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Lawrence Livermore National Laboratory
Site 300 Process Area
HABS/HAER Report

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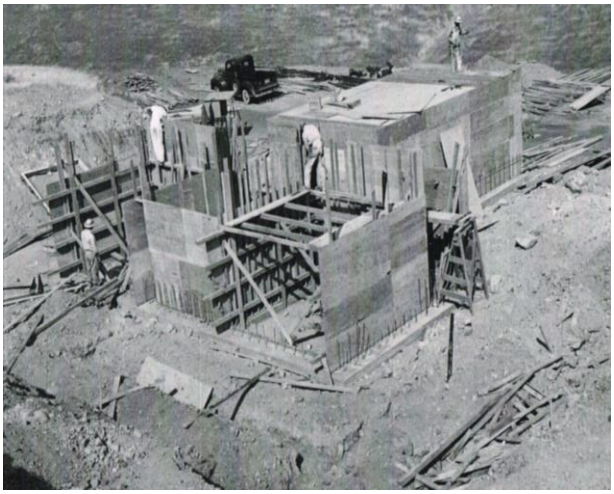

LLNL Site 300, Process Area
HABS/HAER Report

Prepared for
Lawrence Livermore National Laboratory
Livermore, CA

Prepared by
Garavaglia Architecture, Inc. and Alisto Engineering Group
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LAWRENCE LIVERMORE NATIONAL LABORATORY
SITE 300: PROCESS AREA DISTRICT

EXECUTIVE SUMMARY

Background
The Historic Preservation effort is in response to Section 106 of the National Historic Preservation Act dealing with Federal facilities. This document is not intended to serve as an official HABS/HAER Report because the facilities cannot be designated as historic structures. The report documents the special events associated with historic research at the Site 300 facility while allowing the facility to evolve and recycle into new applications and future historic research.

While the Process Area is of historic interest for the period 1957-1992 for its HE formulation and fabrication activities in support of the LLNL Nuclear Weapons design, the District's buildings lack any architectural significance and must continue to support the LLNL new test requirements by adapting to new equipment and on-going uses. It is LLNL intent to continue using the Site 300 facility as a research laboratory and not to "freeze" any of the buildings for historic display. The high security site is not accessible to members of the public and is restricted to very few members of the LLNL employees due to safety considerations.

According to Sullivan and Ulrich 2007 report (page 278): "The Process Area of Site 300 does not qualify for National register consideration under Criterion B, association with a historic figure; Criterion C, exceptional design or architectural significance; or Criterion D, potential to reveal information not found elsewhere. No person of historic note is associated with this district. Nor are the designs of the buildings of architectural interest. The Process Area is not, nor will it be a source of important information. The process activities that occurred there are amply documented in the written record."

Project Information: The Process Area continues to be used as a laboratory and research and testing facility for various explosives. Equipment has been replaced over the years to allow for new testing methods, therefore the integrity of the existing systems cannot be preserved for posterity. The record of conditions over time has been documented for future Archival representation to the general public as this report is approved for publication.

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INTRODUCTION

Purpose

The following buildings that will be reviewed in this report :Building 805 (HE Assembly Facility), Buildings 806A and 806B (HE Machining Complex), Building 807 (HE Explosive Preparation Complex), Buildings 817A-H (HE Pressing and Oven Complex), Building 825 (HE Chemical Process Facility/Chemistry Research Building), Building 826 (HE Chemical Process Facility/Additional Chemistry Research Building) and Buildings 827 A, C-E (Chemistry Development Complex).

Project location

Lawrence Livermore National Laboratory's (LLNL) southern portion of Site 300 is a 7,000 acre experimental high explosives (HE) test facility in the Altamont Hills, fifteen miles east of the main Livermore site, in Alameda and San Joaquin Counties, California.

Team

Alisto Engineering
Garavaglia Architecture, Inc.

Methodology

- Alisto Engineers: compile documentation, organize site visits, select relevant drawing and photographs, finalize and edit the Report

- Garavaglia Architecture, Inc.: synthesize existing documentation, site visit, compose report drafts.

Period of Significance

From 1957 to 1991 the aforementioned buildings were highly engaged in research and development of HE for LLNL nuclear weapons designs.[1] The manufacturing processes that occurred at each of these individual buildings were a component of the larger operation to develop and fabricate HE for LLNL's nuclear weapons designs.[2]

Prior to 1955, Lawrence Livermore National Laboratory (LLNL) scientists had relied on other facilities within the nuclear weapons complex to provide high explosives (HE) for nuclear weapons design. Site 300 was obtained to allow LLNL an HE process area for the production of HE prototypes for their burgeoning weapons program. The High Explosive Process Area (Process Area) was built to formulate, mix, cast, press, mechanize and assemble conventional HE for use in the physics package of nuclear weaponry. Built from 1957 to 1968, the core of LLNL's Process Area consists of twenty-six buildings compartmentalized into four main buildings and five building complexes. HE billets for all LLNL-designed nuclear weapons were developed and facilitated by scientists and technicians at the Process Area at Site 300. Subsequently, LLNL was one of two American laboratories that devised and developed nuclear weapons for the U.S. stockpile.

The 2007 LLNL historic context report enumerated basic themes for the Post-Cold War period, which included Nuclear Weapons Testing and High Explosive Testing as subthemes. The 2012 *Five-Year NRHP Re-Evaluation of Historic Building Assessment of LLNL Main Site and Site 300* stated that the Post-Cold War period as a historical theme pertaining to Site 300 will be reevaluated in a 2015 re-evaluation building assessment. The report suggests that the context would potentially evolve to become better understood as more time is to pass, potentially becoming reconceived, "less in juxtaposition to the Cold War and more as a context or set of historic contexts on its own."[3]

CONTEXT

Early LLNL History

The LLNL was established by physicists E. O. Lawrence and Edward Teller, who were affiliated with the Manhattan Engineering District. Lawrence and Teller believed that

[1] Sullivan and Ulrich, 2007, p. 258.

[2] C. P., Webster-Scholten, Ed. *Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300*. Livermore: Lawrence Livermore National Laboratory, 1994. (UCRL-AR-108131) Pp. 13-4-53.

[3] Michael A. Sullivan and K.R. Heidecker. *Five-Year NRHP Re-Evaluation of Historic Building Assessment: LLNL Main Site and Site 300.* Livermore: Lawrence Livermore National Laboratory, 2012, p.9.

the existing Los Alamos National Laboratory (LANL) was not working aggressively enough to achieve the goal of accelerating advancements in nuclear weaponry. The two advocated for the founding of a second laboratory, determined that the design and production of a thermonuclear weapon in a new facility would be the next advancement in nuclear weaponry. Lawrence and Teller's argument was well received by the Atomic Energy Commission (AEC) as American nuclear policymakers felt an urgency to stay ahead of the Soviet Union both technologically and militarily. To deter the use of weaponry by the opposition, policymakers were determined to significantly increase the U.S. stockpile. Convinced that a second laboratory would accelerate the process of building up a nuclear arsenal, the AEC established the LLNL in Livermore, California, in September of 1952 as a nuclear weapons design facility. [4]

Herbert York, the first director of LLNL, created four missions for the new laboratory; including designing thermonuclear weapons, providing diagnostic measurements for weapons tests for LANL and LLNL, developing a controlled thermonuclear reaction for power sources, and basic physics research. York was in strong pursuit of both weapons and non-weapons related research, and felt that a diversified research program at LLNL would attract the country's brightest young scientists.[5]

Establishment of the HE Process Area

LLNL administrators noted the need for a remote site to conduct HE tests for the weapons program in 1953. Considering that obtaining land for a self-sufficient high explosives test site was crucial for the long-term success of the weapons design program, LLNL purchased 3,400 acres of ranch land east of Livermore, California in 1955. The first two buildings of LLNL's Process Area were Building 805 and Building 806, built in 1957 and 1958, respectively. The Process Area would continue to expand to twenty-six buildings with construction being complete in 1968. The HE Process program remained dedicated to the creation and progression of HE for LLNL through the end of the Cold War up to 1991.[6]

Architectural Character of Site 300

Most of the buildings in the Process Area were constructed of poured concrete, concrete block, or cement-asbestos panels with frangible walls to direct blasts in the event of an accidental explosion. Some auxiliary structures are made of corrugated metal. As the buildings present on this site are industrial and serve purely functional purposes, there are no decorative features or trim present. Most buildings were considered expendable due to the explosives they contained. All building hardware is most likely of commercial

[4] Michael A. Sullivan and Rebecca A. Ulrich. *Historic Context and Building Assessments for the Lawrence Livermore National Laboratory Built Environment.* Livermore: Lawrence Livermore National Laboratory, 2007. 247-249.
[5] Herbert York, "Making Weapons, Talking Peace," *Physics Today* (April 1988).
[6] Sullivan and Ulrich, 2007, p. 252-253.

grade, intended for utilitarian purposes. There were few unique characteristics to these buildings as they were purely practical and functional by nature and not visible or accessible to the public.

ARCHITECTURAL ASSESSMENTS

Building 805, HE Assembly Facility

History and physical character

Building

Building 805 was constructed to trim and assemble HE billets (which were manufactured in nearby Building 806) into device designs for hydrodynamic test shots. Building 805 was designed and constructed in three separate increments. Increment 1 was designed in 1955 by LLNL Plant Engineering and completed in 1957. Increment 2 was designed in 1958 by Indenco Engineers of San Leandro and completed in 1959. Following the style of Increment 1, Increment 2 doubled the building's structural size and handling capability.[7] The third and final increment was designed in 1973 by Garretson, Elmendorf, Zinov and Reibin Architects and Engineers of San Francisco and completed in 1975. The construction of Increment 3 in 1975 enclosed the existing two increments within pre-cast and cast-in-place concrete walls. These modifications transformed the entire structure to house an HE lens facility.[8] Highly utilitarian in character, the building is comprised of a long, monolithic volume, void of ornamental features or decorative finish treatments.

Landscape

Auxiliary landscaped features that once contributed to the functions of Building 805 include, cement trenches, unlined disposal lagoons (removed from service in 1985), and a septic tank with two cesspools.

[7] *Ibid.,* 246.
[8] Sullivan and Ulrich, 2007, pp. 261.

Figure 1. Building 805 (LLNL Archives ca. 1980)

Figure 2. Building 805 rear view (LLNL Archives photo ca. 1975)

Exterior

The one story 6,802 gross square foot industrial building is rectangular in footprint, and stands today as a culmination of three building campaigns. The original rectangular 1,100 square foot structure, Increment 1, sits within the eastern portion of the building, measuring 55 feet long and 20 feet wide. To the northeast of the building sits Increment 2, similar in configuration and style to Increment 1, and nearly double in size measuring 2,650 square feet.[9] Extending the entire length of the building's west side, the 1975 addition of Increment 3 added 5,450 gross square feet to the facility.[10]

It appears that poured concrete foundations are found at Building 805. Concrete walkways surround the perimeter of the building. As noted in early construction photographs (1956 and 1959) Building 805 is of steel frame construction.[11] A slight roof overhang projects from the eastern concrete façade to shelter the main walkway.

Increment 1 had 6 inch thick poured concrete exterior walls on all elevations with a concrete masonry unit wall on the southern elevation, enclosing the tool room. Constructed in a similar fashion, Increment 2 doubled the building's overall footprint, extending the building lengthwise with 12 inch concrete walls. The Increment 3 building campaign included a partial wall to the north and full walls to the west and south, enclosing the existing structure. The final addition walls are of pre-cast and cast-in-place concrete construction. The eastern and northern walls are frangible.

Three metal double doors line the eastern façade. Three double doors and three single doors are present at the western elevation. A single casement window, possibly of acrylic glazing, sits in the east façade adjacent to the southernmost pair of doors.

The pitched roof connecting Increments 1 and 2 was originally clad in corrugated cement-asbestos material. Increment 3 of Building 805 features a flat roof with piping and building utilities/mechanical equipment atop.

[9] *Plans, Elevations and Details Trim and Assembly Building. Building Number 805. Phase II Construction*. Livermore: U.S. Atomic Energy Commission University of California Radiation Lab, drawing PSZ55-805-005JA, revised 1956.

[10] *Plot Plan for the H.E. Lens Facility Building 805- Site 300*. San Francisco: Gattetson, Elmendorf, Zinov, Reibin Architects and Engineers, revised 1974.

[11] This assumption is based on construction photographs of Building 805 Increment 1 in 1956 and of Increment 2 in 1959 which depicts Increment 1 still under construction (UCRL Livermore Photograph Numbers 7287 and 16119).

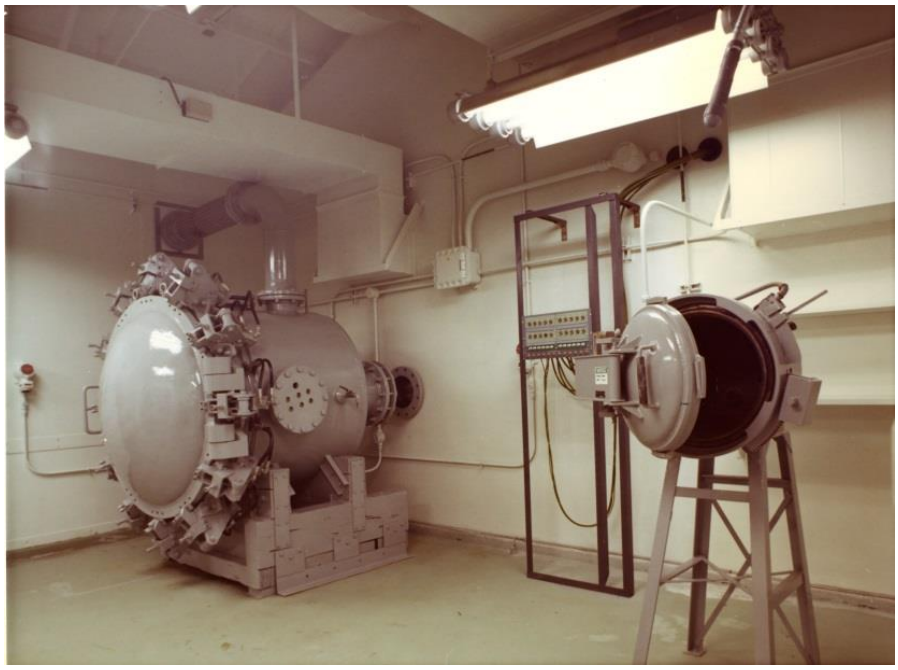

Figure 3. Building 805 (LLNL Archives, ca. 1980)

Figure 4. Building 805 (LLNL Archives, ca.1980)

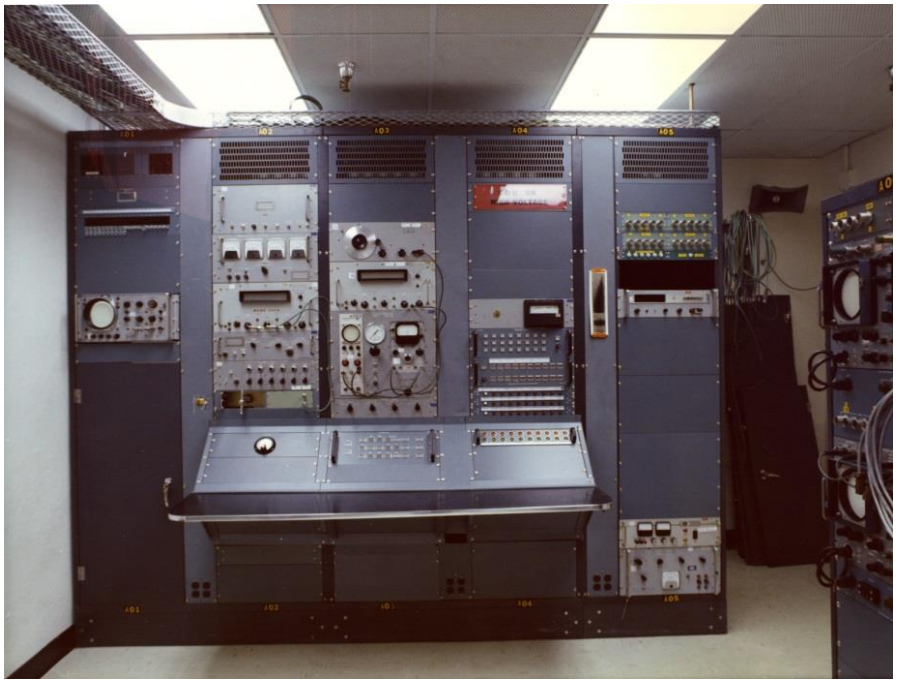

Figure 5. Control panel within Building 805 (LLNL Archives, ca. 1980)

Interior

Configuration

Increment 1 consisted of two large rooms for trim and assembly processes, separated by a central utility room. Larger in its overall footprint, Increment 2 to the north followed an identical floor plan with two large machine rooms, a central utility and control room, and a tool room. This eastern collective portion of the structure was renovated in 1975 to house a press room, HE storage vault, X-ray room, environmental test chamber, support room, firing tank, camera room, and a dark room.

To the west, Increment 3 housed an explosives preparation room, utility room, machine room and technical area, storage room, date reduction room, and office. There are 21 rooms in Building 805; Rooms 101-104, 107, 110, 112, 114, 116, 118, 120, 126, 130, 132, 134, 136, 140, 144 and 148. Increments 1 and 2, and Increment 3 are internally joined by a long central hallway which runs lengthwise through the building. The orientation of the individual rooms to the interior hallways is not regular, and about half of the rooms have direct access to the exterior.[12]

Finishes

[12] *Figure A-1, Facility Floor Plan - Building 805*. TITLE OF REPORT* Appendix A - Facility Plot Plans and Floor Plans. Livermore: LLNL, 15 June 1997.

Vinyl flooring is present in the control rooms, Room 138 (dedicated to the explosives press), and office spaces. Finished concrete comprises the flooring of the radiography room, machine shop, and other laboratory spaces. There is an interior drain trench in the floor of the original HE trim room.[13] The concrete interior walls are finished in plaster and painted white. Vinyl baseboards line the perimeter of each room. The office spaces have acoustical tile ceilings, while the exposed ceilings of laboratory spaces include white painted structural framing and corrugated metal roofing.

Doorways and Doors
Nine of the building's 21 rooms have doors that allow for both interior hallway and exterior access. 11 rooms can be accessed solely from within the interior of the building, while one room is accessed directly from the exterior. There are approximately 23 interior doors within the building.

Mechanical Equipment
The heating, air conditioning, and ventilation equipment of this building is unknown. It appears that much of the mechanics for these systems sits on top of the flat, concrete roof. Recessed fluorescent fixtures embedded within acoustic tiles comprise the lighting in control rooms and office areas of Building 805, while suspended fluorescent fixtures are present in laboratory and shop areas.

Additional
Building 805 contains remote machining equipment, radiography equipment, a lathe, and an explosives press.

Auxiliary Buildings
A 300-gallon underground carbon steel diesel fuel tank is located to the west side of the building. Several small portable storage buildings surround the perimeter of Building 805. This includes two 60 square foot storage structures to the north of the building and two flammable-liquid storage buildings to the east and south, respectively. Additionally, there are several smaller auxiliary structures that service Building 805; including two air conditioners, a cooling tower, and a portable storage magazine.

[13] *Site 300, Building 805. Floor Plan, Sections, Finish Schedule.* San Leandro: Indenco Engineers, Inc., drawing PSZ58-805-008JA, 1958.

Buildings 806A and 806B, HE Machining Complex
History and Physical Character
Buildings
The Building 806 Complex was constructed for HE machining and assembly and is comprised of two main structures (806A and 806B) with two auxiliary structures (806C and 806D) in-between. A wooden barricade blast wall additionally separates Building 806A from 806B. Building access within the extensive 806 Complex is by means of an exterior walkway clad in corrugated fiberglass panels, covered overhead by Buildings' 806A and 806B eave overhangs with supplementary fiberglass panels.

Rogers Engineering designed Buildings 806A and 806B in 1955 and 1957, and construction was complete by 1957. Building 806A was comprised of two large machining rooms separated by a utility room and a control room. Identical yet slightly larger in construction, Building 806B had an office and control room, inert storage room, remote control machining room, utility room, machining room and an inspection room. Highly utilitarian in character, the building is comprised of long, monolithic volumes, void of ornamental features or decorative finish treatments.

Two small, metal Butler buildings, Buildings 806C and 806D, were constructed in 1961 for additional 806 Complex storage. Building 806C was used for inert storage and drum fixture storage and Building 807D was used as a washroom to clean contaminated fixtures.[14] An office was added to 806A in 1966, and a lunchroom was added in 1986.[15]

Landscape
Building 806A has an adjacent septic tank equipped with two cesspools. Soon after building construction, large protective earthen berms were created between Buildings 806 and 807 and the nearby access road. These berms were built to serve as protective building barriers in the event of an explosion.[16]

[14] Webster-Scholten, C. P., Ed. *Table 13-9. Source screening information in the HE Process Area study area: Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300*. Livermore: Lawrence Livermore National Laboratory, 1994. (UCRL-AR-108131)

[15] Sullivan and Ulrich, 2007, p. 261.
[16] John E. Scott, LLNL Site 300 Manager, and Dawn Chase, LLNL Special Projects Manager. "LLNL Site 300." Personal interview. 16 Sept. 2014.

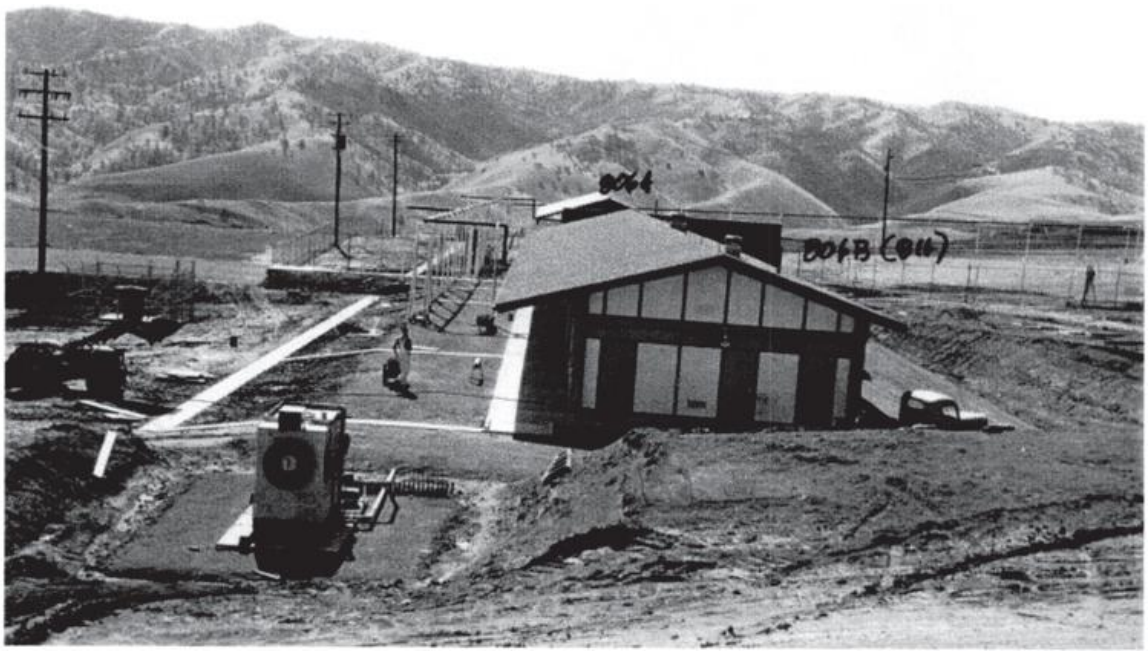

Figure 6. Building 806 Complex (LLNL Archives, ca. 1957)

Figure 7. Building 806 complex South elevation, (LLNL Archives ca. 2003)

Exterior
Rectangular in footprint, Building 806A is a one story 3,408 gross square foot industrial building. Similar in configuration, Building 806B is slightly longer measuring 4,074 gross square feet. Situated between the two main structures, Building 806C and 806D are rectangular in plan, measuring 640 gross square feet each. The buildings are organized side-by-side lengthwise, forming a long, shallow complex.[17]

Poured concrete slab foundations are present at all complex buildings. Concrete walkways surround the perimeter of the buildings. Building 806A has pre-cast and cast-in-place concrete walls on the north, west, and east elevations with a concrete masonry wall on the south elevation. Building 806B is constructed of concrete masonry units, pre-cast concrete, and cast-in-place concrete panels. The walls of Buildings 806C and 806D are of corrugated metal. Both buildings 806A and 806B are of are of steel frame construction.[18] A significant eave overhang projects from the main façades of Buildings 806A and 806B forming an enclosure with upright fiberglass sightscreen and windscreen panels, which provide the exterior walkway with shelter.

Exterior doors in Building 806A are on the east, west, and south walls. Exterior doors in Building 806B sit on the north, east, and west walls.

Buildings 806A and 806B originally featured pitched cement-asbestos paneled roofs, while Buildings 806C and 806D have shallow pitched roofs of the same metal material as their siding. Each of the smaller buildings has three prominent vents atop.

[17] *Figure A-2, Facility Floor Plan - Building 806*. TITLE OF REPORT* Appendix A - Facility Plot Plans and Floor Plans. Livermore: LLNL, 15 June 1997.
[18] Building 805 was built a year earlier than the Building 806 Complex and the buildings two are similar in their original floor plan configuration, building materials and roof type. From this, one can assume that the structural framing of the two buildings are the same.

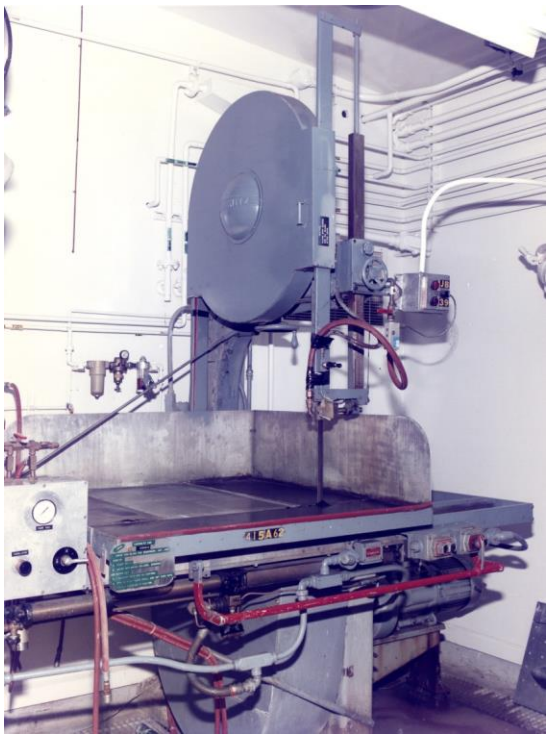

Figure 8. Band Saw in Building 806A (Date unknown)

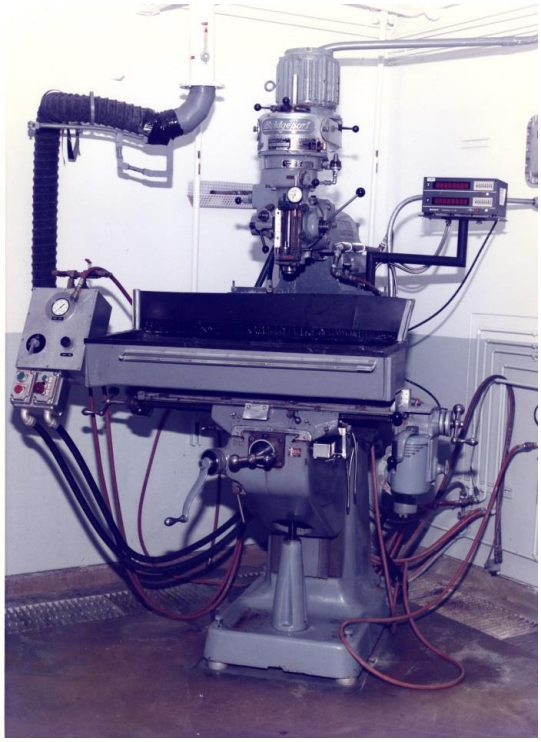

Figure 9. Mill in Building 806A (Date unknown)

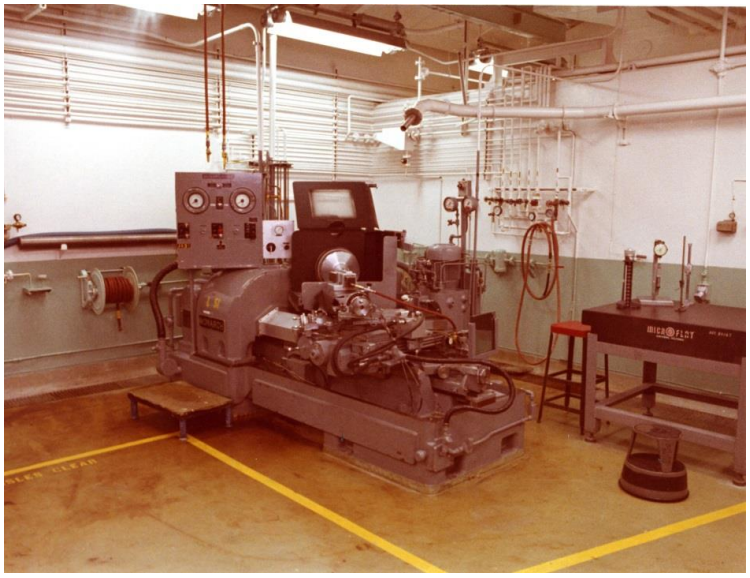

Figure 10. Lathe in Building 806A (LLNL Archives, ca. 1980)

Figure 11. Band Saw in Building 806B

Figure 12. Mill in Building 806B

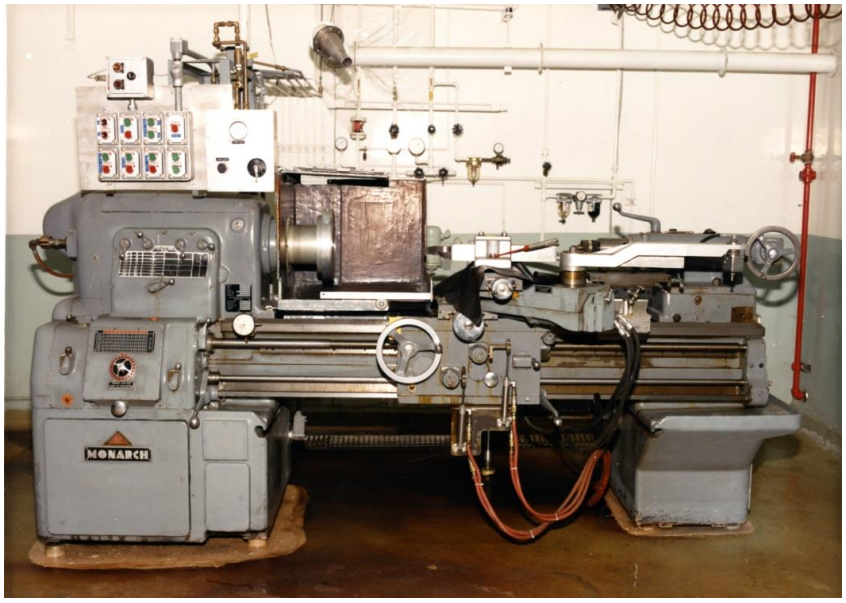

Figure 13. Lathe in Building 806B (LLNL Archives, ca. 1980)

Figure 14. Bostomatic machine in Building 806B (LLNL Archives, ca. 1980)

Interior

Configuration

The rooms in buildings 806A and 806B are each accessible directly from the exterior walkway, and are not accessible to one another from the interior. Rooms are organized linearly. Building 806A has five enclosed rooms, Room 101, 103, 105, 113, and 119, with an unattached Mechanical Room and Room 146 across the walkway from Room 113 and Room 101, respectively. The two main large machining rooms are separated by a utility room and control room.

Building 806B is comprised of five main spaces, Room 109, 121, 129, 134, and 145, which includes an office and control room, inert storage room, remote control machining room, utility room, machining room, and an inspection room. Buildings 806C and 806D are both comprised of a single room.

Finishes

Finished concrete and vinyl flooring comprise the original flooring of this building. The concrete interior walls are finished with white panels of an unknown material. Vinyl baseboards line each room. The ceilings of machining areas are painted white with

exposed structural framing, mechanical piping and corrugated metal roofing. Remote control rooms have dropped acoustical tile ceilings.

Mechanical Equipment
The heating, air conditioning and ventilation equipment of the 806 Building Complex is unknown. Suspended fluorescent fixtures are present throughout the interior. Several types of industrial-grade exterior light fixtures surround the building, suspended from the building's eaves or mounted directly onto the walls.

Additional
Buildings 806A and B contain a Lathe, milling machine, Bostomatic machine, band saw, and a Moore measuring machine.

Buildings 807A, 807B, 807G, and 807H, Explosives Preparation Facility
History and Physical Character
Buildings
The Building 807 Complex was constructed to house HE explosive preparation, including mixing and blending operations of HE component fabrication. Indenco Engineers of San Leandro designed Building 807 in 1958 and construction was complete by 1960. Identical in overall massing and construction materials, Building 807 resembles Increments 1 and 2 of Building 805 (built in 1957 and 1959) and Buildings 806A and 806B (built in 1957). With a slight variation in room configuration, Building 807A consists of two large remote controlled mixing rooms, separated by an inert storage room, an HE storage vault and a utility room.[19] Highly utilitarian in character, the building is comprised of a long, monolithic volume, void of ornamental features or decorative finish treatments. The building is currently used for HE machining and shop space, although the extent and date of the conversion are unknown.[20]

Landscape
A cement-lined trench, dry well, two HE process rinse water lagoons (removed from service in 1985), and a septic tank with two cesspools are auxiliary landscape features that contributed to the functions of Building 807.

[19] Sullivan and Ulrich, 2007, p *259.*
[20] *Ibid.,* 261.

Figure 15. Building 807 (LLNL Archives, ca. 1960)

Exterior
The one story 1,575 gross square foot industrial building is rectangular in footprint. Building 807 is constructed of concrete masonry units, pre-cast, and cast-in-place concrete.

Poured concrete slab foundations are present at all complex buildings. Concrete walkways surround the perimeter of the building. As noted in early construction photographs of similarly constructed Building 805, Building 807 is of steel frame construction.

A significant eave overhang projects from the main façade forming an enclosure with upright fiberglass sightscreen and windscreen panels, which provide the exterior walkway with shelter. The pitched roof was originally covered in cement-asbestos paneled material. Within the past decade, the roof has been replaced with a corrugated metal material.[21] There are five single doors on the south facade and three pairs of doors on the rear, north wall.

[21] Scott and Chase, Personal interview, 2014.

Figure 16. Room 104 in Building 807 (Date unknown)

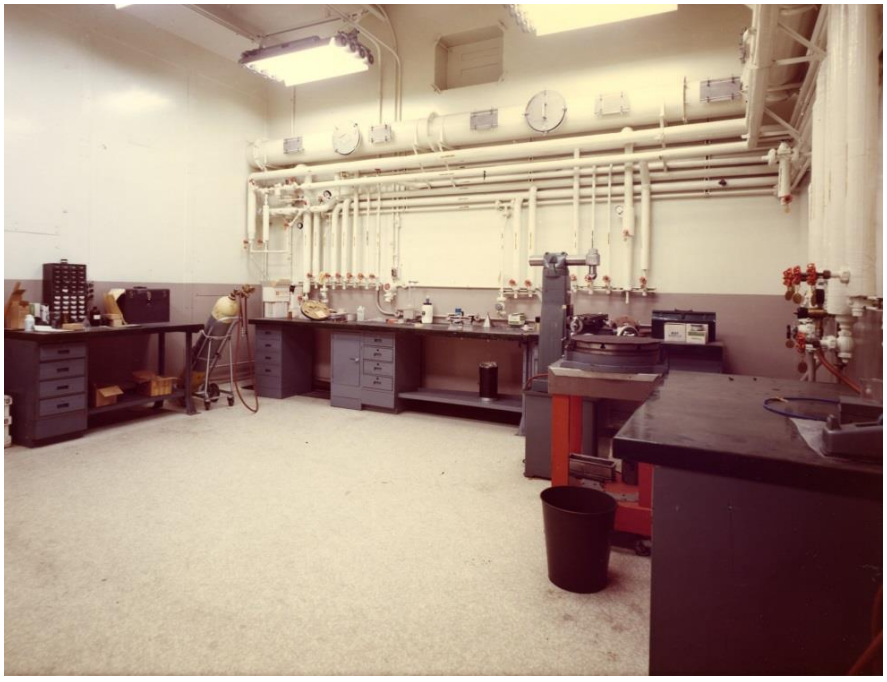

Figure 17. Room 104 in Building 807 (Date unknown)

Interior

Configuration
The rooms in Building 807 are accessible directly from the exterior walkway, and are not accessible to one another from the interior. Rooms are organized linearly. There are five enclosed rooms, Room 104, 106, 107, 108, 109, and 110. The two main large remote control mixing rooms are separated by an inert storage room, an HE storage vault, and a utility room.

Finishes
Vinyl flooring is present in the remote control mixing rooms. The concrete interior walls are finished with white concrete asbestos panels. Vinyl baseboards line each room. The ceilings are painted white with exposed structural framing, mechanical piping and corrugated metal roofing.

Mechanical Equipment
Several types of industrial-grade exterior light fixtures surround the building, suspended from the building's eaves or mounted directly onto the walls.

Auxiliary Buildings
A cooling tower and Building 807B, a solvent storage facility, sit to the south of Building 807.

Buildings 817A, 817B, 817C, 817D, 817E, 817F, 817G, and 817H, HE Pressing Complex
Complex History
The eight buildings that comprise the Building 817 Complex, HE Press and Oven Facility, were constructed for the purpose of transforming powdered HE into pressed and dried explosive billets, for the preparation and isostatic pressing of bulk explosives. Buildings 817A, 817B and 817F have been identified as the primary buildings within the complex and will be profiled in the following analysis.[22]

Rogers Engineering designed Buildings 817A, B and C in 1957 as the initial three buildings of the HE Press and Oven Facility. Construction was complete by late 1959. Buildings 817A and 817B sit at the northwest corner of the Building 817 Complex.

The second building campaign included Buildings 817C and D, which sit in the southeast portion of the Building 817 Complex. Building 817C is a concrete bunker building surrounded by a wood and earth-filled berm. Adjacent to Building 817C, Building 817D is a small metal Butler-type building, not currently in use.

Buildings 817E, F, G and H were constructed in the third and final building campaign for the Building 817 Complex. Ruth and Going, Inc. of San Francisco designed these buildings in 1960, and construction was completed later that year. The now vacant press facility, Building 817E, consists of a concrete and corrugated steel structure. Buildings

[22] Sullivan and Ulrich, 2007, p 265.

817G and 817H are similar in construction to the metal Butler-type Building 817D, and feature corrugated-fiberglass panel skylights. Buildings 817G and 817H once housed the facility's water boilers and flammable liquids. Building 817F was originally a cold-storage facility for HE compounds, and now operates as oven facility to heat and anneal explosives.[23] Today, Building 817H serves as pressing bag supply storage. [24]

The buildings at the 817 HE Oven and Press Facility are still being used for their originally designed functions. Minor equipment and mechanical system upgrades have taken place over time.

Landscape
A cement-lined trench, dry well, two HE process rinse water lagoons (removed from service in 1985), and a septic tank with two cesspools are auxiliary landscape features that contributed to the functions of Building 805. The disposal lagoon was decommissioned and closed in 1989.[25]

Physical Character of Buildings 817A, 817B and 817F
Building 817A
Constructed as the primary control facility for the complex, the rectangular central node of the building is partially enclosed by three poured concrete walls; two angled concrete walls flank from the central western elevation. Earthen infill and gravel covers the flat roof of this structure. The building contains two control rooms and an office.

Building 817B
This structure is rectangular in footprint and comprised of one double-height room with an exterior staircase. Clad in painted metal/Masonite panels, the building features a gently pitched roof.

Building 817F
The façade of this one-room structure features a single poured in place concrete elevation in the form of an isosceles trapezoid. With a flat roof, the building is topped with gravel, creating a steep earthen slope on all remaining sides.

[23] Webster-Scholten, 1994, p. 13-4-53.
[24] Sullivan and Ulrich, 2007, p 268.
[25] Sullivan and Ulrich, 2007, p. 264.

Figure 18. Building 817 Complex looking north (HABS, 2009)

Figure 19. Wall between Buildings 817A and 817B looking south (HABS, 2009)

Figure 20. Building 817F looking south west (HABS, 2009)

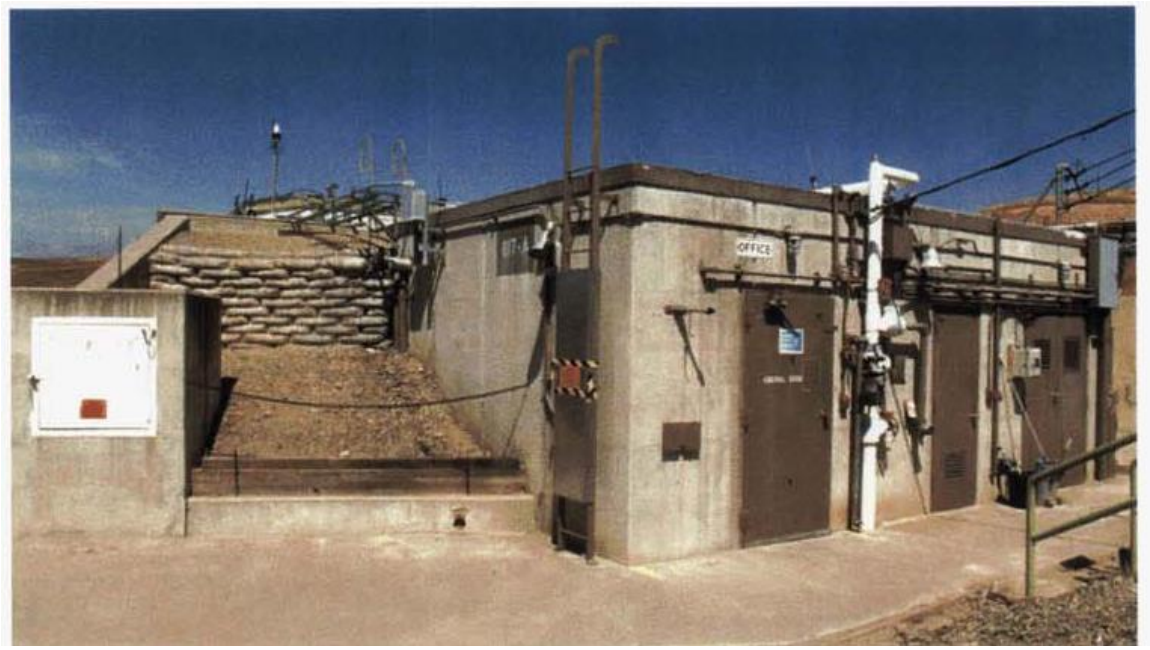

Figure 21. East Elevation of Building 817A (LLNL Archives, 2003)

Figure 22. Building 817A Control Room for remote controlled ovens and presses. (LLNL Archives 2003)

Finishes

Vinyl flooring is present in the remote control mixing rooms. The concrete interior walls are finished with white concrete asbestos panels. Vinyl baseboards line each room. The ceilings are painted white with exposed structural framing, mechanical piping and corrugated metal roofing.

Lighting
Several types of industrial-grade exterior light fixtures surround the building, suspended from the building's eaves or mounted directly onto the walls.

Additional
Building 817B contains isostatic presses. Building 817F contains ovens.

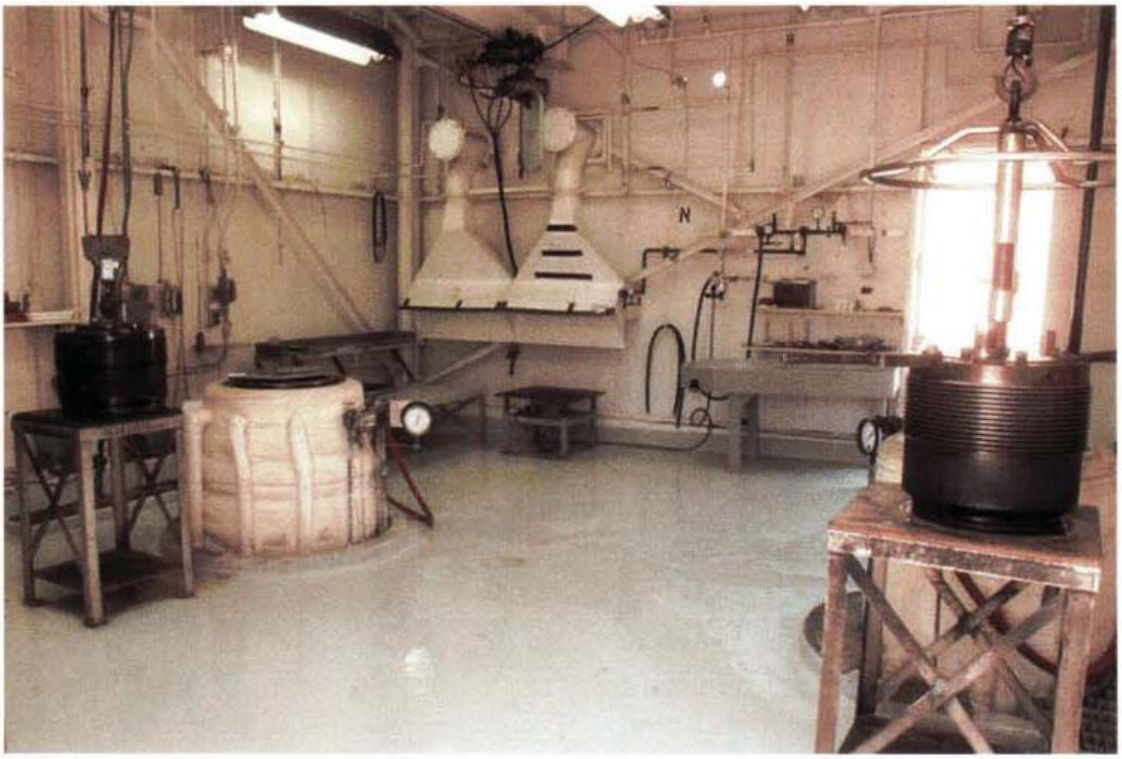

Figure 23. Isostatic Presses in Building 817B, (LLNL Archives, 2003)

Building 825, HE Chemical Process Facility
History and Physical Character
Building
Building 825 was constructed for the testing and development of new HE. Rogers Engineering of San Francisco designed Building 825 in 1957 and construction was complete by 1959. Highly utilitarian in character, the building is a monolithic volume, void of ornamental features or decorative finish treatments. An accidental explosion in the 1970s prompted the rebuilding of the frangible walls. The building is currently used for the mechanical pressing of HE. [26]

[26] *Ibid.,* p. 268.

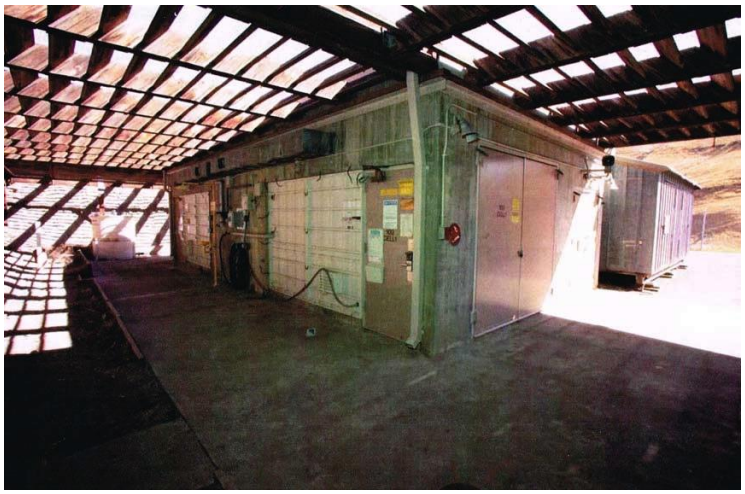

Figure 24. Building 825 (Heidecker, 2009)

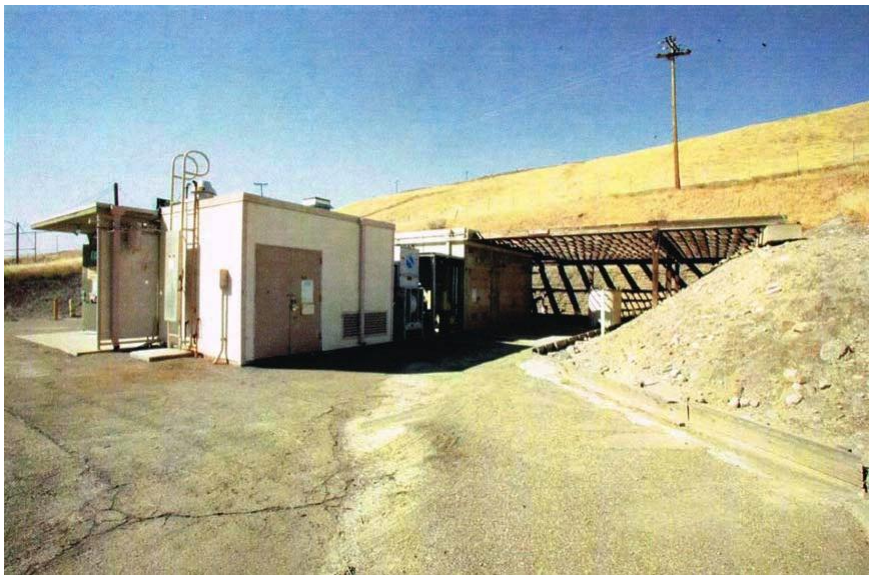

Figure 25. Building 825 (Heidecker, 2009)

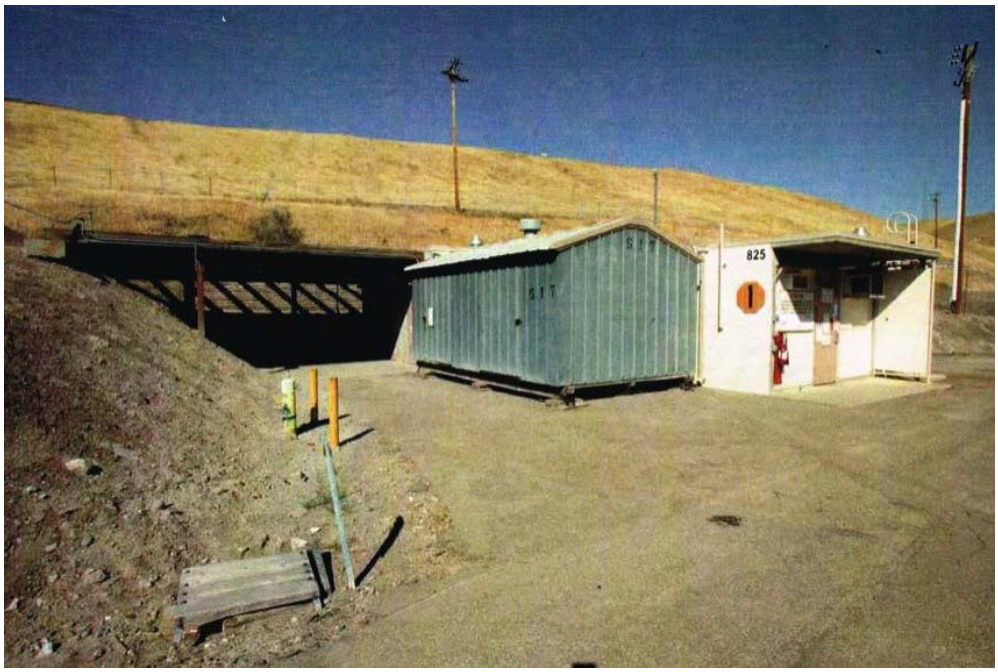

Figure 26. Building 825 (Heidecker, 2009)

Exterior
A four-inch thick slab concrete slab comprises the foundation of this building. As noted in construction photographs from 1958, Building 825 is of reinforced concrete construction.[27] The west wall is frangible and made of wood with exposed metal strips of Faraday Cage. The north and south walls are clad in cement-asbestos panels.[28] Constructed of pressed board and piping, a safety-wall/windbreak protrudes along the east elevation.

There is a concrete overhang above the single door entrance in the eastern facade. The building's flat roof is surmounted by wooden shrapnel baffles project from the south, west, and north roof edges and extends to the surrounding hills.

Three pairs of metal double doors on the northern elevation lead from the exterior directly to the primary equipment room, to Cell 2 and to the additional equipment room. The southern elevation has two pairs of metal double doors, one of which leads to the primary equipment room and the other to Cell 1. The eastern elevation has one single metal door leading to the control room and office. The western elevation features two single metal doors which lead to Cell 1 and 2, respectively.

[27] This assumption is based on construction photographs of Building 825 still under construction (UCRL Livermore Photograph numbers 14135, 14641 and 14443).
[28] *Ibid.*

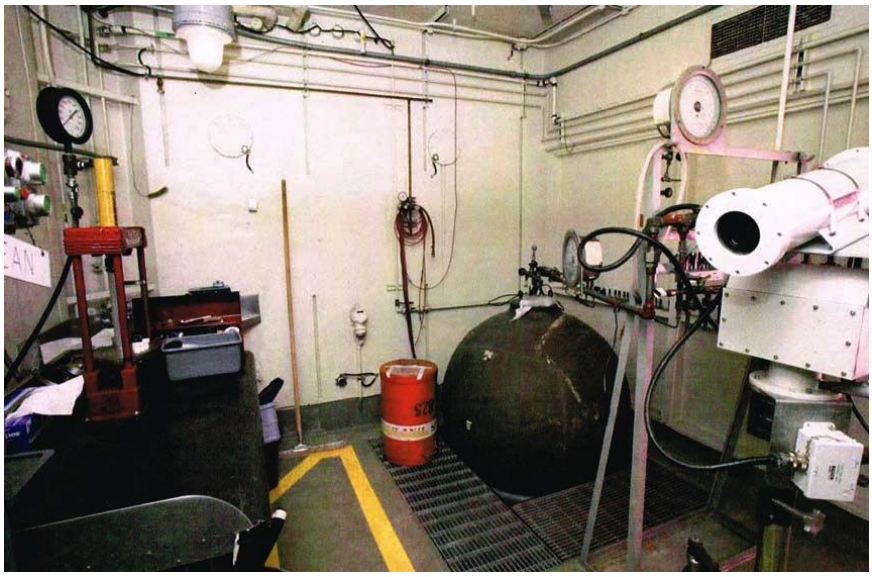

Figure 27. Interior of Building 825

Figure 28. Interior of Building 825

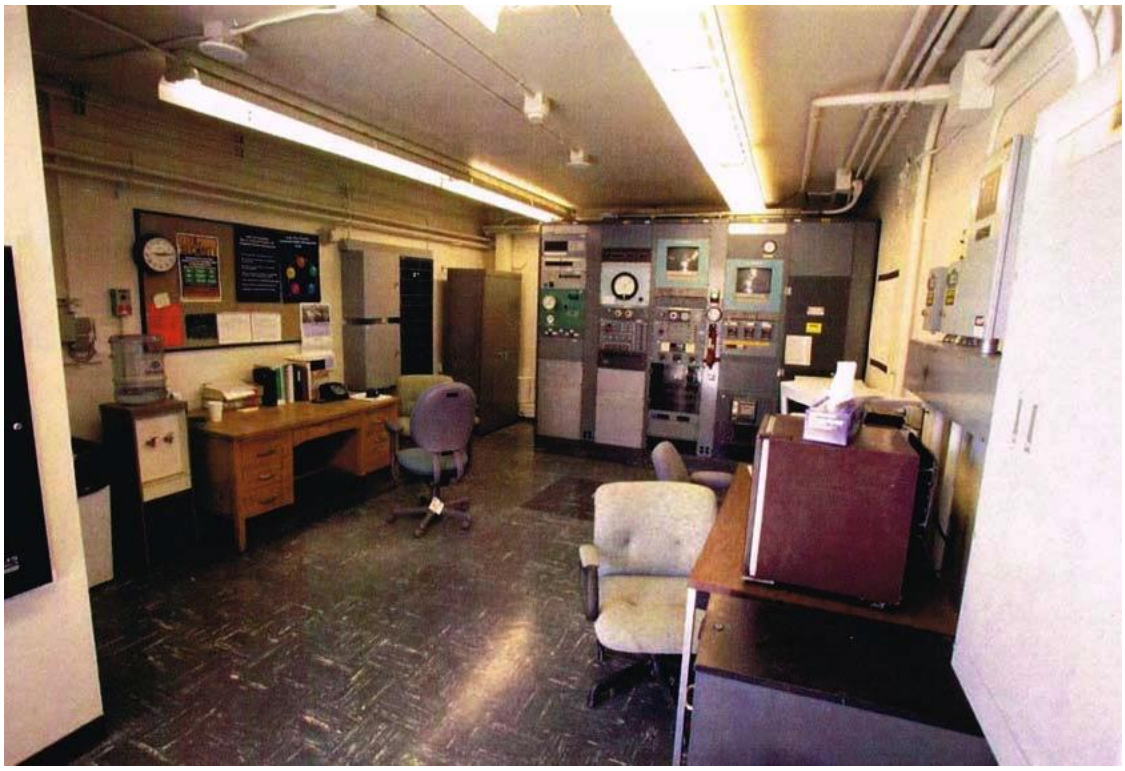

Figure 29. Interior of Building 825 (Heidecker, 2009)

Interior

Configuration

The one story 1,323 gross square foot industrial building is "T" shaped in footprint. Each of the five main rooms of Building 825 is accessible directly from the exterior corridor, which runs horizontally along the width of the building.[29] Internally, two test cells flank the mechanical equipment area. The mechanical equipment area is comprised of a rectangular room and north-south running hallway, which allows for access to either of the test cells. The control room projects to the east of the mechanical equipment area. This rectangular room completes the "T" formation of the building and is accessible from the exterior at the eastern elevation. A secondary mechanical equipment room, sits to the northeast of the control room, and is accessed from the north elevation.

Finishes

6"square vinyl flooring is present in the remote control mixing rooms while painted concrete comprises the flooring of both test cells. The concrete interior walls are finished with white concrete asbestos panels. Vinyl baseboards line each room. The ceilings are painted white with exposed structural framing, mechanical piping and corrugated metal roofing.

[29]Sullivan and Ulrich, 2007, p. 259.

Openings
There are two interior doors leading from the mechanical equipment area, Room 104, to each of the test cells. Behind the control panel in the Control Room, there are two deep, rounded viewports, which face each bay.

Mechanical Equipment
An air-conditioning system is located on the eastern exterior wall. Ceiling mounted T8 fluorescent fixtures line the ceiling of the control rooms.

Additional
A control panel lines the west wall of the control room. Cell 1 contains a remote controlled press and small oven. Cell 2 contains a calorimeter within a 5' deep pit, a small press and a 250-pound crane.

Auxiliary Buildings
An auxiliary metal Butler-type of structure sits to the south of the control room. The structure has a slightly pitched roof and a rounded roof vent.

Building 826, HE Chemical Process Facility
History and Physical Character
Building
Building 826 was constructed as an additional Chemistry Facility for the development and testing of HE. Indenco Engineering designed Building 826 in 1959 and construction was complete by 1960. Highly utilitarian in character, the building is comprised of a rectangular monolithic volume, void of ornamental features or decorative finish treatments. The building is currently used for HE mixing and mechanical pressing.[30]

Landscape

Building 826 was built into the surrounding hillside, and as such, contours to the earth. This feature serves as extra site protection in the event of an accidental explosion within the building.

[30] Michael A. Sullivan and Rebecca A. Ulrich. *Historic Context and Building Assessments for the Lawrence Livermore National Laboratory Built Environment.* Livermore: Lawrence Livermore National Laboratory, 2007. Pp. 268.

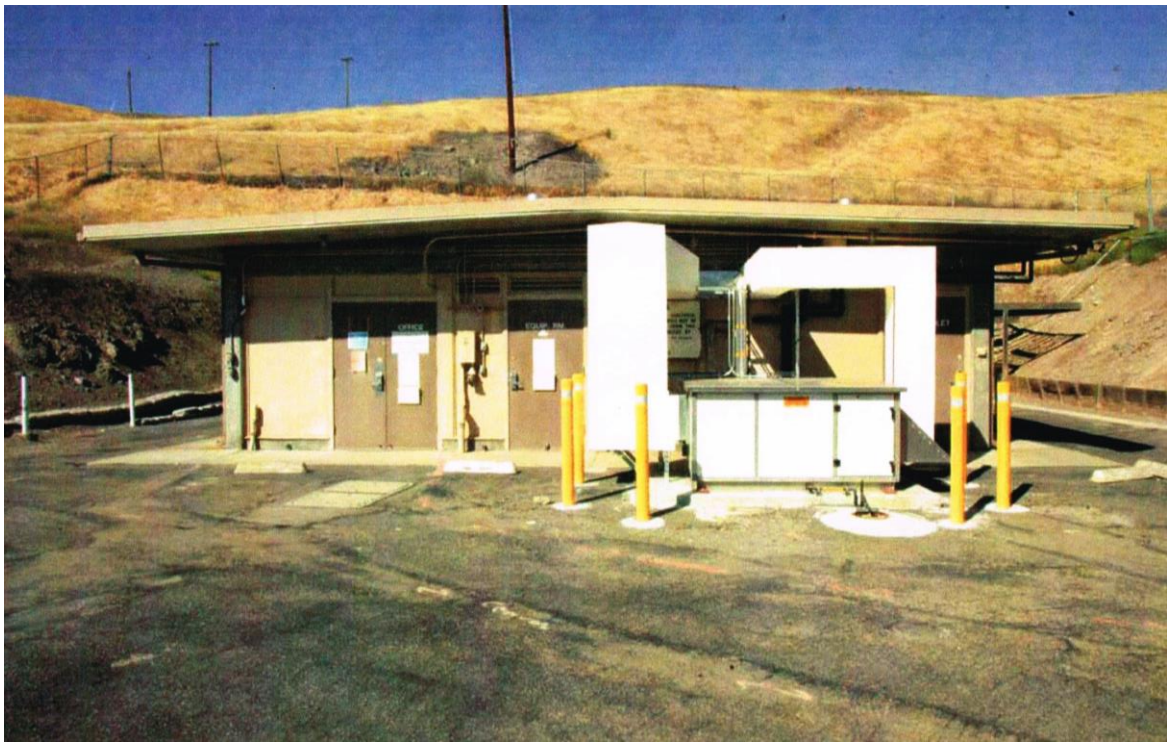

Figure 30. Building 826 Front elevation (Heidecker, 2009)

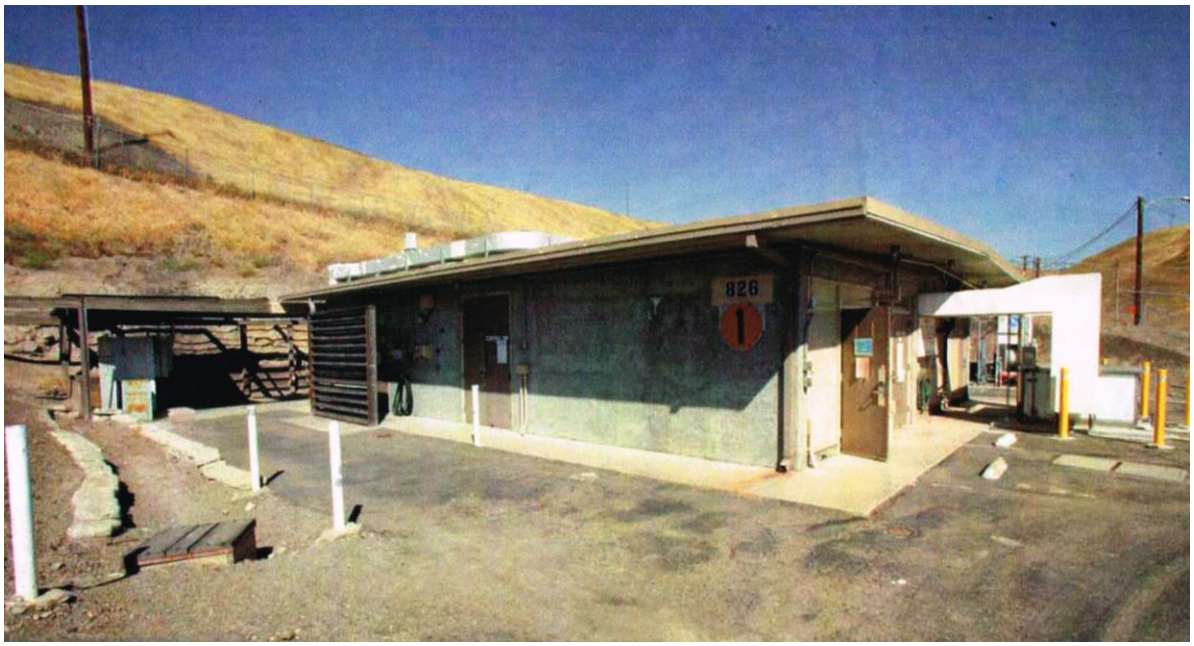

Figure 31. Building 826 (Heidecker, 2009)

Figure 32. Building 826 Rear view (Heidecker, 2009)

Exterior
A four-inch thick concrete slab comprises the building's foundation. As noted in 1959 construction photographs, Building 826 is of reinforced concrete construction.[31]
The north and south walls are constructed of cast-in-place reinforced concrete. The frangible east and west walls are made of wood panels and cement asbestos panels with exposed Faraday Cage metal strips.[32]

An overhead wooden shrapnel baffle system projects from the north, south and west roof edges and extends to the surrounding hills. Each of the rooms is accessible from the exterior walkway, which surrounds the building on all sides. A gently pitched gabled roof with a large overhang surmounts the concrete and frangible walls. Wooden shrapnel baffles extend from the north, south and west rooflines to the abutting hillside.

The north elevation has two single metal doors, one of which leads to the Control Room, Room 100. The other is a vault door that leads to Cell 2, Room 108. A wood louvered protective wall/screen sits just beyond the Cell 2 door. The southern elevation features a pair of double doors leading to the Control Room, a single metal vault door leading to Cell 1. A wood louvered protective wall/screen just beyond the Cell 1 vault door. Three doors allow for access into the eastern elevation. The Equipment Room and Lavatory both have single metal doors, while the Office has a pair of metal double doors. Two pairs of metal double doors sit in the rear west elevation, leading to Cell 1 and 2, respectively.

[31] This assumption is based on construction photographs of Building 826 still under construction (UCRL Livermore Photograph numbers 17667 and 17943).
[32] *Ibid.*

Figure 33. Test cell in Building 826 (Heidecker, 2009)

Figure 34. Central control room in Building 826 (Heidecker, 2009)
Interior

Configuration
The one story 1,678 gross square foot industrial building is rectangular in footprint.[33] It is comprised of six main rooms; with two test cells to the west and a control room, mechanical equipment room and lavatory to the east. A central, north-south running control room bisects the building in a north-south orientation.

Finishes
Six-inch square vinyl flooring is present in the remote control mixing rooms. Painted concrete comprises the flooring of both cells. The western wall in the control room is covered with metal panels. Additional interior walls are assumed to be of gypsum board or concrete.[34] The concrete interior walls are finished with white concrete panels. Vinyl baseboards line each room. The ceilings are painted white with exposed structural framing, mechanical piping and corrugated metal roofing.

Doorways and Doors
There are two leading from Room 100 to Room 107, and Room 101.

Mechanical Equipment
An air-conditioning system is located on the eastern exterior wall. Ceiling mounted T8 fluorescent fixtures line the ceiling of the control rooms. A control panel lines the east wall of the control room. Cell 1 contains a 1-pint mixer, 1-gallon mixer and a vent and hood box. Cell 2 contains a Kent Machine Works press, a Throop press, an injector and small oven.

Buildings 827A, 827C, and 827E, Chemistry Development Complex
History and Physical Character
The Building 827 Complex consisted of five buildings: 827A, B, C, D and E. Of these five buildings, 827A, C and E make up the main chemistry laboratory areas. As Building 827B was a machine shop, it is not of historic interest.

Built in 1967, the Building 827 Complex was constructed as the Chemistry Development Complex to serve as chemistry laboratories and house equipment to melt, heal, mix, and cast explosives. Highly utilitarian in character, the building is comprised of a rectangular monolithic volume, void of ornamental features or decorative finish treatments.

Landscape
The majority of the Building 827 Complex is organized linearly, with building numbers ascending from west to east. The surrounding land is primarily flat.

[33] K. Heidecker. "Architectural Notes."
[34] *Ibid.*

Figure 35. Building 827 Complex site (LLNL Archives, ca.1970)

Figure 36. Building 827A, looking northeast (Heidecker, 2009)

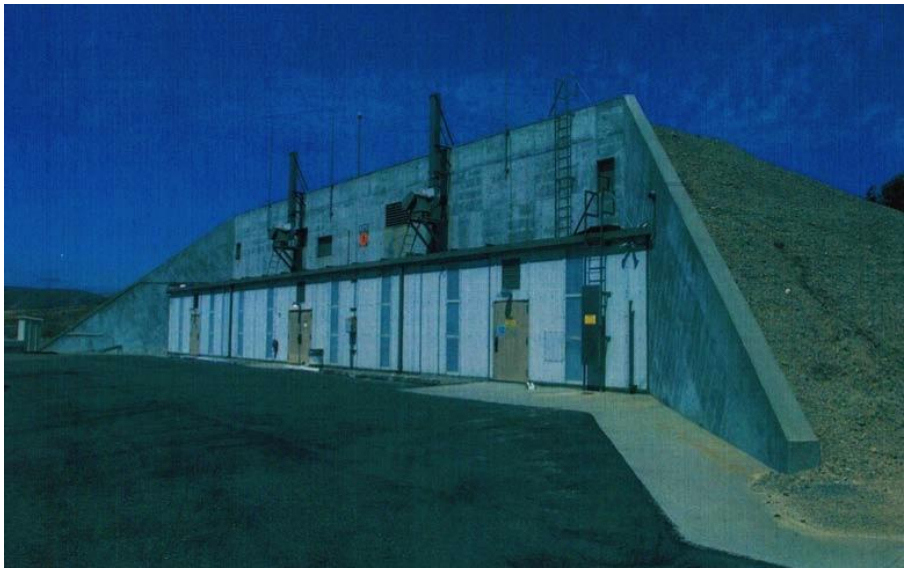

Figure 37. Building 827C, looking southeast (Heidecker, 2009)

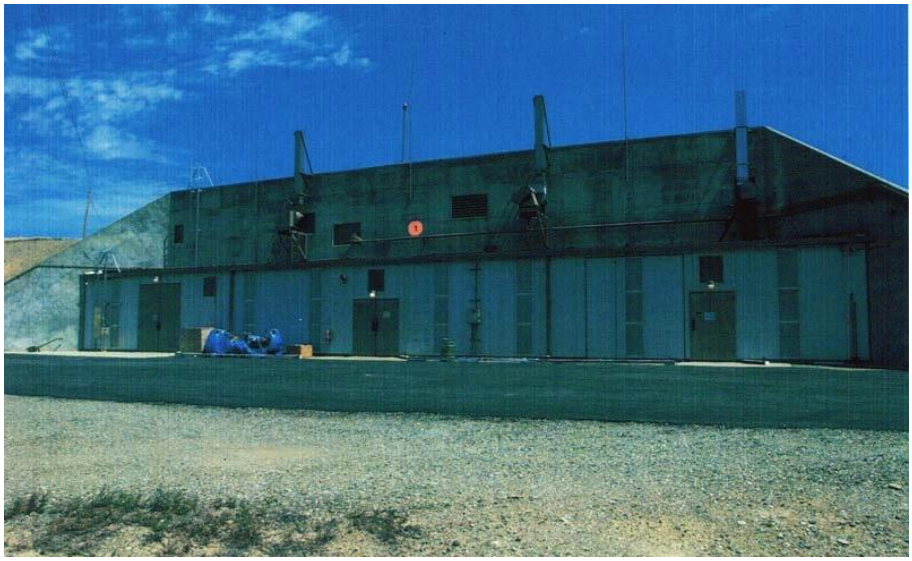

Figure 38. Building 827D, looking south (Heidecker, 2009)

Figure 39. Building 827E, looking west (Heidecker, 2009)

Exterior
Building 827A is a single-story, concrete structure with a basement and flat roof. Comprised of three bays, the primary facades of Buildings 827C, D, and E are constructed of concrete with concrete retaining walls projecting from either end, while the remainder of the structure is embedded in a gravel mound. The lower portions of their facades are frangible, and constructed with clear Plexiglas panels interspersed with opaque asbestos panels.[35] All of the buildings in the 827 Complex are of poured concrete foundations.

Building 827A has a raised concrete walkway, resembling a loading dock, which extends from the northern portion of the building. Two short staircases with metal railings lead to the entryway. Building 827D has a raised concrete walkway, which spans the length of the building.

Buildings 827C, D, and E have flat roofs, which are covered in sloping gravel on all sides.

[35] *Ibid.*

Figure 40. Unknown breezeway in Building 827 Complex

Figure 41. Control room in Building 827A

Figure 42. Room 105 in Building 827D

Figure 43. Room 105 in Building 827D

Interior

Building 827A

Building 827A is a 4,489 gross square feet while Buildings 827C, D, and E are each 3,222 gross square feet.[36] Office Building 827A is essentially rectangular in footprint with its first floor encompassing seven rooms. A large room comprises the western portion of the building while an east-west running corridor bisects the eastern portion. Off of this corridor are two rooms to the north (Rooms 102 and 106), and three rooms feeding off of the corridor to the south (Rooms 101, 103 and 105). This includes a control room, workshop, office, service room, storage room, and analytical laboratory. The building's basement is comprised of two large utility and equipment rooms (Rooms B101 and B107). An exterior staircase in the southeastern portion of Building 827A leads from the outside of the building, directly to the basement. An enclosed staircase towards the center of the northern elevation also leads to the basement.

The flooring in the analytical lab is of painted concrete, while the flooring of the control room is of sheet linoleum.

Buildings 827C, D and E

Buildings 827C, D and E are identical in construction, with minor modifications in interior room configuration. The rooms are organized linearly, and are each accessible from the "breezeway," which is an enclosed interior hallway that runs the length of the building and serves as an interstitial entryway. Two main "cells" flank either end of the building, with a mechanical equipment room, HE vault and an inert storage room in the center. The mezzanine above is centered over the first floor rooms, and is comprised of two rooms. Access to the mezzanine level of these buildings is granted through a staircase located towards the center of the building.

Cells 1 and 2 of Buildings 827C, D, and E, have concrete floors. The flanking test cells in Buildings 827C, D, and E each have concrete ceilings and walls, while their breezeways feature corrugated metal ceilings.

There are doors on the north, east and west elevations of Building 827A. Buildings 827C, D, and E have double metal doors leading to each of the interior rooms.

Mechanical Equipment

An air-conditioning system is located on the eastern exterior wall. Fluorescent tube lighting is prevalent within most of the buildings of the 827 Complex.

[36] *Ibid.*

Cell 1 contains a 1-pint mixer, 1-gallon mixer and a vent and hood box. Cell 2 contains a Kent Machine Works press, a Thropp press, an injector and small oven.

SUMMARY

Lawrence Livermore National Laboratory is interested in preserving the history of its many accomplishments and successful discoveries during the Cold War in the course of its primary mission to protect and defend the security of the US Nuclear Arsenal. In addition, the Laboratory is moving into a future with leading edge inventions and discoveries in computers, medicine, physics, energy, defense, research and development. By continually improving its research tools, including its facilities, LLNL will continue to serve its purpose as a leader in many fields. The Laboratory properties will never be open to the general public, therefore preserving existing buildings as historic for their inventions will never be a practical or sustainable solution for the Federal Government to maintain.

LLNL will make many more significant discoveries which cannot be published or celebrated by the general public until they are officially declassified. The documentation and publishing of records will continue to be sporadic based on the sensitive nature of LLNL research. However, the basic stories will eventually be publically displayed in the existing Discovery Center located in the South eastern corner of the LLNL property and accessible to the public.

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Interview

Scott, John E., LLNL Site 300 Manager, and Dawn Chase, LLNL Special Projects Manager. "LLNL Site 300." Personal interview. 16 Sept. 2014.

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Sullivan, Michael A. and K. R. Heidecker. *Five-Year NRHP Re-Evaluation of Historic Building Assessment: LLNL Main Site and Site 300.* Livermore: Lawrence Livermore National Laboratory, 2012. (LLNL-TR-500131)

Sullivan, Michael A. and Rebecca A. Ulrich. *Historic Context and Building Assessments for the Lawrence Livermore National Laboratory Built Environment.* Livermore: Lawrence Livermore National Laboratory, 2007. (UCRL-TR-234717)

Webster-Scholten, C. P., Ed. *Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300*. Livermore: Lawrence Livermore National Laboratory, 1994. (UCRL-AR-108131)

York, Herbert. "Making Weapons, Talking Peace," *Physics Today* (April 1988).

Appendix A

FACILITY KEY PLANS

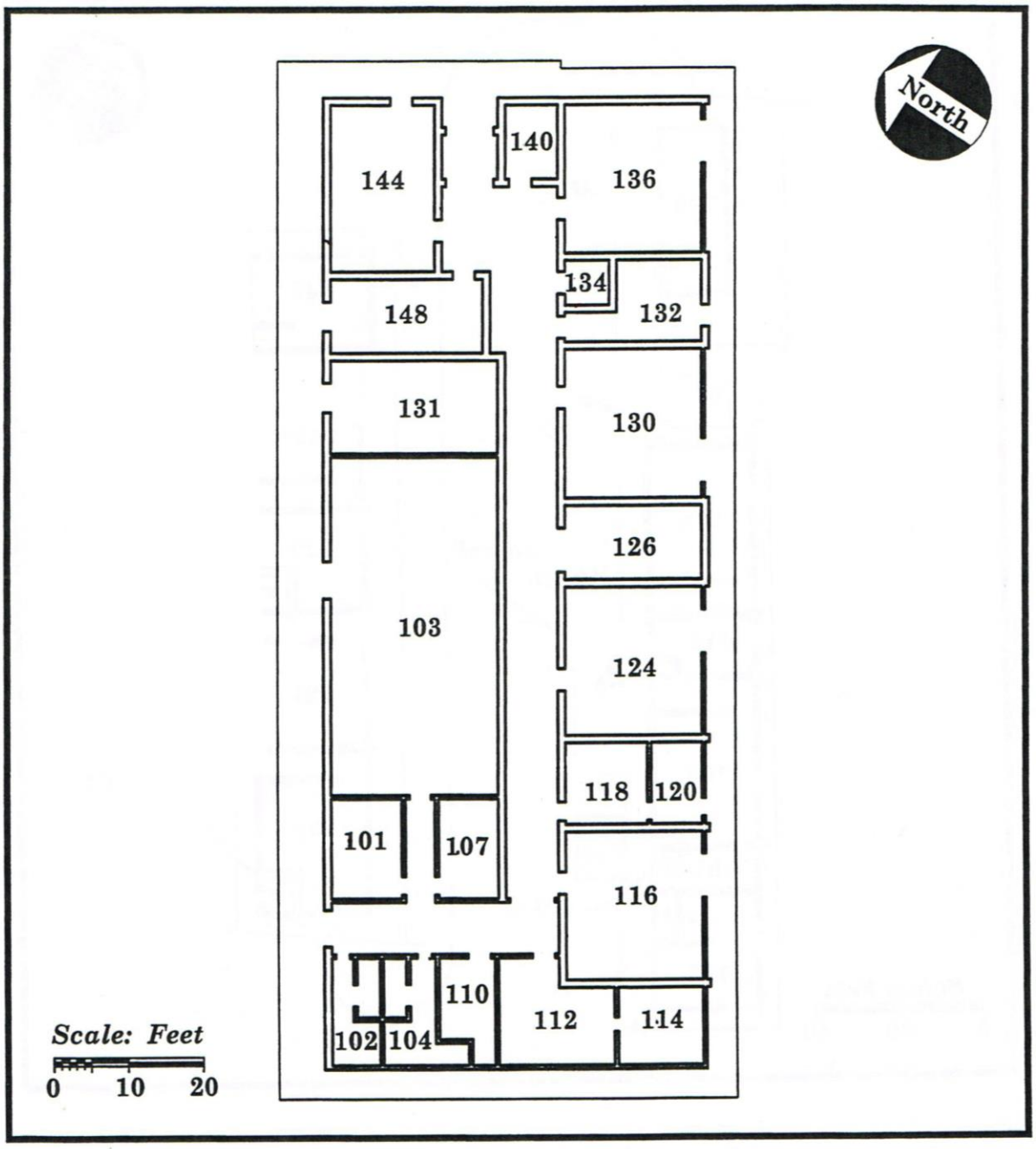

Figure 1. Building 805, Facility Floor Plan, 1997. LLNL Archives. (Figure A-1)

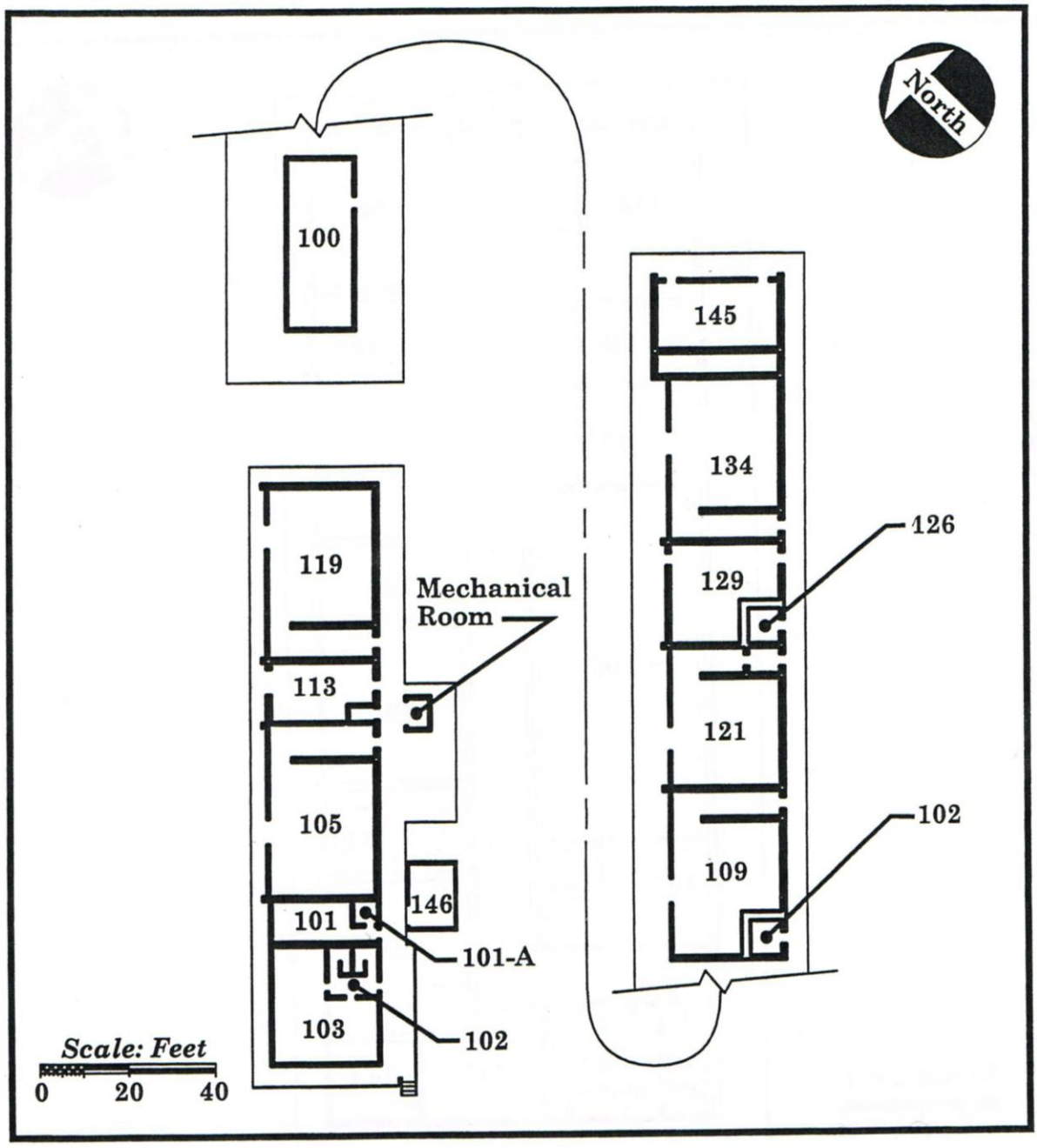

Figure 2. Building 806, Facility Floor Plan, 1997. LLNL Archives. (Figure A-2)

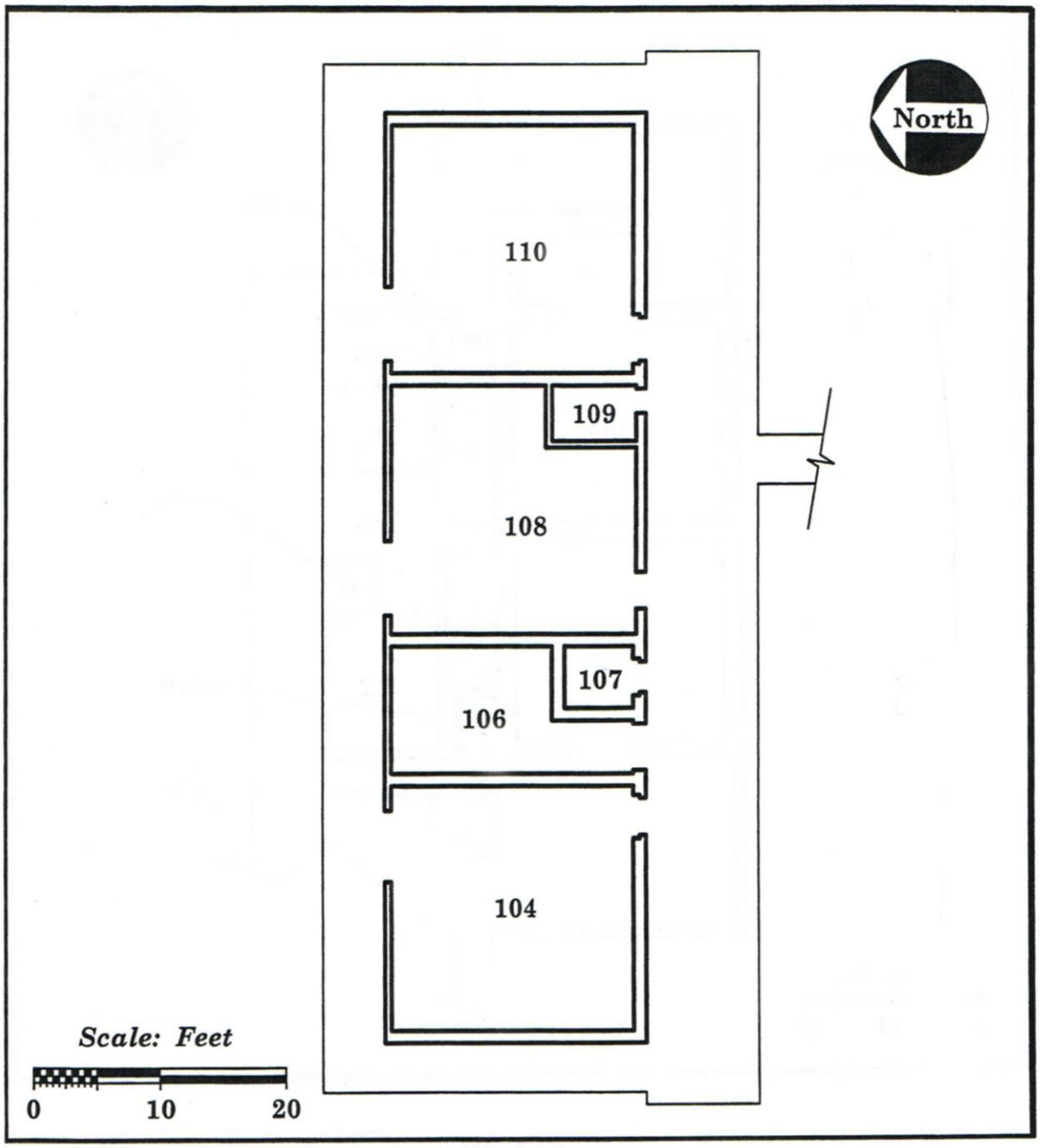

Figure 3. Building 807, Facility Floor Plan, 1997. LLNL Archives. (Figure A-3)

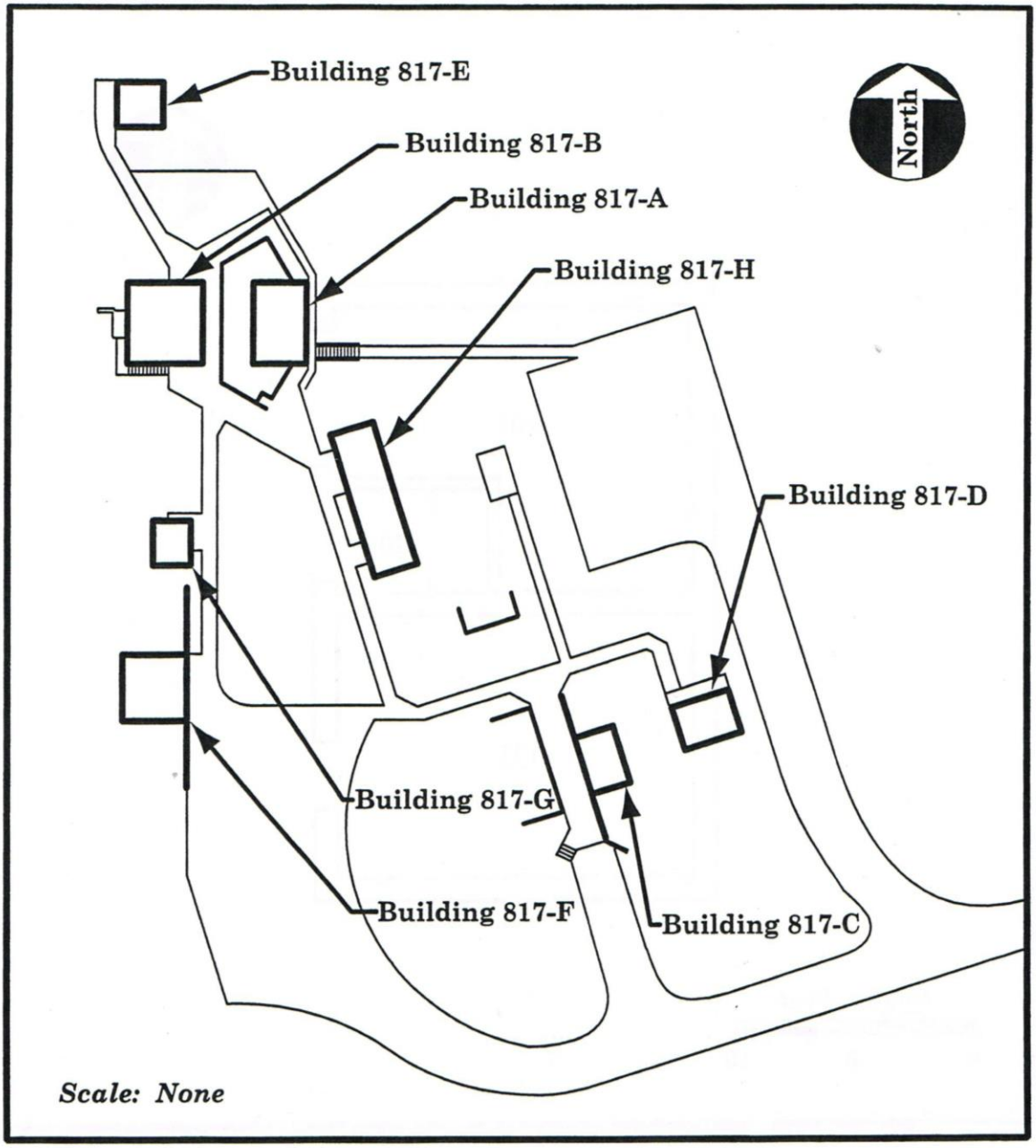

Figure 4. Building 817 Complex, Facility Plot Plan, 1997. LLNL Archives, (Figure A-9)

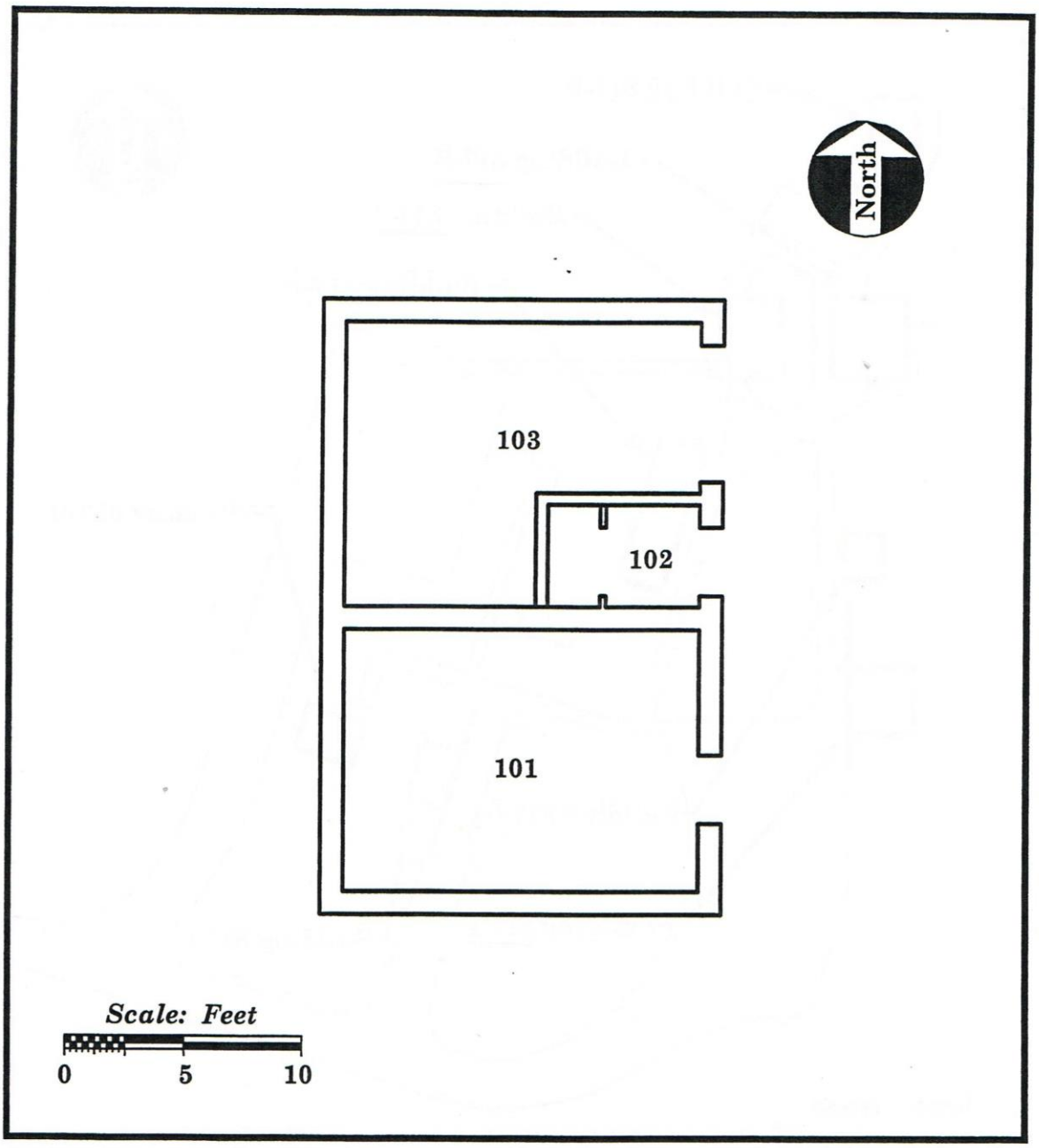

Figure 5. Facility Plot Plan - Building 817, 1997. LLNL Archives, (Figure A-10)

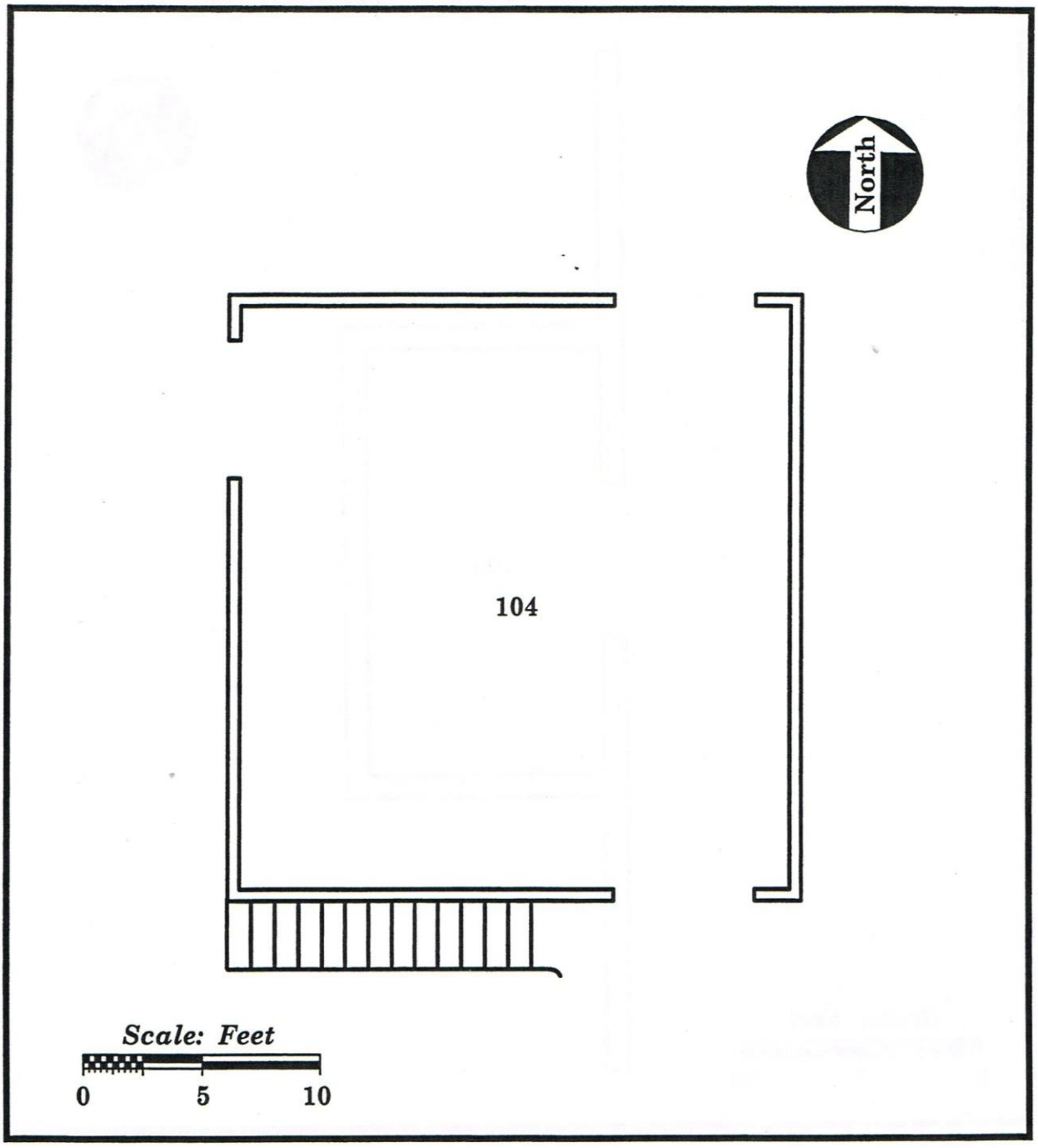

Figure 6. Building 817B, Facility Plot Plan, 1997 LLNL Archives, (Figure A-11)

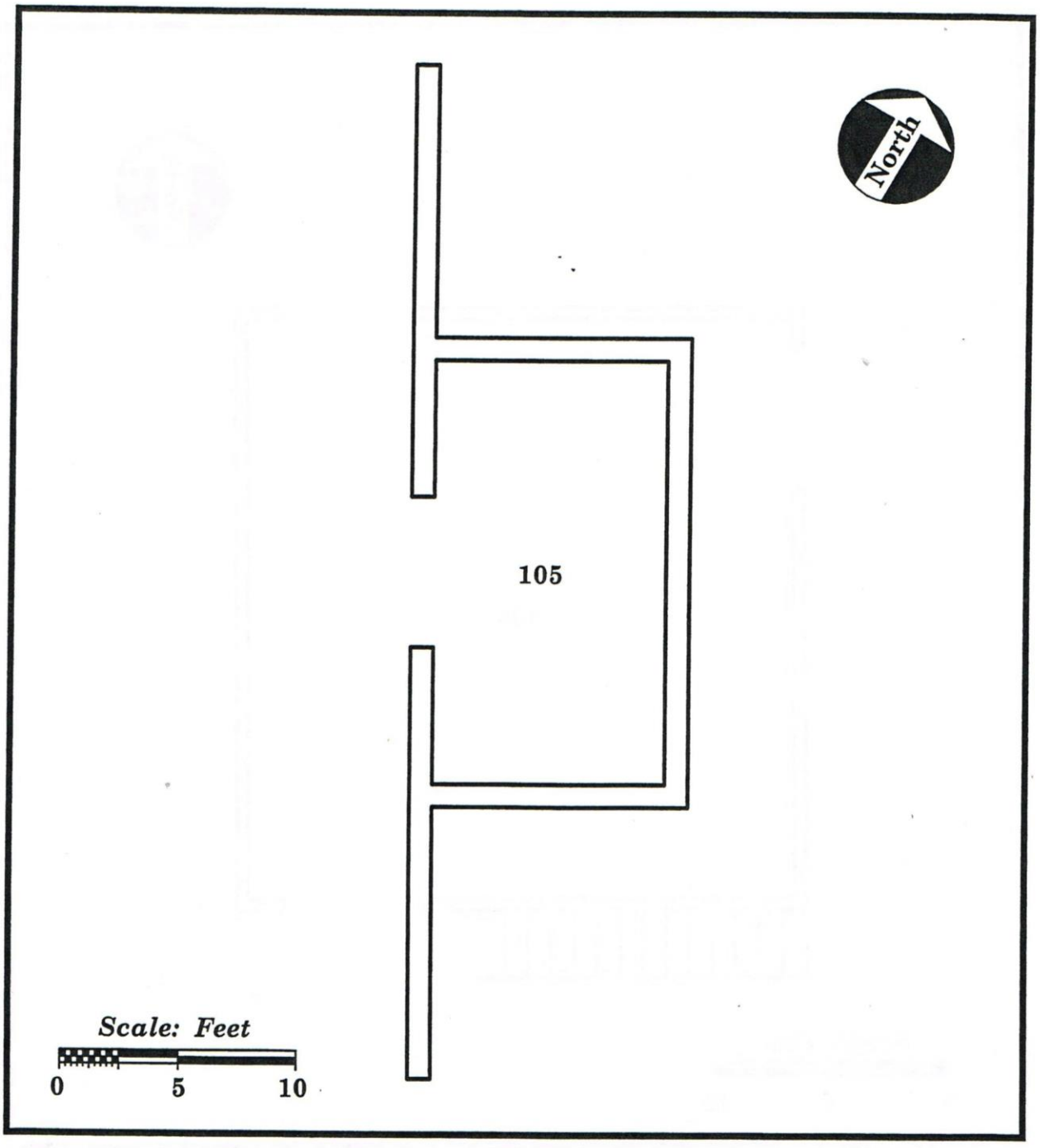

Figure 7. Building 817C, Facility Plot Plan, 1997. LLNL Archives, (Figure A-12)

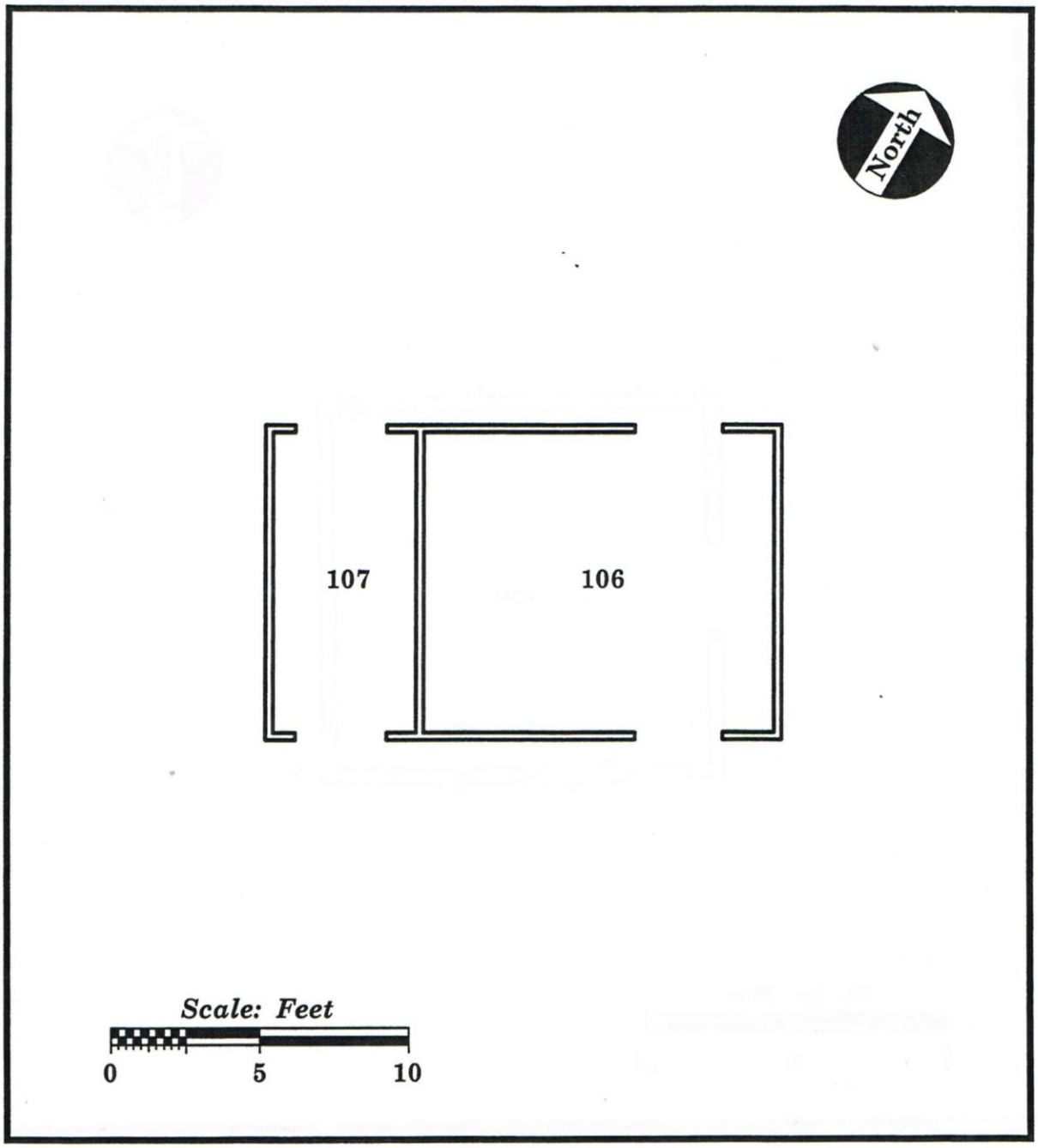

Figure 8. Building 817D, Facility Plot Plan, 1997, LLNL Archives, (Figure A-13)

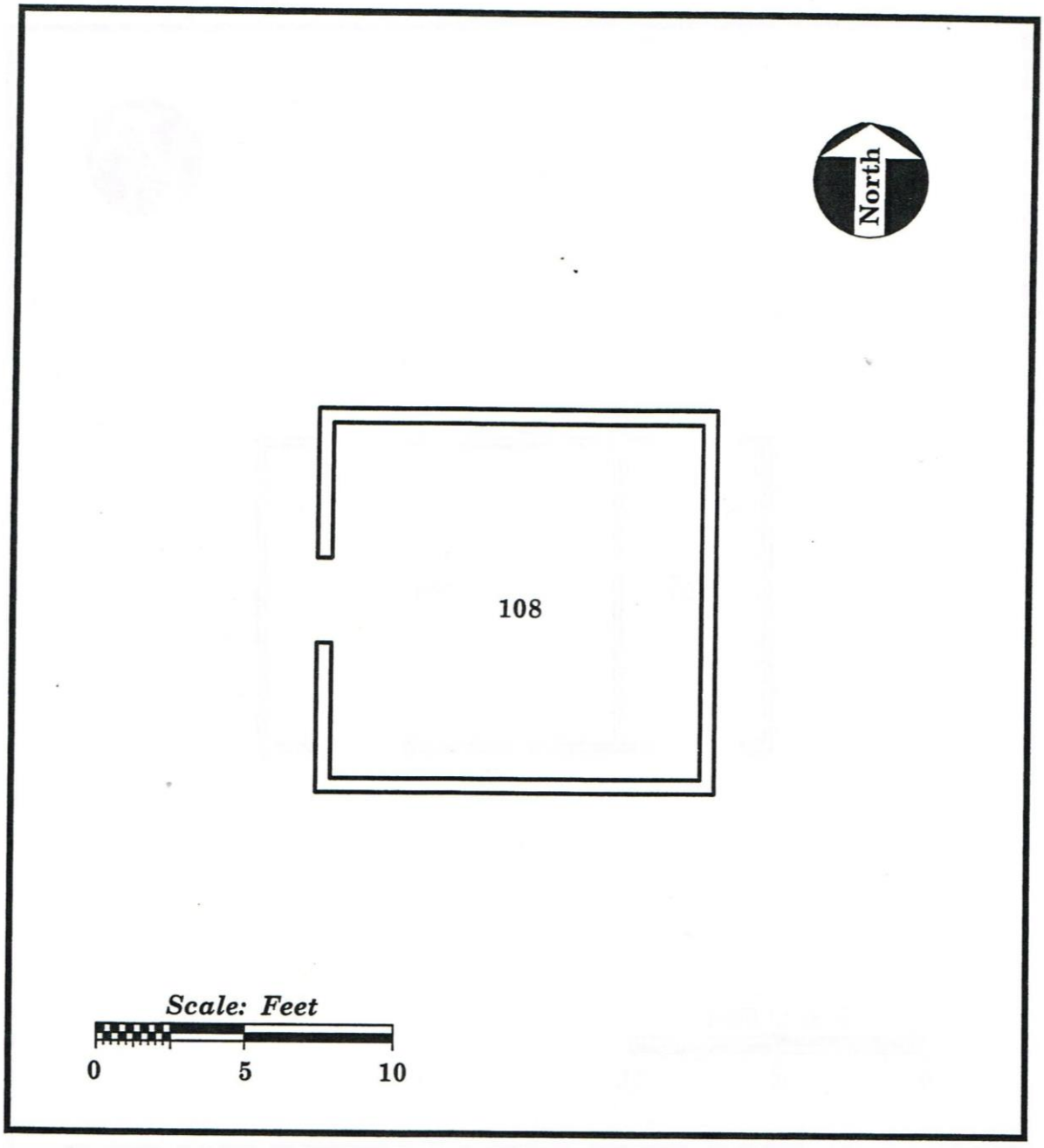

Figure 9. Building 817E, Facility Plot Plan, 1997, LLNL Archives, (Figure A-14)

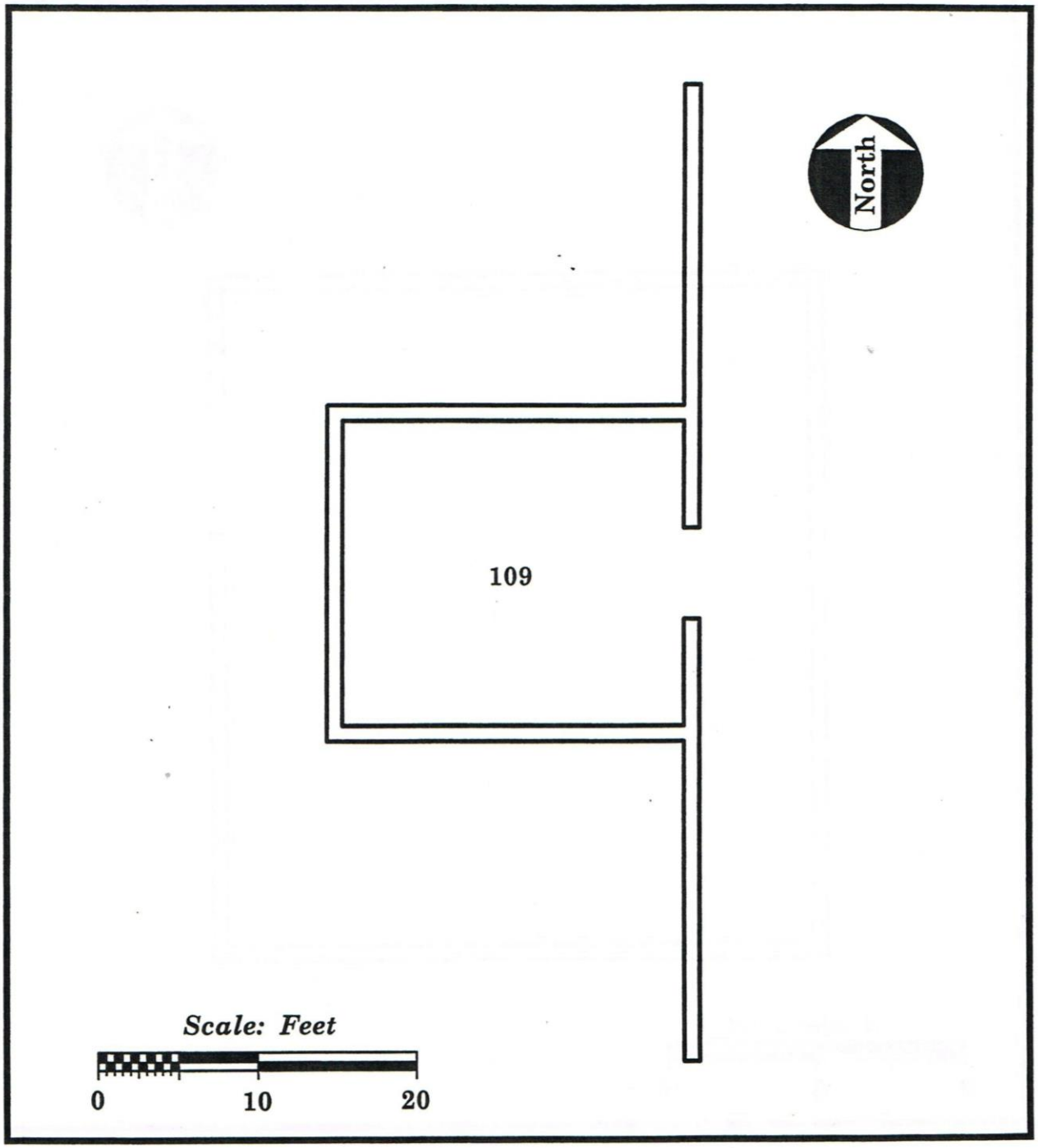

Figure 10. Building 817F, Facility Plot Plan, 1997. LLNL Archives, (Figure A-15)

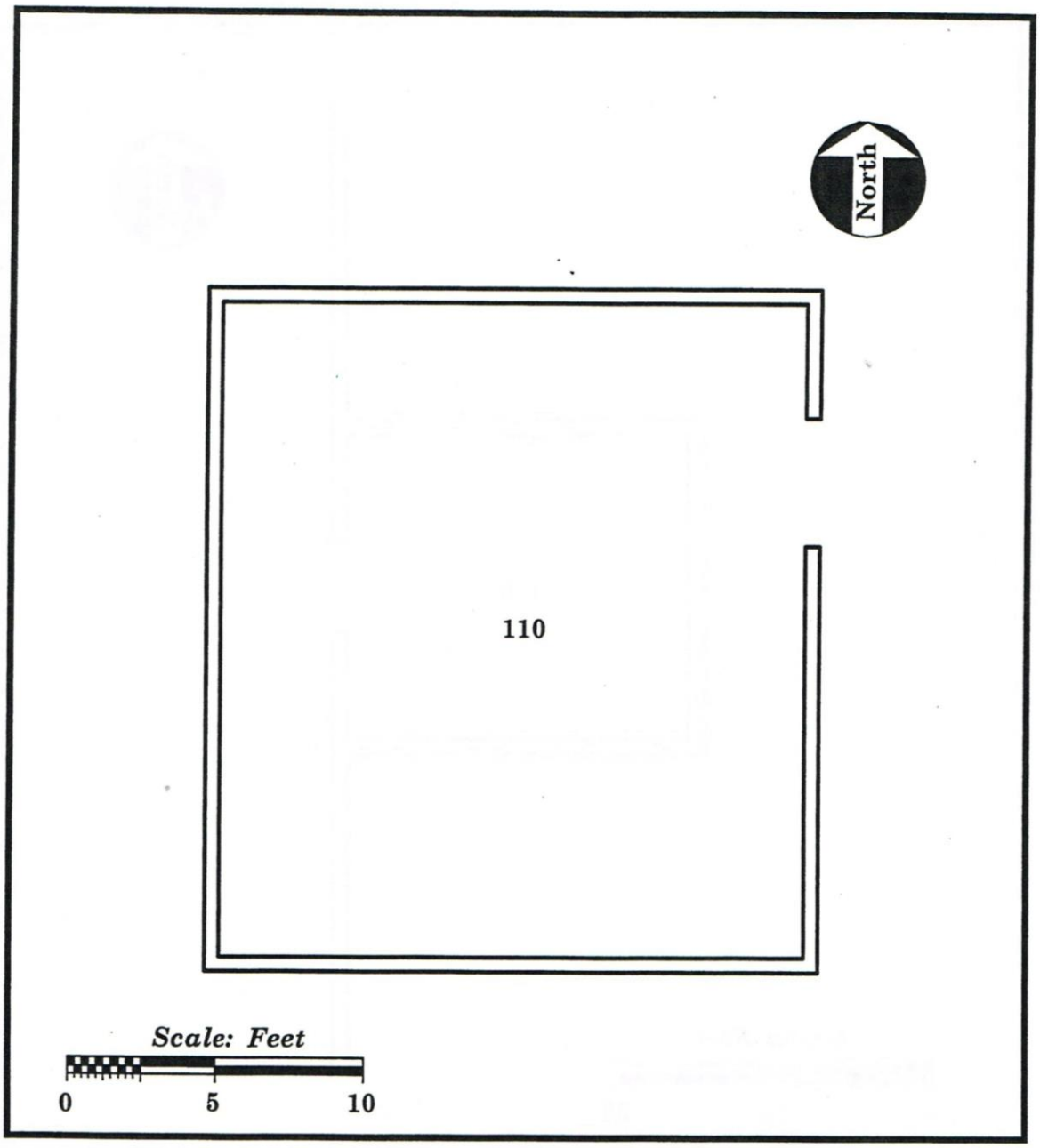

Figure 11. Building 817G, Facility Plot Plan, 1997. LLNL Archives, (Figure A-16)

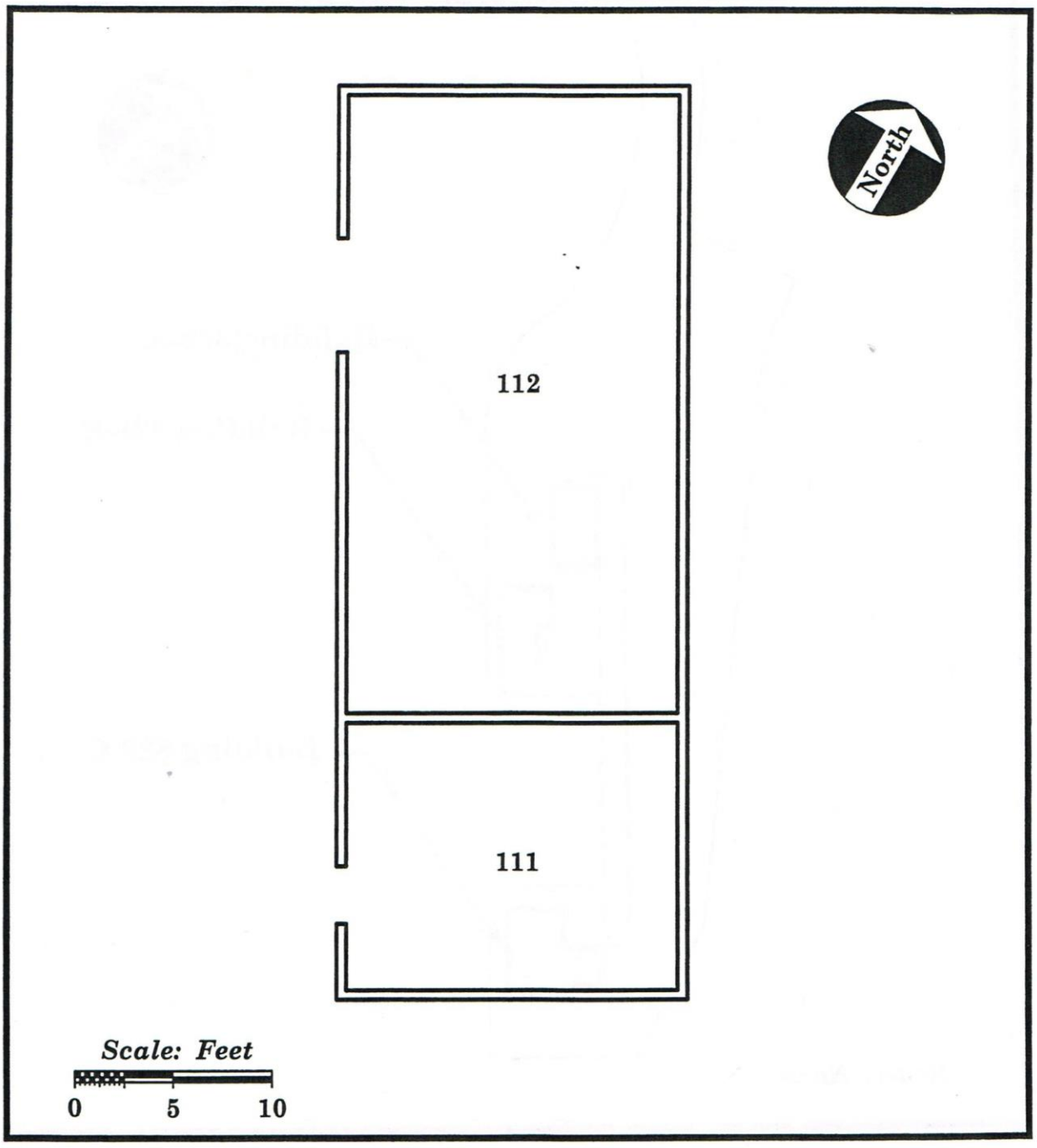

Figure 12. Building 817H, Facility Plot Plan, 1997. LLNL Archives, (Figure A-17)

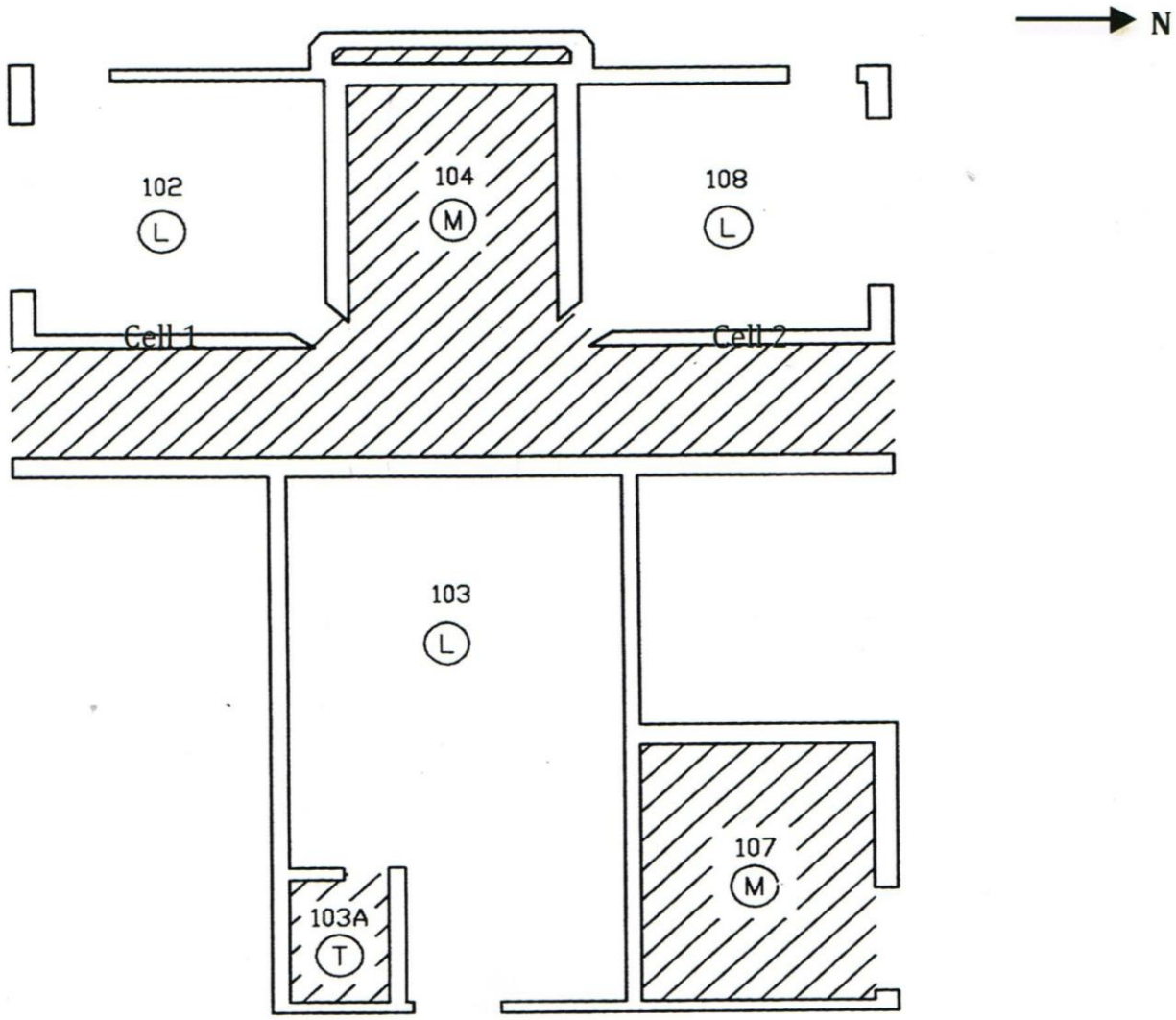

Figure 13. Lab Building 825, Facility Keyplan, 1996. LLNL Archives, (PKS96-825-001B)

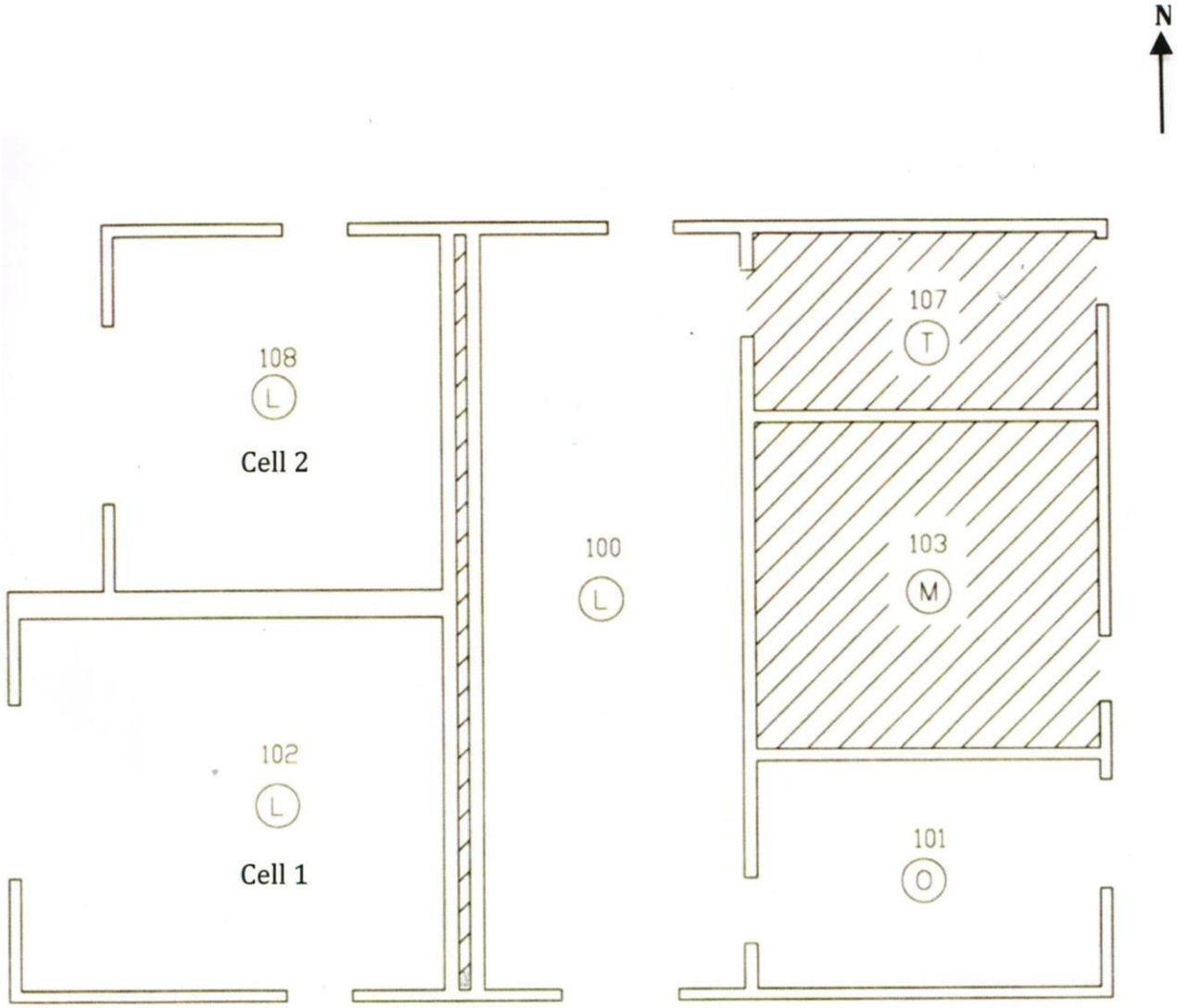

Figure 14. Lab Building 826, Facility Keyplan, 1996. LLNL Archives, (PKS96-826-001B)

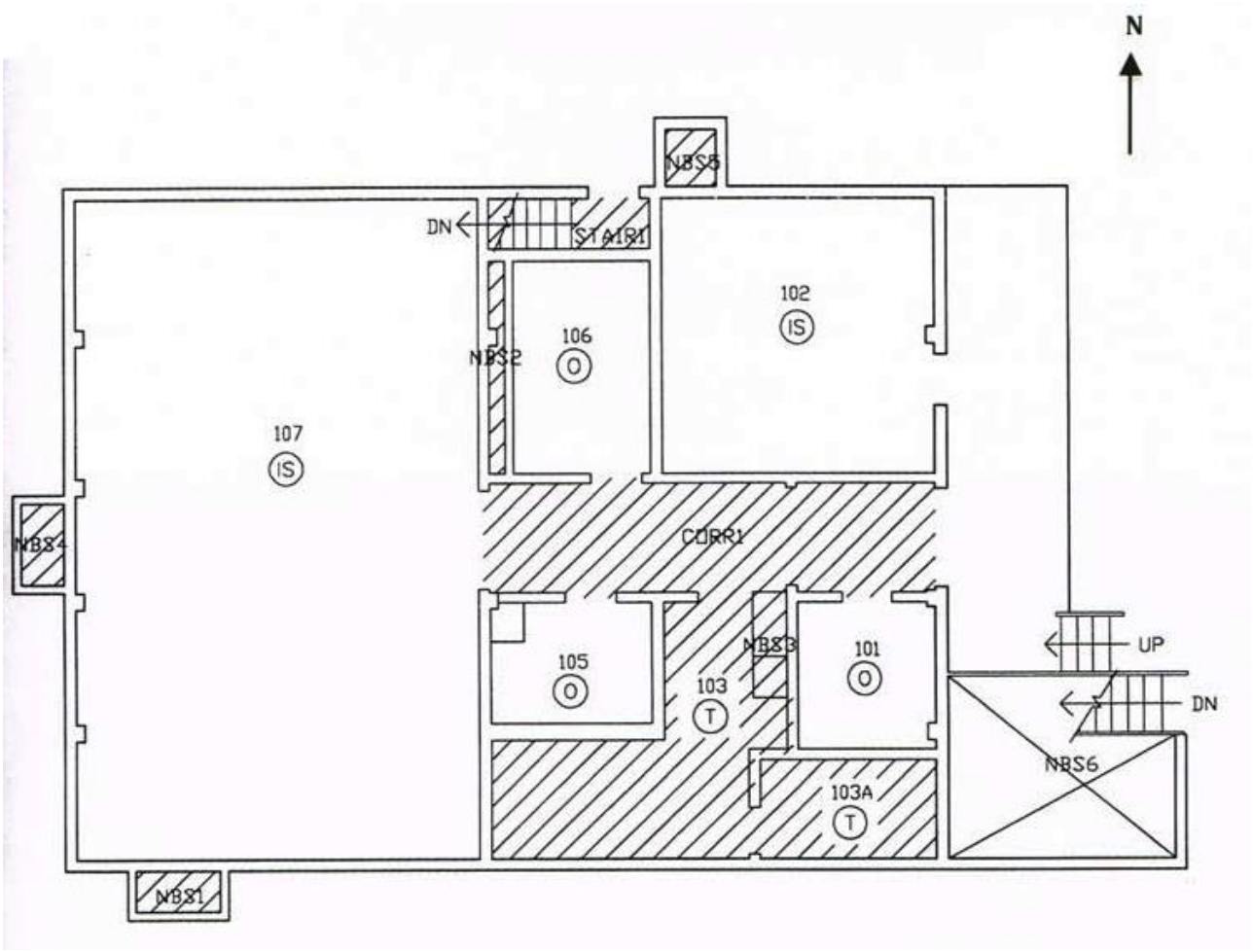

Figure 15. Office Building 827A - First Floor, Facility Keyplan, 1996. LLNL Archives (PKS96-827A-001BA)

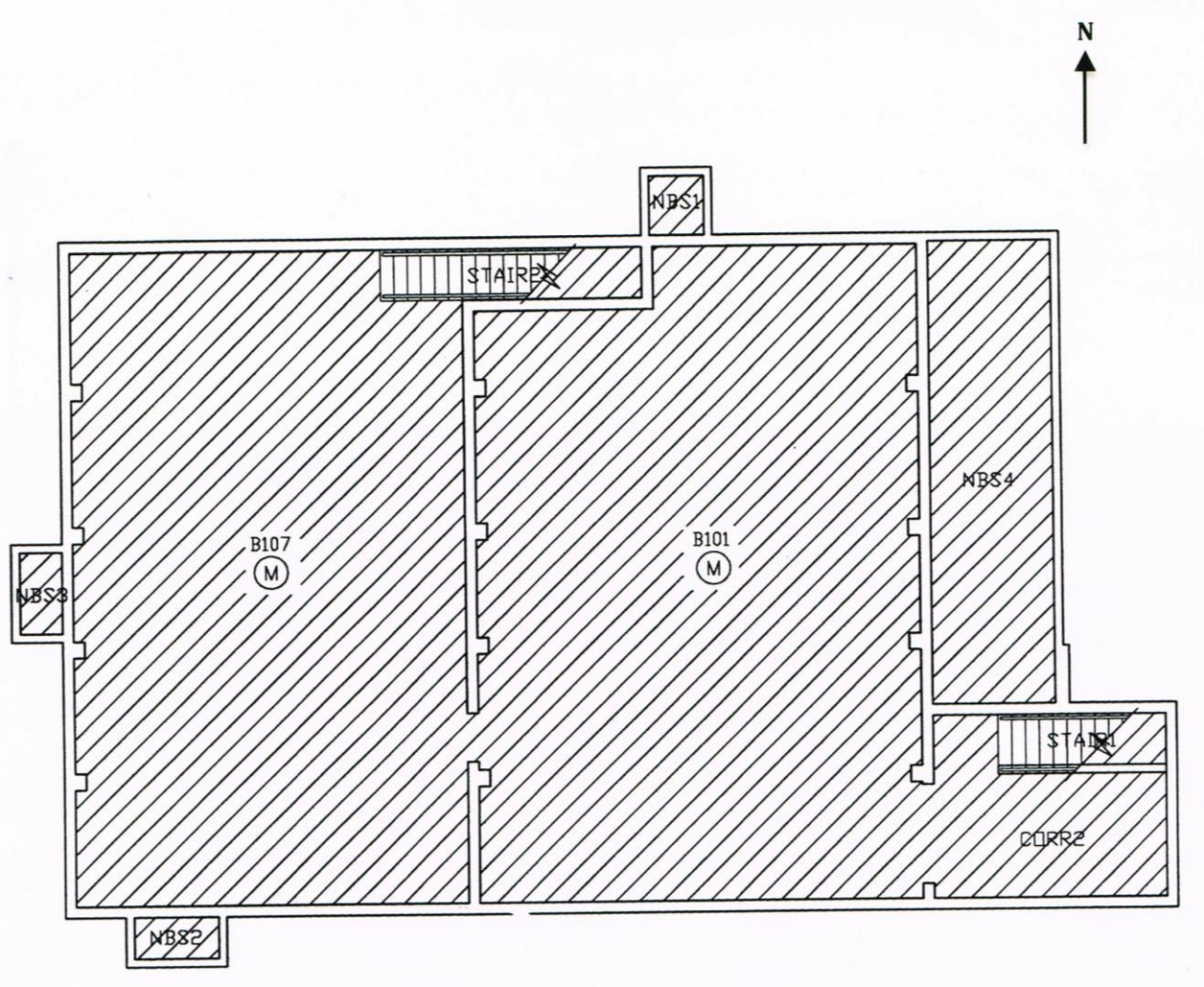

Figure 16. Office Building 827A - Basement, Facility Key Plan, 1996. LLNL Archives (PKS96-827A-002B)

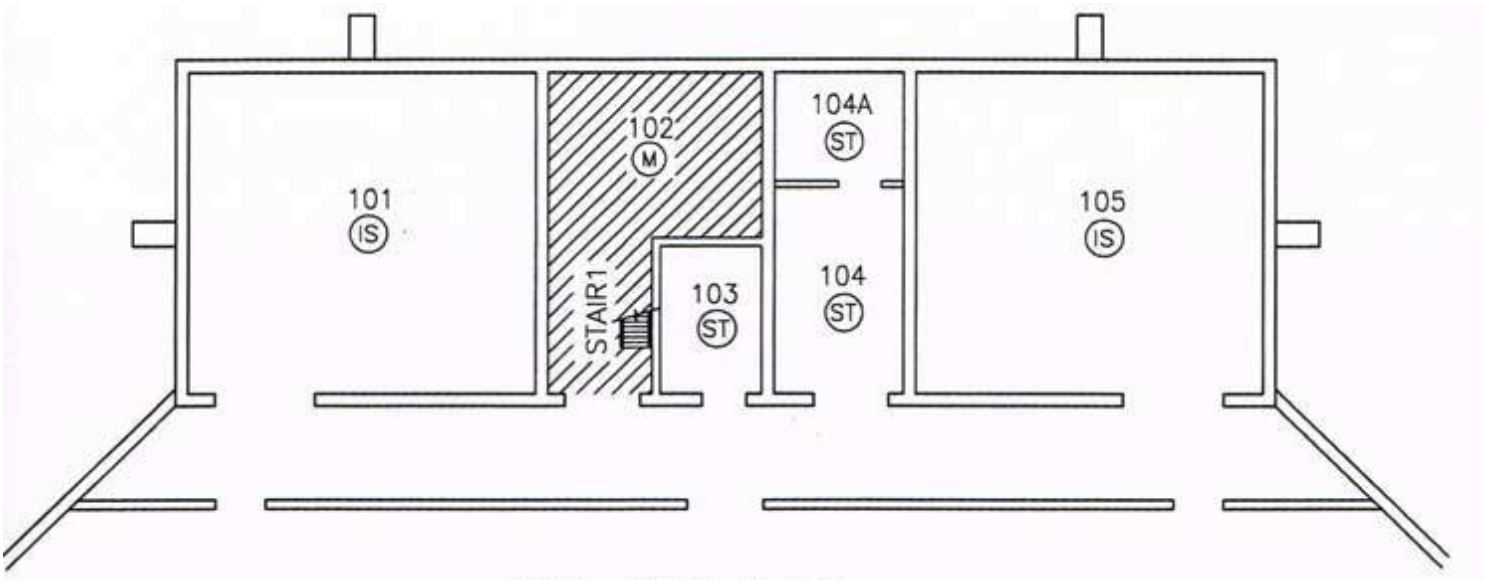

Figure 17. Building 827C - First Floor, Facility Keyplan, 1996. LLNL Archives, (PKS96-827C-001BB)

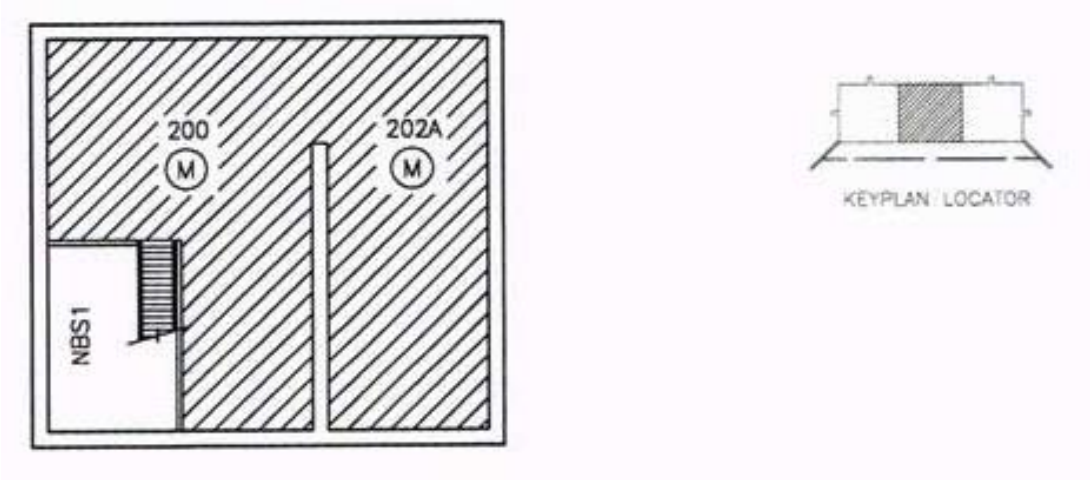

Figure 18. Building 827C - Mezzanine, Facility Keyplan, 1996. LLNL Archives, (PKS96-827C-002BA)

Appendix B

HISTORIC PHOTOGRAPHS

Note: All images are from LLNL Archives unless noted otherwise

BUILDING 805

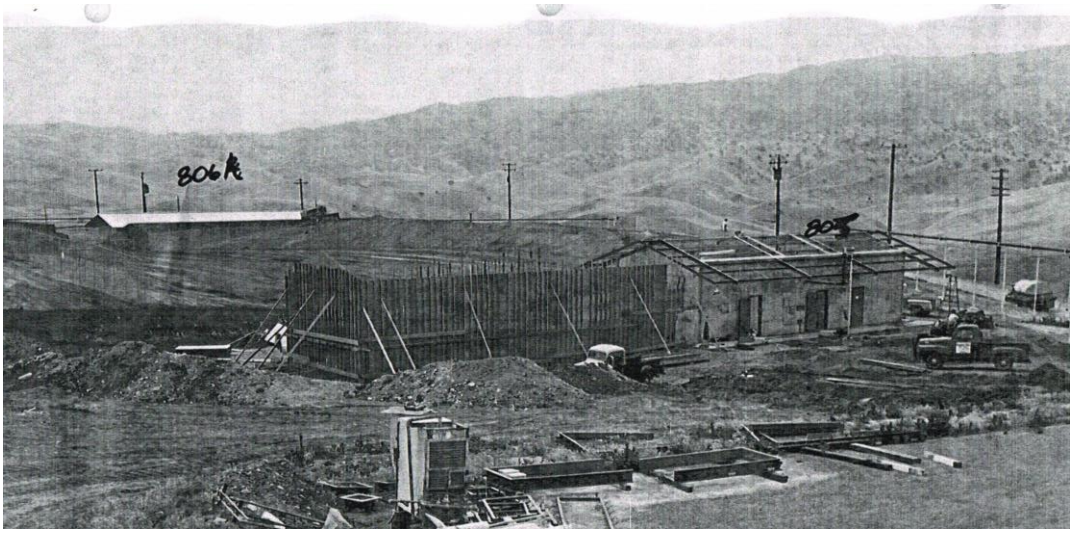

Image 1. Increments 1 and 2 of Building 805 under construction, ca. 1958.

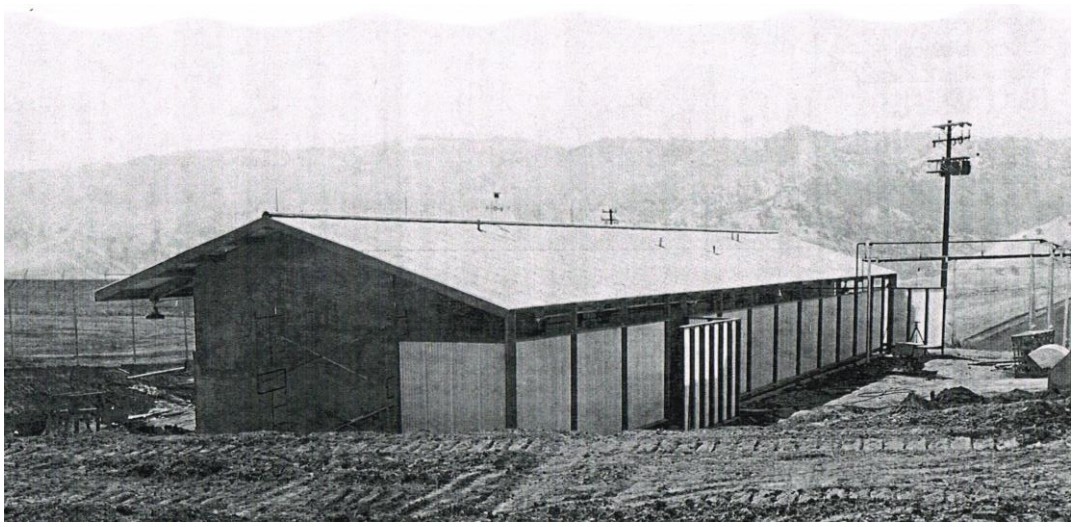

Image 2. Increments 1 and 2 of Building 805 completed, ca. 1959.

Image 3. Building 805 facing west, ca. 1975.

Image 4. Building 805, looking northwest, ca. 1975.

BUILDING 806 COMPLEX

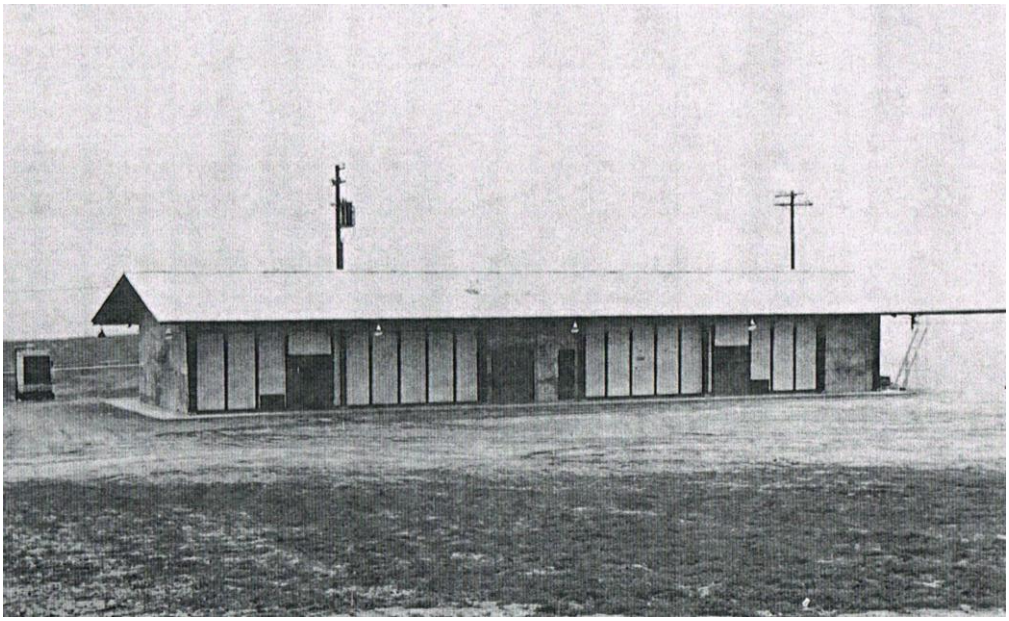

Image 5. Building 806A upon completion of construction, ca. 1958.

Image 6. Building 806B in the foreground with wooden blast barrier at center and Building 806A in the background, ca. 1959.

Image 7. Building 806C adjacent to wooden blast barrier, ca. 1961.

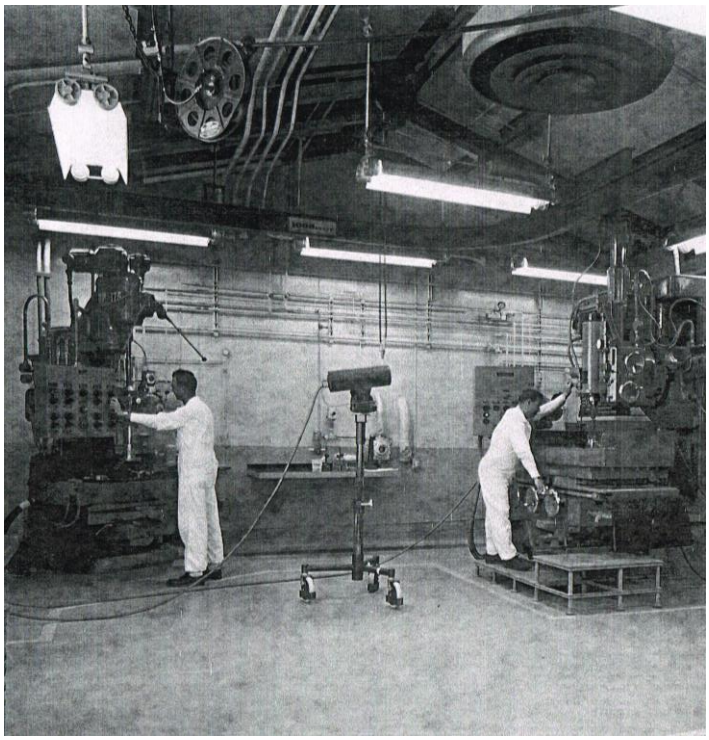

Image 8. Technicians machining HE components in Room 134 of Building 806B, 1975.

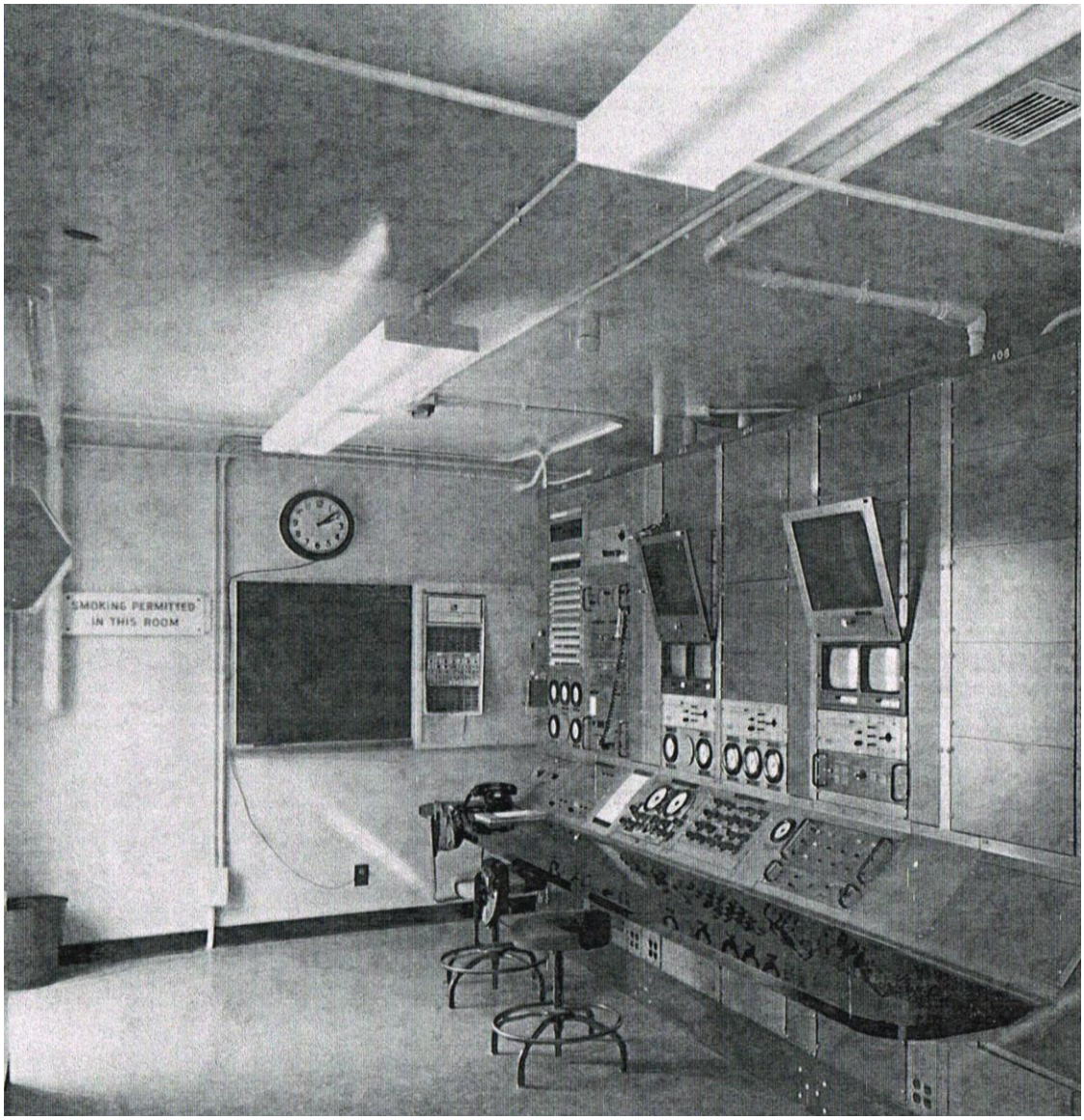

Image 9. Control panel for remote machining in Building 806B, 1975.

BUILDING 807

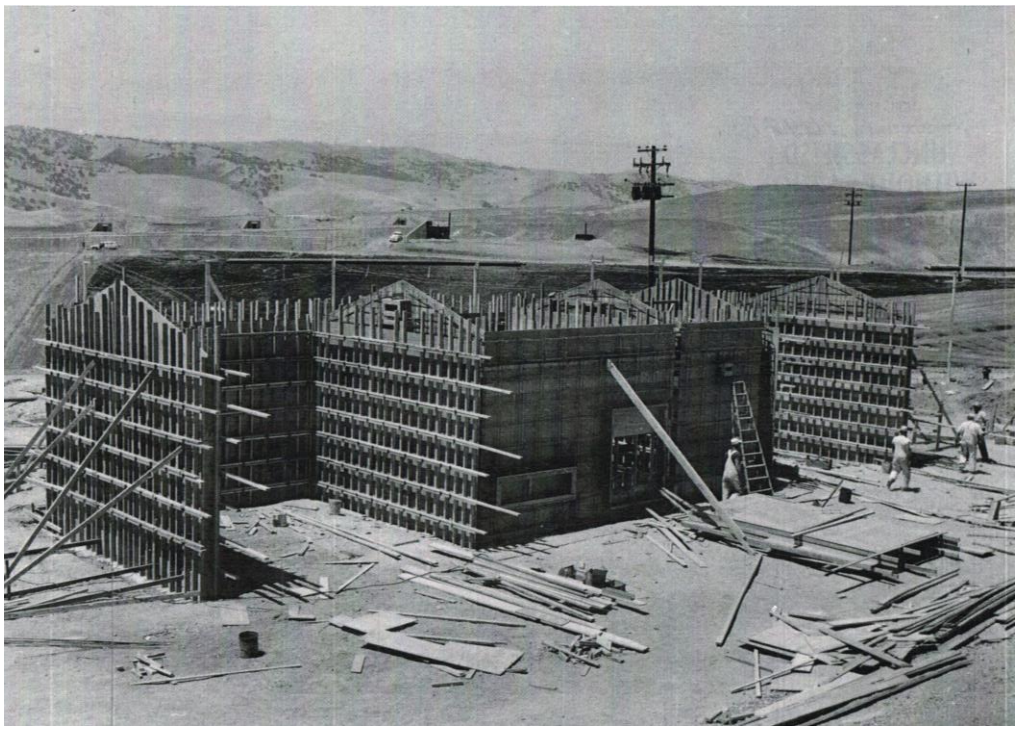

Image 10. Building 807 under construction, ca. 1958.

Image 11. Rear view of Building 807 nearing completion, ca. 1959.

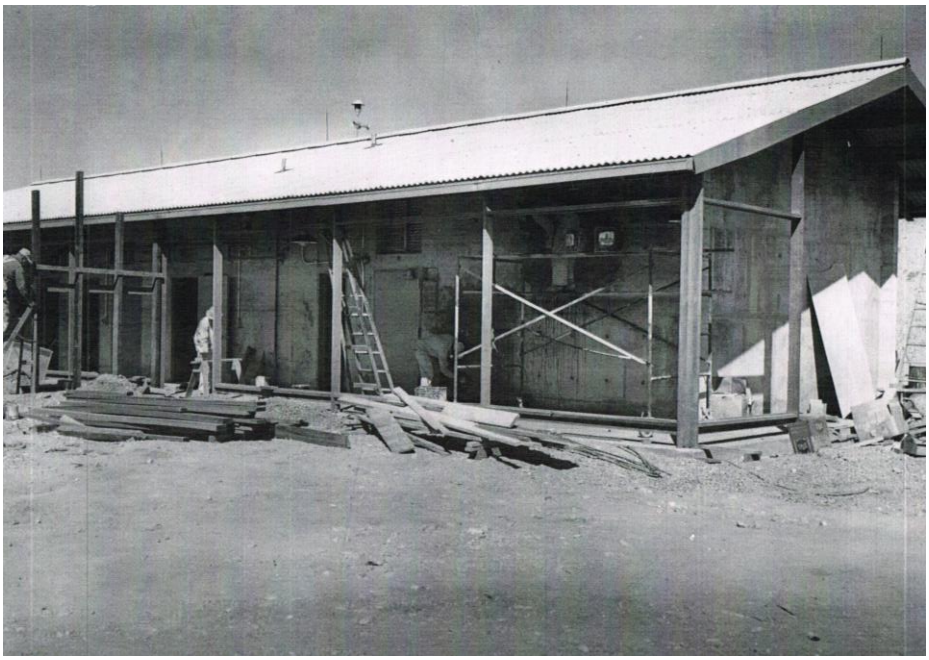

Image 12. View of the facade of Building 807 nearing completion, ca. 1959.

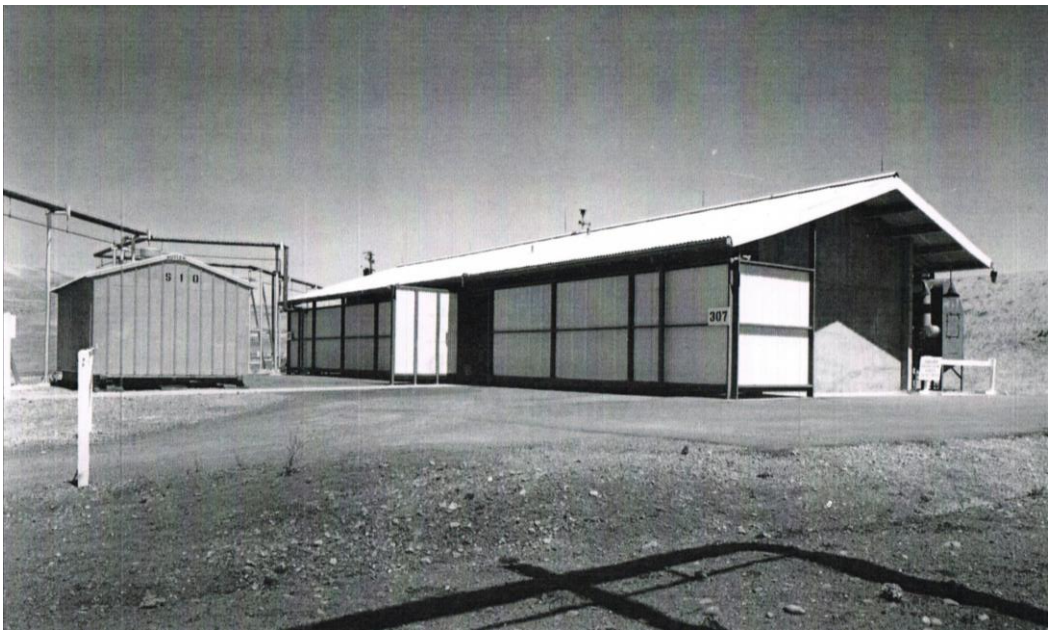

Image 13. Storage Building 807A and Building 807 upon completion, ca. 1960.

BUILDING 825

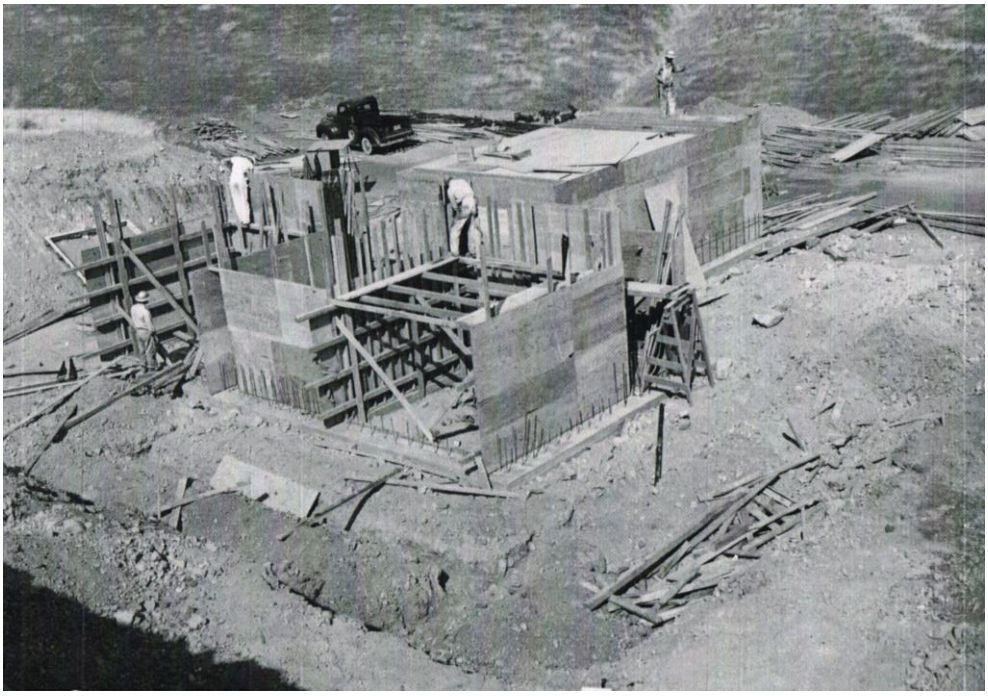

Image 14. Hillside view of Building 825 under construction, looking northeast, ca. 1958.

Image 15. View of Building 825 under construction, looking northwest, ca. 1958.

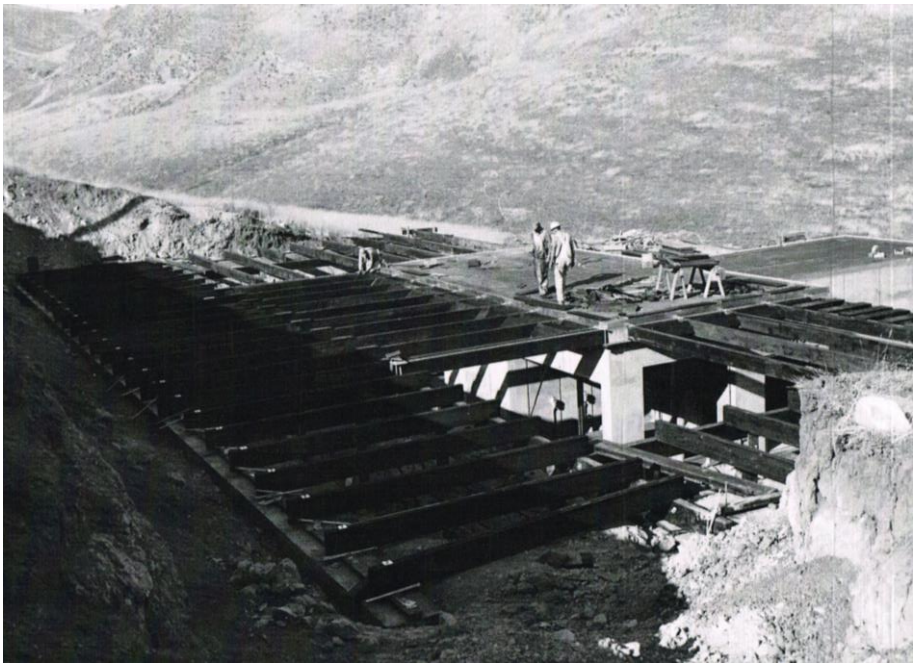

Image 16. View of Building 825 under construction looking northeast as shrapnel baffles are installed, ca. 1958.

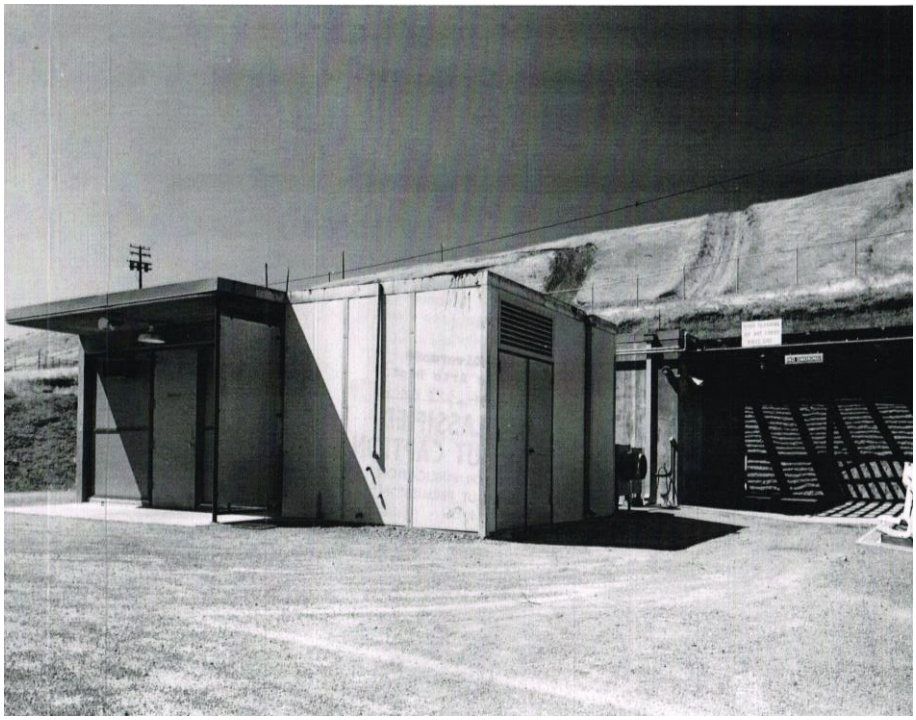

Image 17. View of Building 825 looking southwest just after construction, note the shrapnel baffles extending to the hillside, ca. 1959.

Image 18. View of Building 825 looking northwest just after construction, note the shrapnel baffles extending to the hillside, ca. 1959.

BUILDING 826

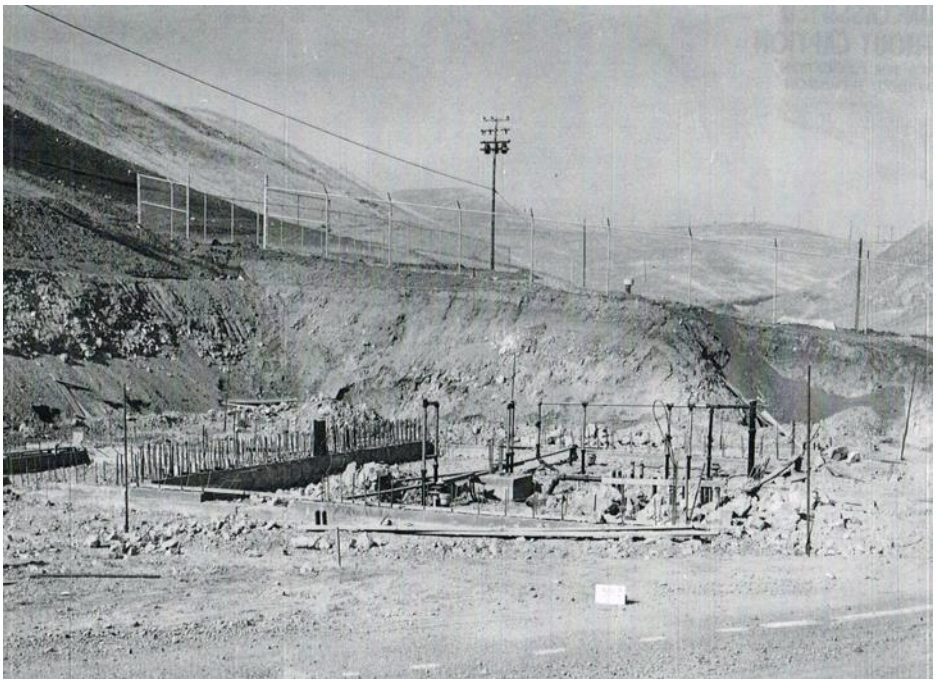

Image 19. Building 826 under construction, looking northwest, ca. 1959.

Image 20. View of Building 826 just after construction looking northwest, note the shrapnel baffles extending to the hillside ca. 1960.