per cubic foot. By the end of World War I, the experimental extraction plants had produced 225,000 cubic feet of helium. When the armistice was signed ending the war, there were 750 steel cylinders of highly compressed helium sitting on the dock in New Orleans, awaiting shipment to France. They would have been the first shipment of helium to the war, but they were instead shipped back to Fort Worth. Nevertheless, the experimental extraction plants had proven the feasibility of producing large quantities of helium economically.

C. SPECIFIC HISTORY OF THE SITE

So successful was the experimental helium extraction plant operated by the Linde Company that they were given a contract on October 22, 1918, for a permanent helium production plant. The "United States Helium Production Plant No. 1" began production of helium under the jurisdiction of the United States Navy in April 1921. The facility, located adjacent to, and south of the Fort Worth and Denver City Railroad, occupied 19.4 acres of land, including a creek bed in the southwest corner of the site. This permanent plant was located mostly on the site that was formerly experimental Plant No. 2. Experimental Plants 1 and 2 were located right next to each other, and jointly occupied three acres to the north of, and adjacent to, the Fort Worth and Denver City Railroad. The new production plant was jointly designed by the Bureau of Engineering, the Bureau of Yards and Docks, and the Linde Air Products Company (Navy Department 1921:438). The plant facility was constructed by the Bureau of Yards and Docks, which installed all of the equipment except the separation apparatus. The Linde Air Products Company was contracted by the Bureau of Engineering to design, manufacture, and install the separation apparatus. Final construction costs totaled approximately \$3.5 million (FAA 1994:8).

The buildings were placed in relation to each other in the logical sequence required by the extraction process to minimize the amount of piping between buildings (Navy Department 1921:443). The complex included an office and laboratory building, a lime storage shed, a storehouse, a compression building, a separation building, a boiler and pump house, a pressure reducer house, a nitrogen storage cylinder house, a carbon dioxide removal system building, a lime mixing shed, two steel towers for transformers, a transmission line, a sewer system, water, gas, and electrical systems, standard gauge railroad siding, and a road and walks (Navy Specification 3800 1919:2).

The cost of the helium produced at the permanent facility was still relatively expensive in the beginning. In the first four months of operation, the plant produced slightly over 260,000 cubic feet of helium at a cost of approximately \$480 per thousand cubic feet. Later that year, the cost dropped to \$174 per thousand cubic feet. By the end of 1923, the cost dropped to \$30 per thousand cubic feet, with the promise of even greater reduction to \$15 per thousand cubic feet.

On the basis of this expectation, plans were made for a second, larger plant adjacent to plant No. 1. Helium Production Plant No. 2 experienced serious problems procuring the necessary equipment and was delayed so often that finally it was cancelled altogether.

While Production Plant No. 1 was under construction, a comprehensive helium survey of all known gas fields in the United States was conducted by the Bureau of Mines. It was realized that the natural gas at the Petrolia gas field would not last forever, and other sources would be required if helium production were to be continued. One source that would have promise for the future was the Cliffside gas field near Amarillo, Texas.

In 1925, for centralization purposes, a Congressional Act (H.R. 5722, March 3, 1925) transferred all government-related helium activities to the Bureau of Mines, which was established in 1910. This Act made the Bureau of Mines "the sole agency entrusted with the production of helium for Government use, including the acquisition of gas lands, drilling of wells, construction of plants and pipelines, and all other necessary operations." (Bureau of Mines 1960:Section 1.1.17)

In addition to producing helium, the Fort Worth facility was host to Navy airships during the 1920s. In 1924, the *Shenandoah*, a 680-foot long dirigible, was the first to visit. Its home port was Lakehurst, New Jersey, and it was on a cross-country voyage to test its speed and endurance. It arrived at the Production Plant's new mooring mast on October 8. A second and larger passenger airship, the *Los Angeles* visited the site in 1928. Other smaller airships visited, but these huge dirigibles made a profound impression on the citizens of Fort Worth. The mooring mast was constructed in anticipation of the arrival of the *Shenandoah*. The site of the mooring mast was one-half mile northwest of the plant in an eighteen-acre field leased for the purpose. The mast was 160 feet tall and, when secured, the airship could swing around in the wind like a weather vane (FAA 1994:16-20).

The Bureau of Mines controlled operation of Plant No. 1 until January 10, 1929, when the plant officially closed. Natural gas depletion of the Petrolia field had been anticipated, and planning and construction of a new facility began in 1927. This new helium production facility was opened in 1929, designed very similarly to its predecessor. The new plant was located in Amarillo, Texas, supplied by the Amarillo gas field. Some of the apparatus used at the helium plant in Fort Worth was moved to the Amarillo plant for reuse.

When the Petrolia gas fields were depleted and the helium production facility moved to Amarillo, the installation in Fort Worth was taken over by the Airways Division of the Lighthouse Service of the Department of Commerce. The agency was created by the Air Commerce Act of 1926 to establish and maintain airway beacons and intermediate landing fields, and to oversee construction of buildings and towers used by communications services. Through

various transitions, the facility eventually became home to the Southwest Regional Office of the Federal Aviation Administration.

DESCRIPTIVE INFORMATION

Physical Description of the Site: On February 15, 1919, Specification No. 3800, "Argon Production Plant at North Fort Worth, Texas," was released by the Bureau of Yards and Docks, Navy Department. It contained specific requirements and instructions for the construction of the complex and individual buildings. The true nature of the plant was obviously still secret to protect the country's strategic materials even though the war had ended three months earlier. Construction of the helium plant began in the spring of 1919 and was completed in March 1921. The site was approximately nineteen and one-half acres of fairly level cleared land. The whole site was surrounded by a fence. On the southwestern section of the site was a creek running in a south by southeasterly direction. This creek was subsequently channeled into a sluiceway that drained into a pond used for cooling the plant's generators. A spur of the Fort Worth and Denver City Railroad crossed the grounds north of the separation and compression buildings (Buildings 2 and 3). The first building encountered on entering the facility was the two-story office and laboratory building (Building 1) located north of the railroad spur. South of the rail spur were Building 2, the separation building, originally one story with a 42-foot tall clerestory central block, and Building 3, the compressor building. Buildings 2 and 3 were separated by a space holding seven large gas holding tanks and Building 7, a storehouse. Two rows of additional gas holding tanks stood north of Building 7, directly across the rail spur. In the northeast corner of the facility were Building 10, the plant's power system, and the settlement basin/cooling pond. The original Building 11, the pressure reducer house that held the valves that controlled the flow of natural gas into and out of the plant, was located on the north side of the complex, north of the holding tanks. There were, in addition, a building for carbon dioxide removal, a lime-mixing shed and a lime storage shed (Navy Department 1921:445). None of these latter three buildings remains. The War Industries Board requested that none of the buildings at the facility be built of structural steel. As a result, all of the principal buildings were constructed of cast-in-place light concrete; some of the lesser buildings were frame covered with stucco.

Current Features and Appearance: Today, the gas holding tanks are gone. In their place and throughout the complex are live oak trees. Only certain components of the early complex remain. They are as follows: Building 1, Office and Laboratory; Building 2, Separation Building; Building 3, Compression Building; Building 7, Cylinder Storage Building; Building 11, Pressure Reducer Building; and the Sluiceway/Pumphouse/Pond. Several newer buildings, constructed after the helium plant ceased operation, have been added to the complex. Building 4 was completed as a warehouse in 1953. Building 5, a World War II temporary wooden building, was probably moved to this location. Building 6, a shop, was completed ca. 1950s. The

cafeteria, Building 8, was constructed in the area between Buildings 2 and 3, where the gas holding tanks formerly were located. Building 9, also a World War II temporary frame structure, was probably moved to this location from elsewhere. A number of storage sheds and a carport have been added recently. Two entry guardhouses were built in the 1960s at the west and south entrances to the complex.

SOURCES OF INFORMATION

A. ARCHITECTURAL DRAWINGS

Record Group 71, Entry 649. Bureau of Yards and Docks, Facility Blueprints. On microfilm file, National Archives, College Park, Maryland.

B. HISTORIC VIEWS

Record Group 72, Entry 162, Boxes 1, 16, 25. Bureau of Aeronautics, Helium Plant Material, 1919-1930. On file, National Archives, Washington, D.C.

C. BIBLIOGRAPHY

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Record Group 71. Bureau of Yards and Docks, General Correspondence, Shore Establishments, 1918-1925. On file, National Archives, Washington, D.C.

Record Group 71, Entry 649. Bureau of Yards and Docks, Facility Blueprints. On microfilm file, National Archives, College Park, Maryland.

Record Group 72, Entry 62. Bureau of Aeronautics, General Correspondence, 1925-1942. On file, National Archives, Washington, D.C.

Record Group 72, Entry 162. Bureau of Aeronautics, Helium Plant Material, 1919-1930. On file, National Archives, Washington, D.C.

Record Group 80, General Records of the Navy, Secretary of the Navy Correspondence, 1916-1926

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Texas Historical Commission to Federal Aviation Administration. Correspondance, James W. Steely (DSHPO) to Sharon E. Wynn. December 22, 1994.

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Turner, Scott. *Information Circular, About Helium (I.C. 6745)*. United States Bureau of Mines.

D. LIKELY SOURCES NOT YET INVESTIGATED

There are a number of repositories and facilities, both in the state of Texas as well as elsewhere, that have the potential to contain records or information pertaining to the former United States Helium Production Plant located at 4400 Blue Mound Road, in North Fort Worth, Texas. In addition to the following list, the potential for oral history accounts is a promising avenue for further research. The two FAA publications listed in the bibliography above were very useful in preparation of this document, and they contain several accounts from local residents employed at the former Helium Plant, many of which could be pursued as further leads. The following is a list for continuation of, or augmentation to, the results of the research presented in this document. The following list is arranged in no particular order, and should not be considered conclusive.

Various archived/microfilmed newspapers/periodicals in the collections of various state public libraries, particularly in Amarillo, Texas, and Wichita Falls, Texas.

Various files and collections at Texas Universities

Federal Aviation Administration Records Facility, Cincinnati, Ohio

City of Fort Worth Planning Department - Historic Building Permits

Navy Historical Foundation

Department of the Interior Library

National Science Foundation

Records of the Lone Star Gas Company

Records of the Linde Company, New York

Records of the Air Reduction Company, New York

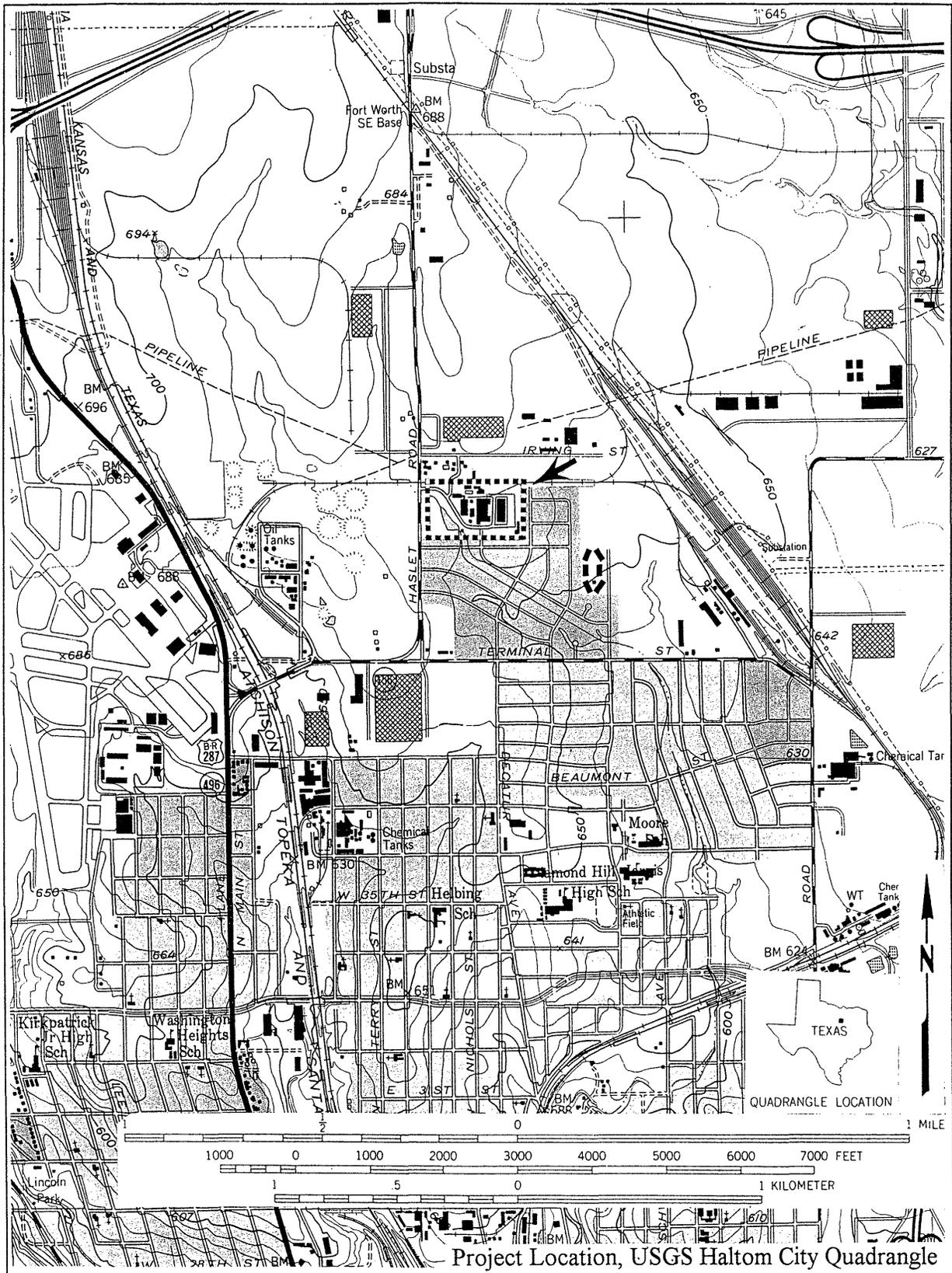
PROJECT INFORMATION

The site of the former United States Helium Production Plant, which is also the former site of the Southwest Regional Headquarters of the Federal Aviation Administration (FAA), and currently owned by FAA, is scheduled for transfer to the General Services Administration (GSA) for disposal. The site of the former United States Helium Plant was first identified for its historical significance during the Tarrant County Historic Resources Survey in 1989, conducted by the Historic Preservation Council for Tarrant County. The survey determined that this resource appeared to be eligible for the National Register. The Texas Historical Commission concurred with this recommendation, and determined the property eligible for the National Register of Historic Places under Criterion A for its significance as an early twentieth century helium plant, designed to research and extract helium from natural gas (Texas Historical Commission to FAA 12/94). In 1994, the Corps of Engineers, on behalf of the FAA, performed a survey and evaluation of historic properties at the former FAA Southwest Regional Office/United States Helium Production Plant. This effort concluded that six features at the site met the criteria of eligibility for inclusion in the National Register of Historic Places. These six features (Building Nos. 1, 2, 3, 7, 11, and the Pumphouse/Sluiceway/Pond) are discussed in this documentation package.

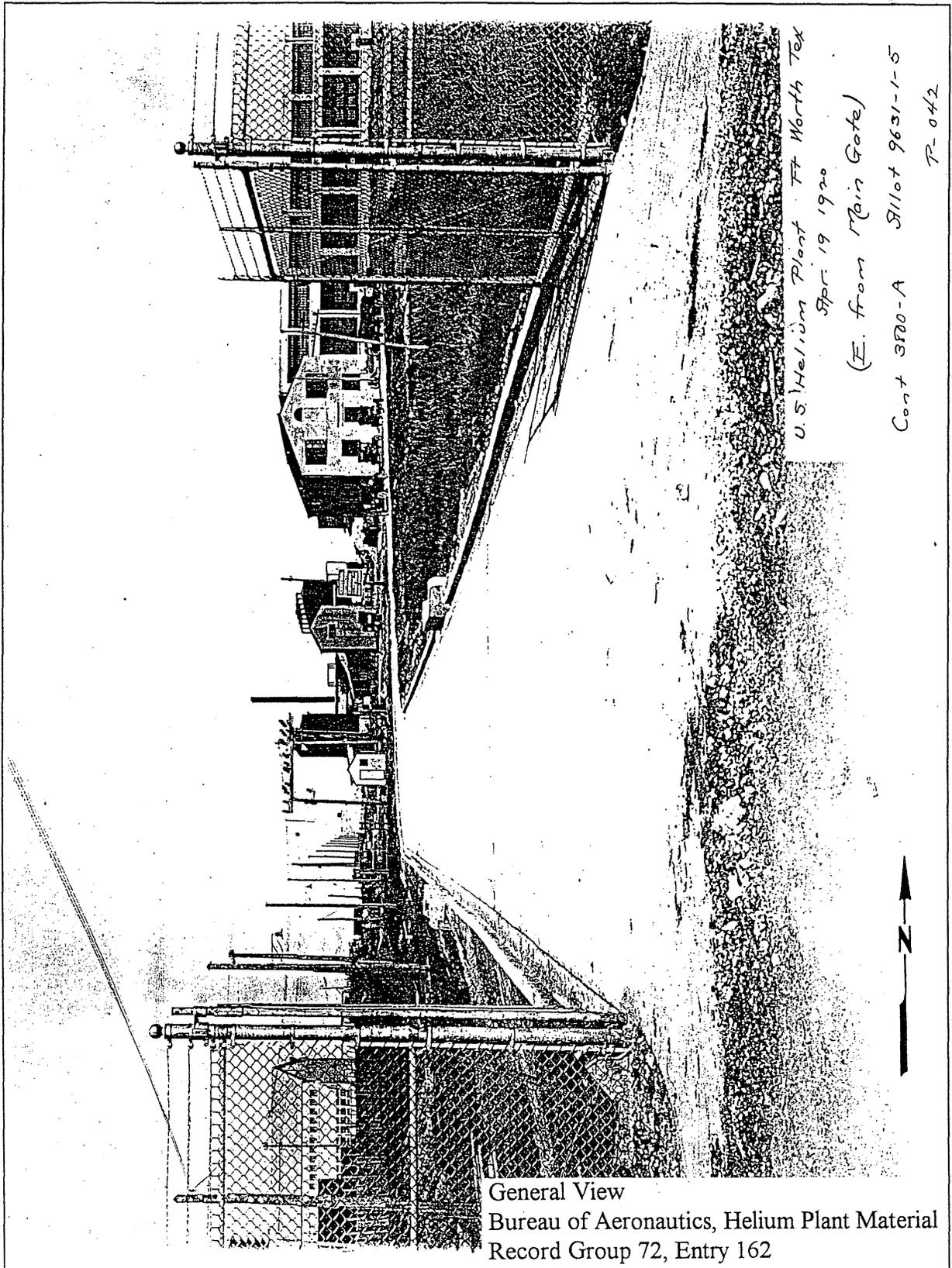
Prepared by: Alice Crampton, M.A.
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Historian
Affiliation: Parsons Engineering Science, Inc.
Date: April 9, 1998

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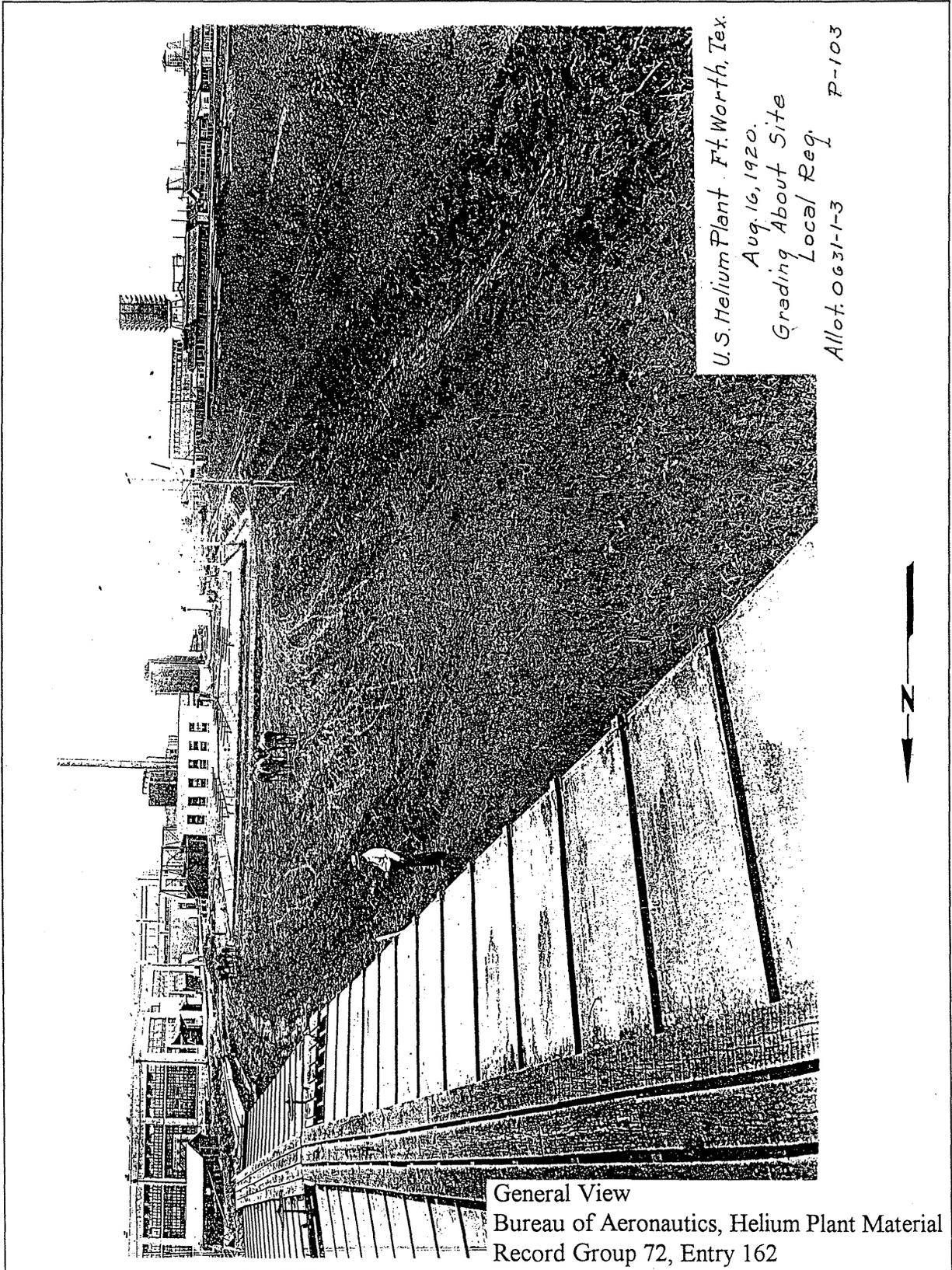
GRAPHIC DOCUMENTATION



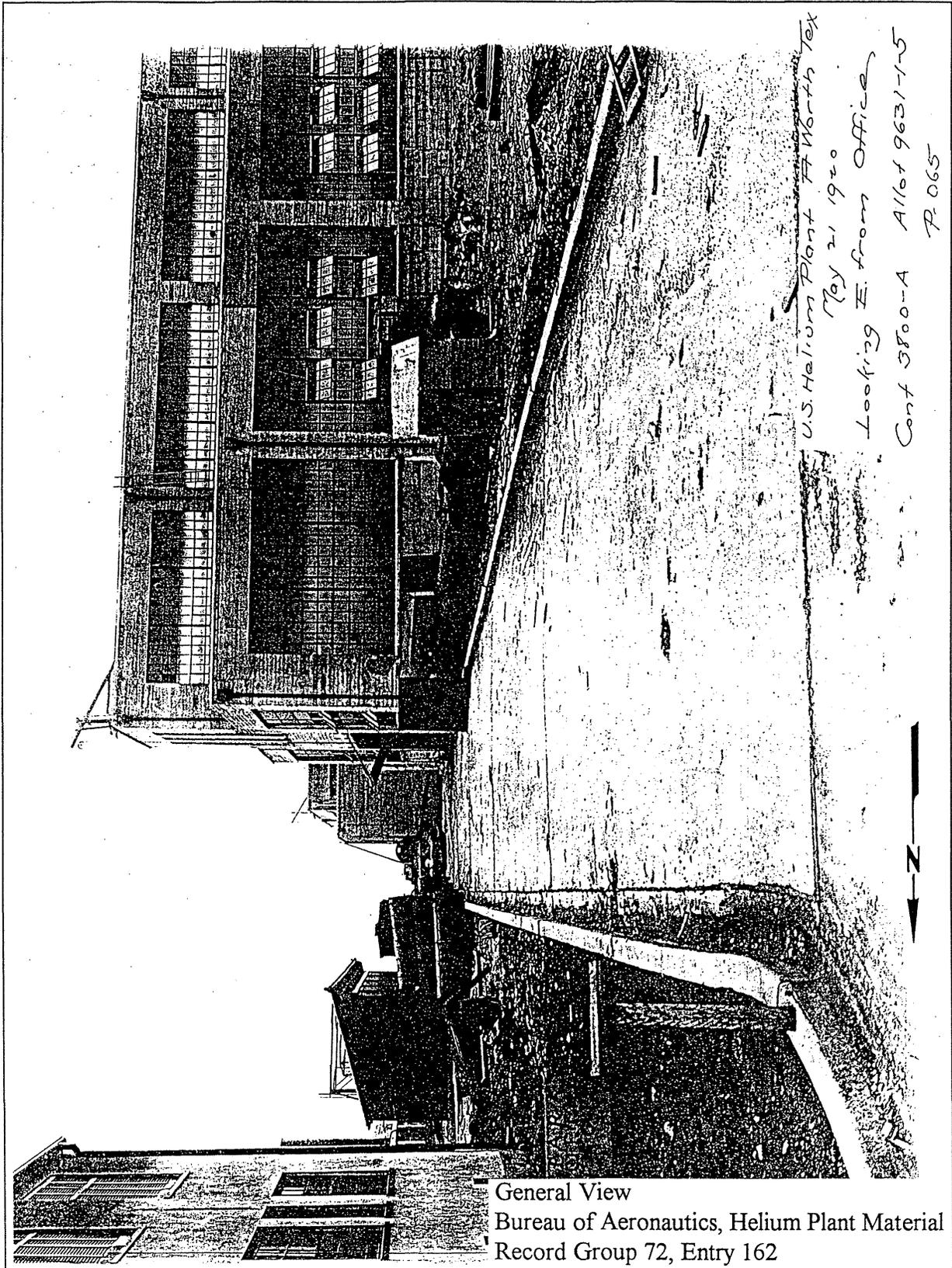
Project Location, USGS Haltom City Quadrangle



General View
Bureau of Aeronautics, Helium Plant Material
Record Group 72, Entry 162



General View
Bureau of Aeronautics, Helium Plant Material
Record Group 72, Entry 162

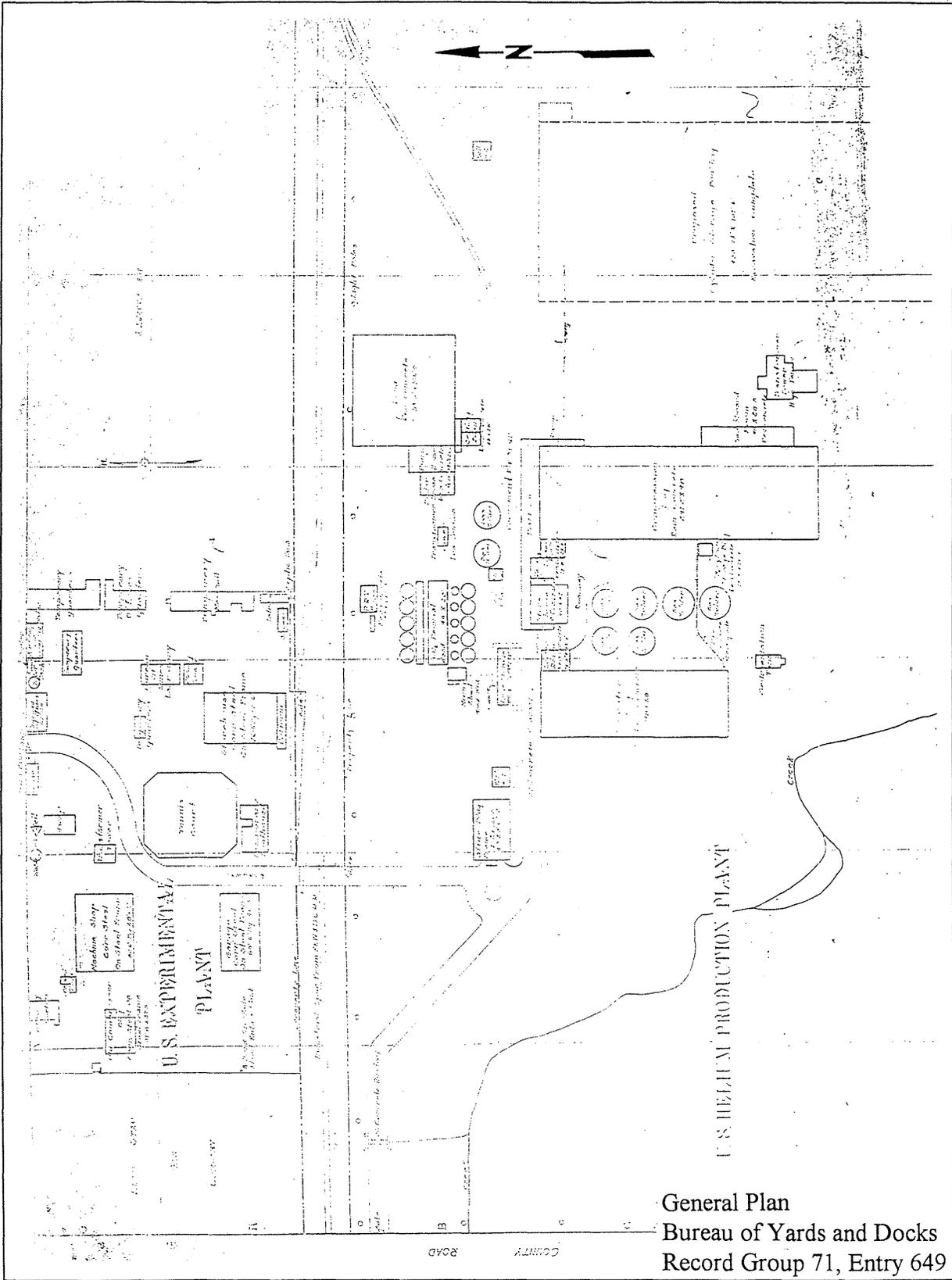


General View
Bureau of Aeronautics, Helium Plant Material
Record Group 72, Entry 162

Fiscal Year -1-9-2-3-					Fiscal Year -1-9-2-4-				
MONTHS	Helium Produced in Cuft.	Nat. Gas Processed in M. Cuft.	Nat. Gas Consumed in M. Cuft.	Loss in %	Loss in %	Nat. Gas Consumed in M. Cuft.	Nat. Gas Processed in M. Cuft.	Helium Produced in Cuft.	MONTHS
January	458,330	78,674	14,270	18.15	21.95	23,686	107,778	731,890	December
February	440,090	77,507	14,323	18.46	16.72	17,086	102,188	590,065	November
March	604,020	97,897	17,341	17.72	15.28	15,794	103,350	636,140	October
April	627,940	113,439	13,738	12.07	9.90	9,792	98,984	321,140	September
May	472,000	101,267	12,669	12.51	10.83	12,496	115,301	485,820	August
June	322,800	84,527	12,511	14.80	10.66	11,963	112,221	588,170	July

1922
%
Oct 13.05
Nov 17.80
Dec 13.12

Selected Statistics
Bureau of Aeronautics, Helium Plant Material
Record Group 72, Entry 162



General Plan
Bureau of Yards and Docks
Record Group 71, Entry 649

