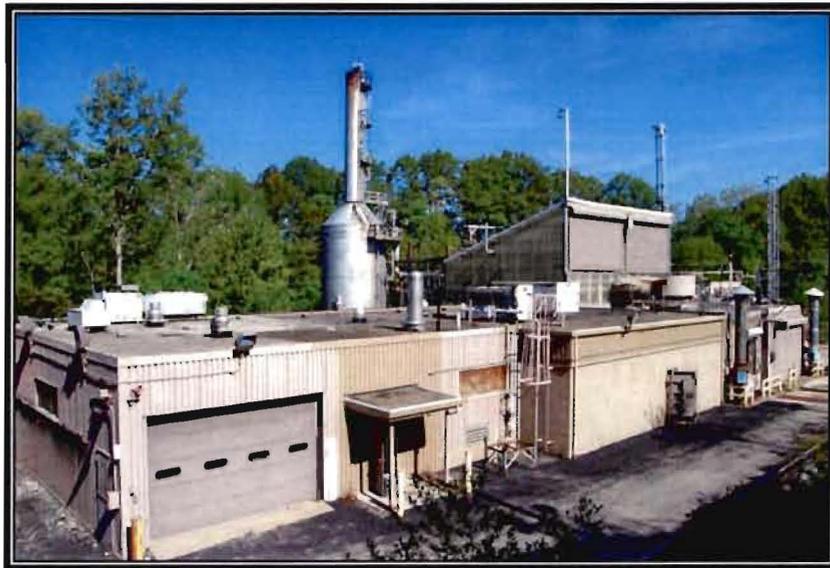


ARTIFACT INVENTORY AND EVALUATION

ROCKET ENGINE TEST FACILITY NASA GLENN RESEARCH FACILITY

CLEVELAND, OHIO



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LIST OF ACRONYMS

DOE Department of Energy

HDC Hardlines Design Company

NASA National Aeronautics and Space Administration

NACA National Advisory Committee for Aeronautics

NASM National Air and Space Museum

FLOX Mixture of 30% Liquid Fluorine and 70% Liquid Oxygen

LOX Liquid Oxygen

OHPO Ohio Historic Preservation Office

RETF Rocket Engine Test Facility

ROB Rocket Operations Building

SECTION A

INTRODUCTION



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OVERVIEW HISTORY OF THE ROCKET ENGINE TEST FACILITY

In 1940, the National Advisory Committee for Aeronautics (NACA) created Lewis Research Center, a field installation in Cleveland, Ohio, intended to support aeronautical research with an emphasis on the development of more efficient rocket engines (National Park Service 2001). Built in 1956 by NACA at Lewis Research Center, the Rocket Engine Test Facility (RETF) accommodated a number of important developments in rocket technology during its years of active operation (Butowsky 1984). The RETF Complex "is an integrated stand alone test facility dedicated to the testing of full scale rocket thrust chambers" (Butowsky 1984). A recent National Park Service document stated that "... the most significant achievement of Lewis was in pioneering research that led to the development of hydrogen as a rocket engine fuel and in the development and testing of new materials for spacecraft and aircraft" (National Park Service 2001). RETF research on the manipulation of liquid hydrogen and oxygen aided development of the RL-10 Centaur rocket engine and the J-2 Saturn rocket engine, used in NASA's Apollo moon exploration missions (Butowsky 1984). The current design for Space Shuttle rockets has also benefited from RETF research on liquid hydrogen fuel. Along with the development of hydrogen as a rocket fuel, the Lewis Research Center completed significant research in the areas of "high energy propellants; electric propulsion; aircraft engine noise reduction; engine pollution reduction; and data bank research information in aerospace safety" (National Park Service 2001).

The National Park Service determined that the most historically significant period in the history of the RETF began in 1957 with the opening of the test facility, and ended around 1969 with the first successful Apollo moon missions. During the 1960s, for example, technical problems such as "combustion instability" surfaced in the U.S. space rocket development program. Personnel at the RETF researched problems such as this and reported results to NASA Headquarters. The NASA development department then used RETF research results to design and build better rocket engines. Rocket testing at the RETF significantly increased during the development period for rocket engines associated with the Apollo Program. During this period, RETF engineers sometimes worked around the clock, often testing four to five times a week. After the Apollo mission, research at the RETF contributed to the development of engines for the space shuttle and other programs. Specifically, RETF engineers worked on minimizing low-cycle fatigue in order to develop a re-usable engine. They built a research engine called the Plug Engine that could be re-fired eighty times on one tank of fuel. This allowed the cyclic testing of over a hundred spool pieces of various design and materials (NASA 2002).

In the late 1970's and 1980's, RETF engineers also tested the first LOX cooled engines ever built by NASA and explored the problems of using this unique cooling concept. In the late 1990's, three separate programs were run for TRW under a contractor/NASA contract. Two rocket engines with 16,000 lb. and 40,000 lb. thrust, fueled by liquid

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hydrogen/liquid oxygen, were tested along with a 13, 000 lb. thrust kerosene/liquid oxygen engine. The final RETF Stand A program involved the testing of a liquid hydrogen cooled rocket engine with high aspect ratio cooling passages. RETF was officially closed on July 1, 1995 (NASA 2002).

The RETF underwent several modifications during the period it was in active use. The original test stand facility installed in 1957 in Building 202 is known as Test Stand A, or "A-Stand." In the late 1960s, RETF was upgraded to test more powerful engines, and Buildings 205 and 206 were constructed as part of this goal. Around 1967, an upper stage was added to the scrubber stack of Building 202 to reduce exhaust output. A second test stand, the Altitude Test Stand (Test Stand B), was installed in 1985 to simulate outer space conditions. This test stand was also used for high-ratio nozzle testing. In the early 1990s a new test stand known as C-Stand was constructed north of Building 202. C-Stand was involved in research related to kerosene rocket propellant programs and liquid hydrogen ejector testing. A major rehabilitation of the RETF was underway by 1994, but funding cuts forced the facility to close in June 1995. The facility has been vacant since 1995 and is now slated for demolition related to the development of a new runway at Cleveland Hopkins Airport.

In 1985, the RETF was listed on the National Register of Historic Places and was designated a National Historic Landmark by the National Park Service (NPS). The complex was cited for its role in the advancement of lightweight, regeneratively cooled hydrogen engines and also for its role in facilitating the overall progress of propulsion technology used in NASA missions and programs (Butowsky 1984).

Since the RETF is a National Historic Landmark, its demolition is being mitigated through Historic American Engineering Record (HAER) documentation. Other mitigation products include videos and a museum display focused on RETF, and the salvage and curation of RETF records and artifacts. This report is being completed to satisfy a major requirement in the RETF Memorandum of Agreement (MOA) that a list of significant artifacts be compiled prior to demolition of the facility.

PROJECT OBJECTIVES

The purpose of this report is to identify artifacts associated with the NASA Rocket Engine Test Facility (RETF), as mandated in the MOA covering the mitigation of the RETF. Personnel of Hardlines Design Company (HDC), the City of Cleveland, the Ohio Historic Preservation Office (OHPO), NASA GRC, and the NASA Office of History attended a meeting on August 16, 2001 to identify potential artifacts. HDC, the OHPO, and NASA GRC representatives made a preliminary examination of the RETF site and identified items to be used in a Museum Display associated with this project, or to be offered for curation as historic artifacts. Notes and photographs from this meeting have been used to guide the artifact selection and identification reflected in this report. Based on results of this examination, it was anticipated that a limited number of large

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objects would be identified for salvage, and that a large number of smaller items such as telephones, control panel components, and other objects will be identified and documented.

Within this report, HDC has included a section that will assist the City in developing a plan to remove and store items that minimizes damage until disposition of the features is arranged. HDC is not responsible for arranging or executing removal and storage of the features. These efforts will be implemented and coordinated by the City of Cleveland in collaboration with NASA and the OHPO. The City of Cleveland will be responsible for the safe removal and storage of historic artifacts prior to final disposition or curation. The City of Cleveland will oversee the removal of the salvage items to a designated storage space.

PROCESS FOR IDENTIFYING AND DISPOSITIONING ARTIFACTS

NASA Procedures and Guidelines NPG 4310 *Identification and Disposition of NASA Artifacts* (16 March 1999) provides guidelines for the identification, reporting, transfer, or disposal of NASA articles, equipment, and hardware of historical interest. NPG 4310 defines artifacts as "unique objects that document the history of the science and technology of aeronautics and astronautics." The importance of these objects originates from their association with "historic flights, programs, activities, or incidents; achievements or improvements in technology; our understanding of the universe; and important or well-known personalities."

According to NPG 4310, artifacts are to be identified by NASA Center Property Disposal Officers, in conjunction with relevant Public Affairs Offices, program and project directors, and Center Directors. The ensuing documents describe the relationship of the artifact to the historically significant project or program. These reports are submitted to NASA Headquarters and the National Air and Space Museum (NASM). NASM relays to NASA which artifacts they hope to acquire and provides shipping instructions for their relocation. NASA may dispose of artifacts that NASM does not wish to obtain through the normal disposal process.

Linda Norberg of NASA GRC staff will complete the NASA property management process and will be responsible for offering artifacts that NASM or the potential museum display does not wish to use to NASA Centers and to the Smithsonian Institute. If some artifacts are not used in the museum display or claimed by NASA or the Smithsonian, they will be dispositioned by NASA. The normal disposal process for artifacts is 21 days for NASA Centers and NASM, then 21 days for other Federal and DoD agencies. After this process is completed, HDC will then be responsible for contacting Ohio repositories to offer the remaining artifacts. In this case, HDC will submit a single letter to the Ohio Historic Preservation Office (OHPO) to cover the sixty-two museums and repositories covered under the Ohio Historical Society. The items will also be offered to four to six

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other repositories in Ohio that are not affiliated with the Ohio Historical Society. The U.S. Air Force Museum at Wright-Patterson Air Force Base will be included in this list. Other possibilities include COSI and museums in the Cleveland metropolitan area. Museums and repositories will be expected to claim the artifacts within four to six months after they are offered, to allow the City to avoid incurring costs for long-term storage of the items.

CRITERIA FOR ARTIFACT SELECTION AND CATEGORIZATION

The purpose of the assessment was to identify items of historic significance appropriate for salvage. A number of different types of artifacts were identified based on NASA Procedures and Guidelines NPG 4310 *Identification and Disposition of NASA Artifacts* (16 March 1999), the input of NASA personnel, recommendations of the Ohio Historic Preservation Office (OHPO), and input from retired RETF engineers and technicians.

The selected artifacts fall into several categories. An interactive museum display setting that emulates a control room will be designed and built as part of the mitigation process for the RETF. The display is to include a number of interactive elements and will re-use materials from RETF facilities. Therefore, items such as signs, labeled pipes, phones, control panels, and other graphics were tagged as artifacts. These items may be of use for the interactive museum display and therefore should be salvaged. Signs that were custom-made for the RETF facility and that refer to terms or concepts unique to rocket testing were tagged, while more generic mass-produced signs that did not reflect the unique function of the RETF were not tagged. A number of framed RETF color renderings, test photos, and engine models were also tagged as artifacts in the control room (Building 100). Although these items were not used directly for RETF testing, they have visual appeal for re-use in the museum display, and they help tell the story of the facility.

A second category of artifacts represented items that were part of the actual research work of the RETF and that were unique to the facility or to the concept of rocket engine testing. Some of these artifacts conform to the mandate in NASA Procedures and Guidelines NPG 4310 *Identification and Disposition of NASA Artifacts* (16 March 1999) that artifacts are "unique objects that document the history of the science and technology of aeronautics and astronautics."

There were some objects that appeared to fit these criteria. The largest such artifact identified was A-Stand (Artifact 202A-4), a large metal stand on which rocket engines were mounted for vertical testing in the Building 202 test cell during the entire operation of the RETF facility from 1957-1995. Other items included a rocket engine used for A-Stand testing in the early 1960s (Artifact 202C-2). A large number of rocket nozzles, engines, skirts, spool pieces, and other rocket engine elements were also

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found throughout the facility. Some of these items were used in rocket engine testing on the facility's A-Stand or B-Stand from the early 1960s through the 1990s.

Other items were fabricated for use at A-Stand or B-Stand but appear not to have been used for actual testing. Some items stored in the C-Stand building and in the basement of Building 202 appeared to be spare parts or rocket elements that were never used. In some cases a large quantity of identical elements were found. If, in consultation with RETF retirees, these elements were not found to have major significance to the facility, a single representative example was tagged. Many of these items were portable and were not found in their original locations. It is not clear if these items have a great deal of historic significance, since they seem to have never been used for actual testing at the facility. However, some of these objects have strong visual appeal and may be useful for the RETF museum display.

The artifacts can also be categorized in terms of items that were fixed in their original position or context in the facility, and "loose" or "portable" items that were temporarily stored in a particular location, but that may not have any connection to or historical significance for that portion of the facility. For example, the Observation Room control panel in Building 202 is still attached to the wall in its original position, and its significance is related to the building and room in which it is located. In contrast, rocket nozzles that were actually tested at A-Stand were found in storage in the C-Stand building. Although these nozzles are discussed under this report's discussion of C-Stand, the items were placed in the C-Stand structure for storage only. These nozzles do not "belong to" C-Stand, and their historic significance is related to testing activities at A-Stand. It is important to distinguish between features that are in their original context and portable features that have been moved from their original locations.

A few black and white photograph albums and a few stray file folders with technical notes from the final years of RETF were found in Building 202. These items should be considered "records" rather than "artifacts" and should be removed to the central storage area for RETF records so they can be appropriately assessed and archived. These items were not tagged or removed as part of this assessment.

In efforts to clarify the differentiation of each item in this report, a four-category classification system has been developed by NASA. The system first divides items in this report into objects NASA will re-use for its programs or place in storage for later use (Category 1), and objects that NASA does not plan to re-use or store for program use (Categories 2,3, and 4). Items in Category 1 will not be used in the RETF museum display and will not be placed in the NASA property management disposal process.

Items not designated as Category 1 were designated by NASA as Category 2 or Category 4 items. Category 4 items meet the definition of an artifact based on NASA Procedures and Guidelines NPG 4310 *Identification and Disposition of NASA Artifacts*.

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Category 2 objects were included in this report because of their visual appeal or potential usefulness in the RETF museum display, but are non-artifacts under NASA NPG 4310. After NASA designated each artifact as Category 1, 2, or 4, personnel from HDC and Lucarelli Designs and Displays selected Category 2 and Category 4 items that had potential for use in the RETF museum display. These items retain their Category 2 and Category 4 status, but have also been designated as Category 3 to indicate that they will be reserved for the museum display and therefore held back from the property disposal process. Items offered to other NASA facilities, the Smithsonian, and other repositories would include items in Categories 2 and 4 that have not also been designated as Category 3. One exception is photographs and other graphics in Category 2. These items will be retained by NASA GRC, but they may be loaned to museums or other repositories.

In individual photo entries for each item in this report, the control number for each item is followed by a listing of its category (i.e. Category 1, Category 2, Category 3, or Category 4. For example, the listing for Artifact #1 found in Building 100 would be "100-1(Category 2)." The following is a brief summary of the system's main points:

Category 1: (NASA Reuse Items)

- These items are **not** artifacts.
- Items will be **reused or stored at GRC for NASA** and will **not be placed in the NASA property management disposal process.**

Category 2: (Non-Artifacts)

- These items are **not** artifacts under NASA guidelines.
- Category 2 Photographs and Artworks are NASA property. These items will be **available for loan to museums, but cannot be designated as Category 3.**
- Some non-photo/artwork Category 2 items have been designated as Category 3. Category 2 items that are not photos, artworks, or Category 3 items will enter the NASA property management excess process.

Category 3: (RETF Museum Display Reserve Items)

- These items are reserved for use in the **RETF Museum Display.**
- These items will **not** be placed in the NASA property management excess process, unless they are not used in the museum display.

Category 4:

- These items **are** artifacts under NASA guidelines.
- These items will enter the NASA property management excess process as artifacts unless they have also been designated as Category 3.

Every effort was taken to make a thorough assessment of the entire RETF complex for this report. No significant artifacts were found in Building 205. The search for artifacts extended into all buildings located at the RETF test stand site and included outdoor

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portions of the site. This exploration covered all of Buildings 202, 205, 206, 206A, the Observation Blockhouse, C-Stand, and the Pole Barn on the southern side of the site. The search also included the control room in Building 100.

Based on the RETF mitigation Scope of Work, tracking down items removed from the RETF to other locations was not part of this project. It is outside the scope of this assessment document to track down or retrieve items removed from the RETF site. Some objects still in place at RETF have also been identified as items that will be re-used for NASA mission activities. The B-Stand structure at Building 202, for example, was not tagged as an artifact because NASA plans to retain this piece of equipment and will move it to a new location at GRC. If the HDC field team was aware at the time of the field survey that an item was to be re-used by NASA, it was not tagged.

FIELD WORK

The RETF artifact inventory and assessment was completed on June 4, 2002 at NASA Glenn Research Center. Roy Hampton, Senior Historian/Project Manager, and Heather Reinbold, Preservation Planner, of HDC tagged, photographed and assigned an inventory number to each item. Mr. Hampton and Ms. Reinbold were assisted by Richard Kalynchuk of NASA GRC, who arranged access to the facility, and Jon Erdmann of Parsons Engineering, who helped coordinate access and provided general assistance with field work. Mr. Neal Wingefeld and Mr. Doug Bewley, former RETF engineers, also assisted the project team. Mr. Wingefeld and Mr. Bewley identified technical items that were important in the testing and research activities of the RETF and helped interpret the significance of the items. Mr. George Repas, an engineer who worked at RETF during most of the facility's operation, also provided valuable technical assistance, especially in terms of identifying and assessing the historic and technical significance of rocket engines and components. The HDC project team also consulted NASA GRC's collection of RETF historic photos to assist in determining the age of artifacts, especially Building 202's test cell hardware and the control room equipment in Building 100.

One hundred sixteen (116) items were tagged. The RETF consists of Building 202, the test stand and scrubber facility, and a number of additional support facilities for the test stand. The search area for this assessment included the Building 100 control room and the entire tract associated with the main operation area of RETF. This area includes the following buildings:

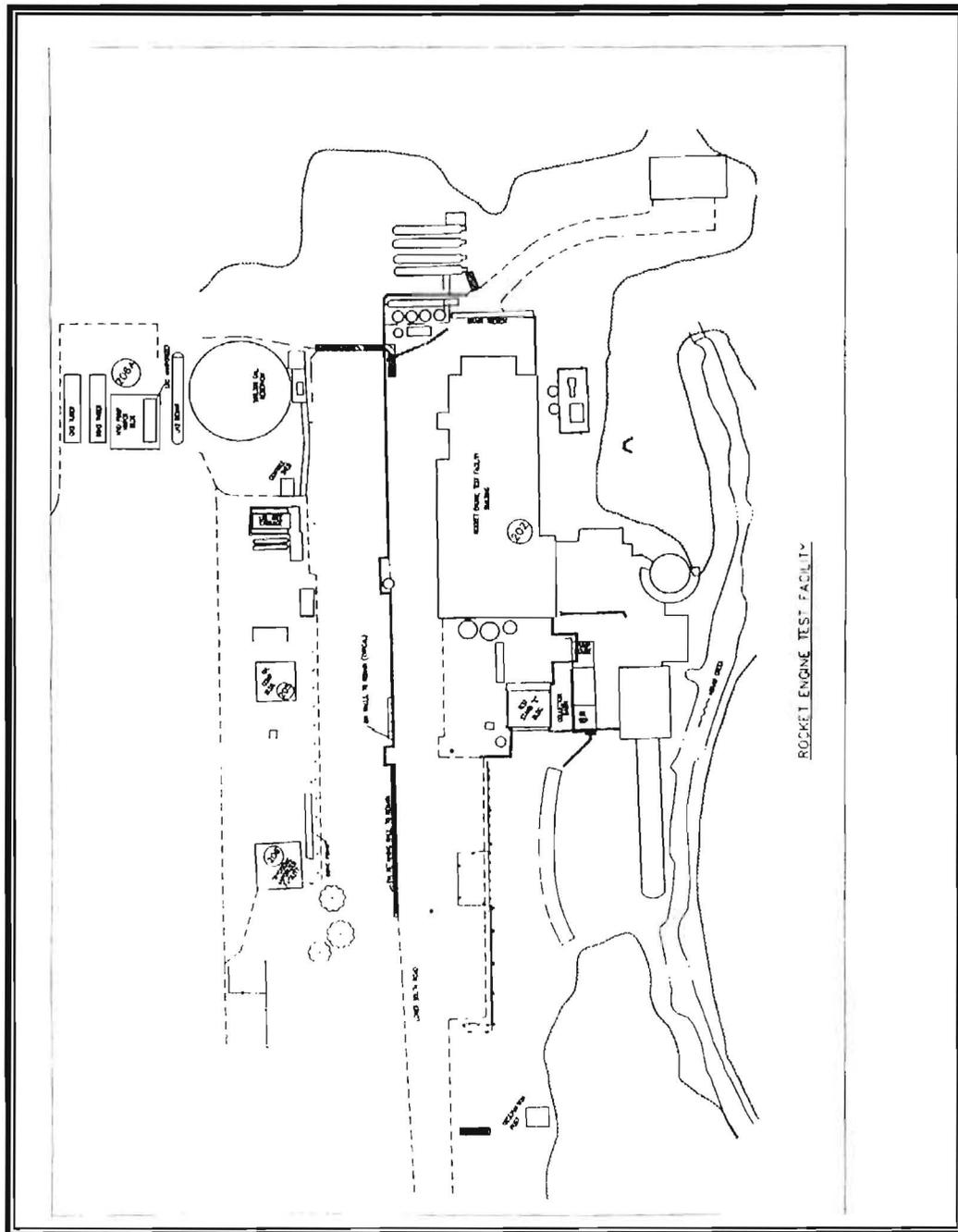
- Building 202: Test Stands A and B, scrubber, pump facilities, retention tanks, and shop area (built 1956-1957, repeatedly modified)
- Test Stand C, located north of Building 202 (built early 1990s)
- Building 205: Gaseous Hydrogen Compression Propellant Transfer and Storage Area (built late 1960s)
- Building 206A: Hydrogen Vaporizer Facility (built 1980s)
- Building 206: Cryogenic Vaporizer Facility (built late 1960s)

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- Observation Blockhouse (built 1956-1957)
- Pole Barn (built early 1990s)

Items were tagged as artifacts in the Building 100 control room and in, on, or near various parts of Buildings 202, 206, 206A, C-Stand, the Observation Blockhouse, and the wood-frame Pole Barn located on the facility's south end. No significant artifacts were found in Building 205. The search for artifacts extended into all buildings located at the RETF test stand site and included outdoor portions of the site. This covered all of Buildings 202, 205, 206, 206A, the Observation Blockhouse, C-Stand, and the Pole Barn on the south side of the site. In Building 100, the search for artifacts focused on the control room. Other parts of Building 100 did not contain RETF-related materials, and certain rooms were secured research areas inaccessible to non-NASA personnel.

Each artifact was assigned a control number based on the number of the building it was found in, on, or near. For example, the first artifact tagged in Building 100 was numbered 100-1, the second 100-2, etc. The largest numbers of artifacts were found in the Building 100 control room, at C-Stand, and in Building 202. Only a modest number of artifacts were found in Buildings 205, 206, and 206A.



Map of the Rocket Engine Test Facility.

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SECTION B

BUILDING 100 - ROCKET OPERATIONS BUILDING (ROB)



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BUILDING 100 - ROCKET OPERATIONS BUILDING (ROB)



Figure B.1: Northeastern corner of Building 100.

Building 100 Description

Building 100 stands approximately one-quarter mile north of the RETF test stand complex. This one-story, T-shaped, flat-roofed building has a continuous basement beneath the western/southern section of the first floor. The exterior of Building 100 was mostly constructed of yellow brick, with a yellow brick and concrete veneer entrance. An addition located on the southwestern part of the building is constructed of corrugated metal.

Located on the first floor of the Rocket Operations Building (ROB) (Building 100) are a test stand facility remote control room, general office space, and a shop area. The basement of the building is used as a storage and utilities area. The artifact search was confined mainly to the basement, lobby, and control room areas of the building. The remainder of the building consists of laboratory and office spaces that do not appear to contain any remaining RETF artifacts.

Data from the RETF were processed into a central data system, which offered on-line data reduction potential to terminals at the ROB. All test stand procedures were remote-controlled on panel meters and closed-circuit television systems. Intercommunication and emergency systems, along with two independent phone

systems, provided the arrangement essential for the safety of rocket testing (Butowsky 1984).

Types of Artifacts Located in Building 100

The bulk of the Building 100 artifacts were panels and equipment used to control RETF experiments at A-Stand, B-Stand, and C-Stand. Most of these objects were still fixed in their original positions and appeared to date from a rehabilitation of the control room that likely occurred in the 1980s. A large aqua green control panel was also found in storage in the basement of the building and was identified by RETF retiree Neal Wingefeld as a historic RETF control panel. This panel was likely used from its installation when the facility opened in the 1950s until the 1960s or 1970s. The control room itself also contained a significant number of portable artifacts, including three models of rocket engines or engine components, a few actual rocket components, and a series of photos of RETF tests and renderings of the facility.

The control panels, test photos, and renderings are all objects that are unique to RETF and likely conform to NASA procedures and Guidelines NPG 4310 *Identification and Disposition of NASA Artifacts* as "unique objects that document the history of the science and technology of aeronautics and astronautics." Some of the rocket engines and engine models found in Building 100 also appear to fit that category.



Figure B.2: Photo of the RETF Control Room as it appeared in 1976.

Table B.1: Artifacts in and around RETF Building 100.

Artifact #	Category	Description	Artifact #	Category	Description
1. 100-1	3	Mockup Model of FLOX-Methane Rocket Engine	19. 100-19	4	Upper Graphic A-Stand Panel
2. 100-2	2	Framed Photo of RETF C-Stand Test	20. 100-20	4	A-Stand Graphic Panel
3. 100-3	2	Framed Color Rendering of RETF	21. 100-21	4	A-Stand Graphic Panel
4. 100-4	2	Framed Color RETF rendering	22. 100-22	4	A-Stand Panel
5. 100-5	2	A-Stand Color Test Photograph	23. 100-23	2	A-Stand Panel Button
6. 100-6	2	A-Stand Color Test Photograph	24. 100-24	2	A-Stand Button Panel
7. 100-7	4	Cutaway Rocket Thrust Chamber	25. 100-25	2	A-Stand Red Telephone
8. 100-8	4	Injector Cutaway/Inside Copper Engine Liner	26. 100-26	1 or 2	C-Stand Panels
9. 100-9	3	Cutaway of Plug Engine Assembly	27. 100-27	2	B-Stand Panels
10. 100-10	4	Electroformed Nickel A-Stand Engine	28. 100-28	2	Electric Speed Indicator Panel for A-Stand
11. 100-11	3	A-Stand High Aspect Ratio Cooling Passage Engine	29. 100-29	2	Abbean Certified Hygrometer
12. 100-12	2	Aerial Photograph of RETF	30. 100-30	2	Thermometer
13. 100-13	2	"RETF Data Analysis Room" Sign	31. 100-31	3	Ramp Generators
14. 100-14	2	"Panel is Energized Do Not Touch" Sign	32. 100-32	3	Abort Panel
15. 100-15	4	Oxygen/Fuel Combustion Pressure Analog Computer	33. 100-33	3	Telephone
16. 100-16	3	A-Stand Control Panel	34. 100-34	2	Telephone
17. 100-17	3	Graphic Panel of RETF Scrubber	35. 100-35	3	Ramp Generator Panel
18. 100-18	3	Graphic LOX Panel	36. 100-36	4	Original RETF Control Panel
			37. 100-37	4	South 40 Testing Schedule Sign

BUILDING 100 ARTIFACT PHOTOGRAPHS

1. 100-1 (Category 3) Mockup Model of FLOX-Methane Engine -

Artifact Description:

- * Silver metal base
- * Model made of silver plastic

According to RETF engineer George Repas, this is a model of a FLOX-Methane rocket engine. FLOX is a mixture of 30% liquid fluorine and 70% liquid oxygen. The engine type represented by this model was to be built by Pratt and Whitney during the 1970s. The FLOX-Methane engine project was to be directed by NASA Lewis Research Center but was cancelled before any major work beyond a concept study was completed (George Repas). The model is made of silver plastic and appears to be an accurate scale model. Based on Mr. Repas' comments, it is likely that the model dates from the 1970s. The model is portable and is not fixed in position. The original location of the model is unknown.



2. 100-2 (Category 2) Framed Photo of RETF C- Stand Test -----

Artifact Description:

- * Hangs on the west wall of building

This photo appears to date from the late 1980s or early 1990s. The photo shows C-Stand in operation during testing. C-Stand was used to test special seals to be used in turbo-pumps and was in operation in the late 1980s and early 1990s. No specific date was visible on the photo. The item is framed and matted in a black composition frame and is protected by glass. The picture is hanging on a wall in the control room.

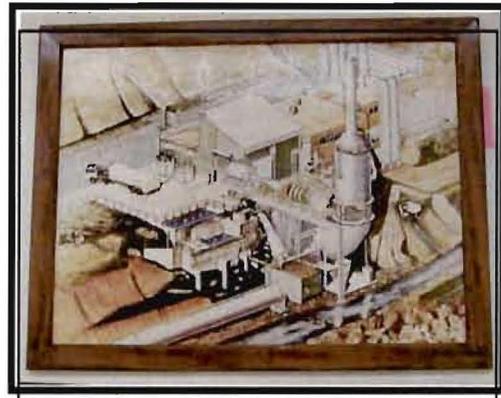


3. 100-3 (Category 2) Framed color rendering of RETF -----

Artifact Description:

- * Color rendering depicts RETF Building 202,
looking
southeast

This color reproduction of a rendering of RETF shows B-Stand and was therefore likely produced in the mid-1980s or later. The print is mounted in a wooden frame but is not protected by glass. It is hanging on a wall in the control room. A NASA record photo appears to date this rendering to 1985.



4. 100-4 (Category 2) Framed color RETF rendering -----

Artifact Description:

** Color rendering of RETF, looking southeast*

This appears to be a second version of the color rendering seen in Artifact 100-3. This version features a prominent cutaway of the Building 202 Test Cell and does not show B-Stand, probably in the interest of showing more details of the scrubber. The rendering is framed in a black composition frame and is protected with glass. It is hanging on a wall in the control room. A NASA photo dated a similar rendering of RETF (Artifact 100-3) to 1985.



5. 100-5 (Category 2) A-Stand Color Test Photo -

Artifact Description:

** Tan matted A-Stand color test photo*

This is a color photo of testing of a LOX (liquid oxygen) cooled rocket engine at RETF A-Stand. The LOX-Cooled Engine Program took place on and off at RETF from the early 1980s through 1989 (George Repas). Mr. Repas recalls designing and building a total of 26 of these engines over the course of the LOX-Cooled Engine Test Program. The image is framed in a brown composition frame, is protected by glass and hangs on a wall in the control room.

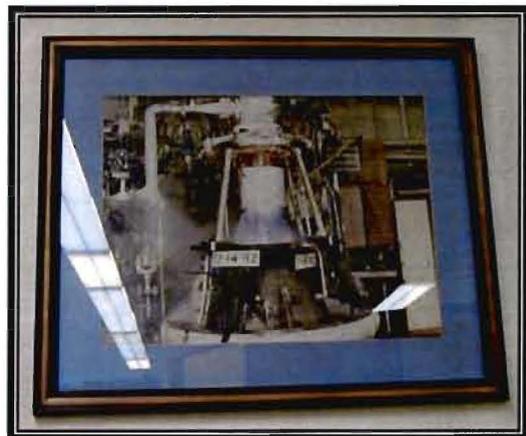


6. 100-6 (Category 2) A-Stand Color Test Photo -

Artifact Description:

** A-Stand color test photo with blue matting*

Photo of an A-Stand rocket test that occurred on February 14, 1992 (date visible in photo). The image is framed in a black composition frame, is protected by glass and hangs on the eastern wall of Building 100's control room. The photograph is of a TRW 16,000 lb. (16K) thrust liquid hydrogen cooled engine. The 16K engine tests were one of three programs operated at RETF from 1990-1995 through a contractor government agreement between NASA and TRW (George Repas). This program tested a new type of injector design and a new variety of abrasive coating. These programs were the last major tests of large engines completed at RETF.



7. 100-7 (Category 4) Cutaway Rocket Thrust Chamber -----

Artifact Description:

- * *Cutaway model of a rocket engine thrust chamber*
- * *Stainless Steel with yellow and orange paint on chamber interior*

This model appears to demonstrate the function of a rocket engine thrust chamber. RETF Engineer George Repas recalls being told that this engine was tested at the NASA-Lewis Rocket Lab, and was then cut in half, painted, and displayed in Building 100. Mr. Repas recalls first seeing this engine cutaway on display in Building 100 in 1963. Mr. Repas was not certain which propellant was used to power this engine when it was originally tested. The rocket engine may date from the main period of significance as defined by the National Park Service (1957-1969), or it may be an engine tested at NASA-Lewis before the RETF was built. The cutaway is a portable item and is currently sitting on the control room floor. The item is significant as an item displayed in the RETF control room building for much of the period of significance for the facility.



8. 100-8 (Category 4) Injector Cutaway and Inside Copper Engine Liner ---

Artifact Description:

- * *Rocket engine copper inner liner, with cooling passages and injector cutaway*

This object has two pieces. The aluminum assembly is a cutaway of a typical injector that was used on numerous rocket engines at the RETF A-Stand. "The item shows how the oxygen and hydrogen were injected into the rocket engine combustion chamber by exposing the paths the two took" (Doug Bewley). The second piece is "the inside copper liner of a rocket engine showing how the cooling passages were machined into it. These passages were used to remove heat from the rocket engine. LOX (liquid oxygen) or sometimes LH2 (liquid hydrogen) flowed through the passages and the heat that was transferred to the liquid was measured. This was one of the long-running research programs at RETF A-Stand" (Doug Bewley). According to George Repas, this copper liner was for a hydrogen-cooled high-pressure rocket engine. Mr. Repas recalls designing and building twenty-one of these engines in the early 1970s. The engines were to be tested at RETF to research the concept of "low cycle fatigue." Mr. Repas also recalled that due to high fuel costs, many engines of this type were never tested, and indicated that some unused examples may still be in storage. This artifact is a portable item currently stored on the control room floor.

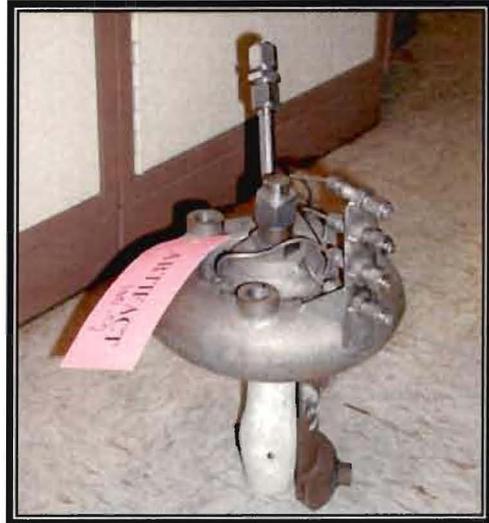


9. 100-9 (Category 3) Cutaway of Plug Engine Assembly -----

Artifact Description:

- * Silver metal cutaway of plug engine assembly
- * Consists of a stainless steel injector, copper spool piece, and ceramic coated copper plug

This is a cutaway of a Plug Engine design. According to George Repas, this artifact represents a unique engine that was tested at the RETF from 1972 through the 1980s. The engine has "a liquid oxygen-gaseous hydrogen injector with a hole down the center. Into this hole was mounted an hourglass-shaped cooled plug. The plug was ceramic-coated to provide more cooling margin. Bolted to this injector/plug combination was a cylindrical liquid hydrogen-cooled copper engine which we called the Spool piece. We would run liquid hydrogen through the spool piece and fire the engine, shut it off, fire it again, in a cyclic fashion, often doing 85 firings before the liquid hydrogen tank was starting to get empty" (George Repas). The piece was tested until it began to leak, and the number of cycles the spool piece could take before leaking was used "to gauge the low cycle fatigue characteristics of the spool piece material" (George Repas). Some spool pieces were fired as many as 300 cycles. George Repas indicated that he built a total of 135 spool pieces. He also indicated that many different copper alloys were used for the spool pieces, one piece had a silver liner, or differing cooling passage configurations, or ceramic coatings (George Repas). This artifact is a portable item currently located on the control room floor.



10. 100-10 (Category 4) Electroformed Nickel A-Stand Engine -

Artifact Description:

- * Silver metal A-Stand engine

This is a finished hydrogen-cooled rocket engine, with a copper liner inside that is similar to Artifact 100-8. This engine and other similar engines were tested at the RETF A-Stand in the early 1970's and early 1980's (George Repas). The engine is currently located on the floor of the control room and is fully portable. The engine appears to be a representative example of the type of rocket engine that was tested on A-Stand in the early 1970s.



11. 100-11 (Category 3) A-Stand High Aspect Ratio Cooling Passage Engine -----

Artifact Description:

** Extensive instrumentation on top section*

“One of the concepts that came out of the spool piece tests was high aspect ratio cooling passages. It was determined that this type of channel could cool the rocket engine better vs. the conventional, more square or rectangular channels. The engine in this picture is a high aspect ratio rocket engine that I built for testing in April 1995 at South 40. After these tests were over, the facility (RETF) was shut down” (George Repas). The engine is portable and is currently located on the floor of the control room. It represents the last generation of rocket engines tested at RETF.



12. 100-12 (Category 2) Aerial Photo of RETF -----

Artifact Description:

** Aerial photo of RETF, looking northeast*

This color aerial photographic print appears to date from 1967-1984, since the 1967 second stage is visible on top of the Building 202 scrubber, but B-Stand has not yet been built. The print is mounted in a wooden frame and is protected by glass. The picture is securely affixed to a blank portion of the RETF control panels, probably via screws. Since the object is securely fixed to the wall, this appears to be its original context, and the object should not be considered “portable.” The bottom edge of this piece is visible in a 1976 photograph of the control room.

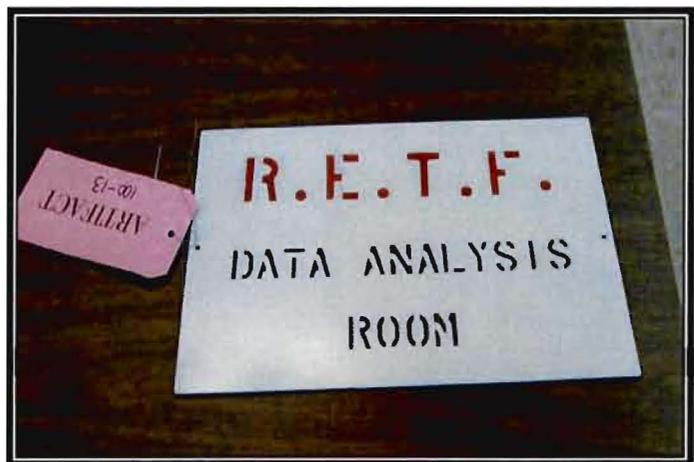


13. 100-13 (Category 2) "RETF Date Analysis Room Sign" -----

Artifact Description:

** Metal sign that once hung in the Control Room in Building 100*

This small metal sign with a white background and red and black stenciled lettering once marked the RETF Data Analysis Room. The age of the sign is unknown. The sign is no longer attached in its original position and is a portable object.



14. 100-14 (Category 2) "Panel is Energized, Do Not Touch" Sign

Artifact Description:

** Metal sign hung on a panel in the Control Room of Building 100*

This small sign is composed of metal coated on the front side with hard plastic. It is a portable item and is not attached to any control panels or other surfaces in the control room. This item appears in photos of the RETF control room dating to as early as 1983.

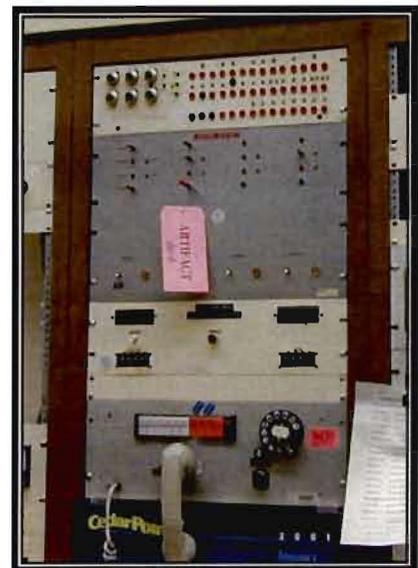


15. 100-15 (Category 4) Oxygen/Fuel Combustion Pressure Analog Computer -----

Artifact Description:

** Metal-faced vertical analog computer*

This computer dates from the 1970s and was used in testing engines on the RETF A-Stand. The item is mounted on a large metal control panel structure and is in its original position in the RETF control room.

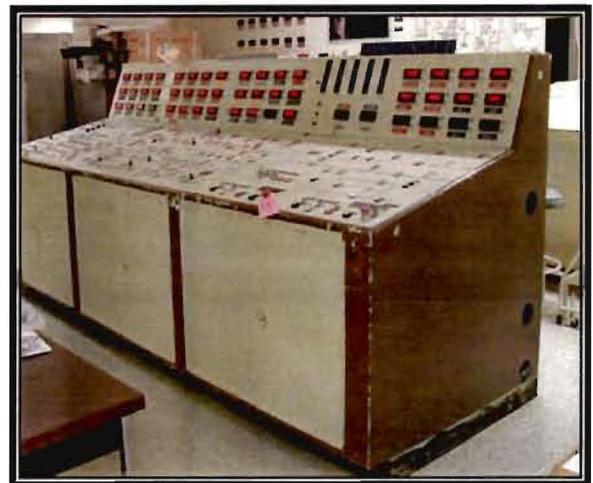


16. 100-16 (Category 3) A-Stand Control Panel -----

Artifact Description:

** Labeled "Illuminated Graphic Console D"*
** Used to control and monitor RETF A-Stand*

This was one of the major control panels used in A-Stand testing. This console is visible in a 1976 photograph of the control room, although some of the instrumentation has been changed since then. The item consists of metal painted beige and brown, and has a series of buttons and digital displays that still activate. This console is in its original position in the control room. The 1976 photograph shows that it was originally light green. The beige paint dates from 1983-1987.

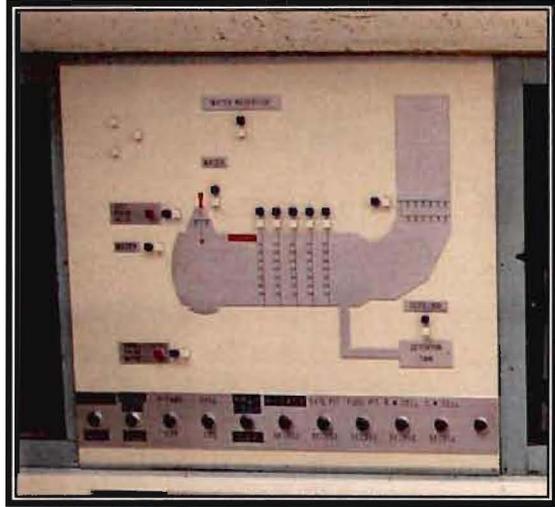


17. 100-17 (Category 3) Graphic Panel of RETF Scrubber -----

Artifact Description:

- * Illuminated graphic panel
- * Used to monitor A-Stand scrubber facility

This panel is vertically mounted onto a metal control panel structure by a series of screws. The metal panel is painted beige and has hand-cut silver metal graphics and plastic buttons. The panel is in its original position and appears to date from an RETF control room upgrade that probably occurred in the 1970s or early 1980s. Particularly appealing is the graphic representation of the RETF scrubber and exhaust stack, a detail unique to this facility. This panel is visible in 1983 photos of the control room.

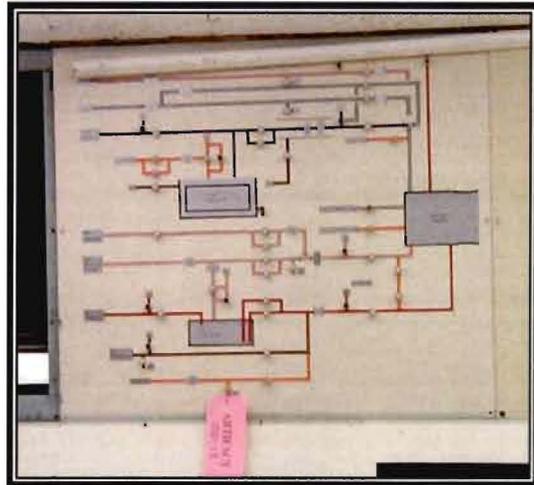


18. 100-18 (Category 3) Graphic LOX Panel -----

Artifact Description:

- * Illuminated graphic panel
- * Used to monitor the liquid oxygen (LOX) at the A-Stand test cell

This artifact is located near Item 100-18 and is part of the control panel system installed during the rehabilitation of the RETF control room in the 1970s-1980s. It is vertically mounted with screws onto a control panel structure. This artifact consists of metal that is painted beige, and the surface has silver metal and painted graphics and plastic buttons. This Panel is visible in 1983 photos of the control room.

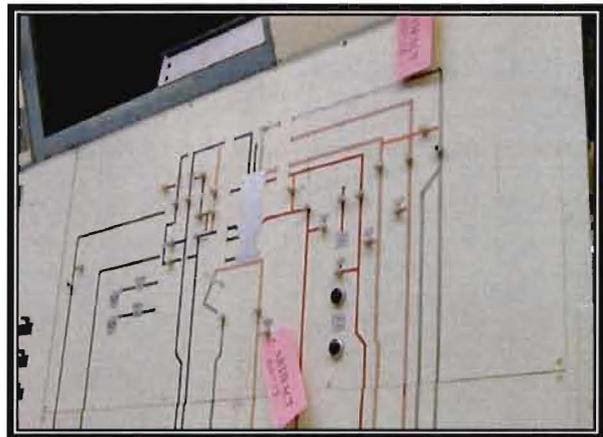


19. 100-19 (Category 4) Upper Graphic A-Stand Panel -----

Artifact Description:

- * Illuminated graphic panel

This item is located near Item 100-18 and may have been installed or reworked during the early 1980s. This artifact is similar to Item 100-18, and it is also vertically mounted with screws to a control panel. This panel is visible in 1983 photos of the control room.

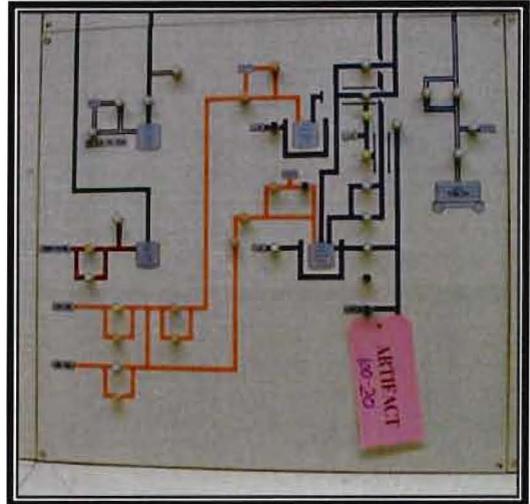


20. 100-20 (Category 4) A-Stand Graphic Panel ---

Artifact Description:

** Illuminated graphic panel*

This item is located near Item 100-18 and may have been installed or reworked in the early 1980s. The description of this artifact is similar to that of Item 100-18, and it is also vertically mounted with screws to a control panel structure.

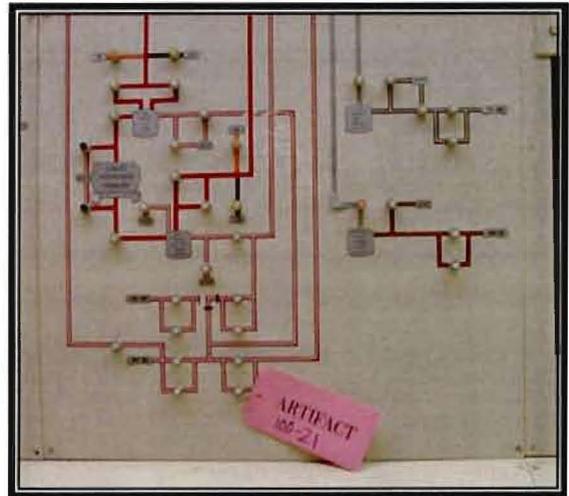


21. 100-21 (Category 4) A-Stand Graphic Panel -

Artifact Description:

** Illuminated graphic panel*

This item is located near Item 100-18 and may have been installed or reworked in the early 1980s. The description of this artifact is similar to that of Item 100-18, and it is also vertically mounted with screws to a control panel structure.



22. 100-22 (Category 4) A-Stand Panel -----

Artifact Description:

** Illuminated control panel*

This item is a diagonal screw-mounted panel located at waist level and affixed to a control panel structure. It consists of metal painted beige and may have been installed or reworked during the early 1980s.

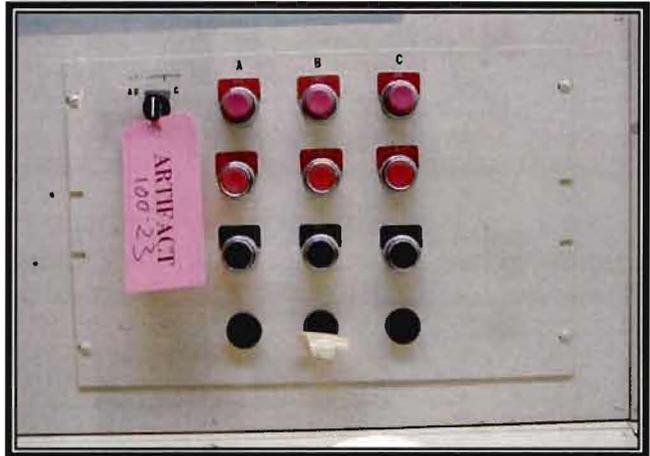


23. 100-23 (Category 2) A-Stand Panel Button -----

Artifact Description:

** Wall-mounted, metal-paneled A-Stand button panel*

This item is a vertical screw-mounted panel located at waist level and affixed to a control panel structure. It consists of metal painted beige with plastic and metal buttons, and was probably installed or reworked in the early 1980s.

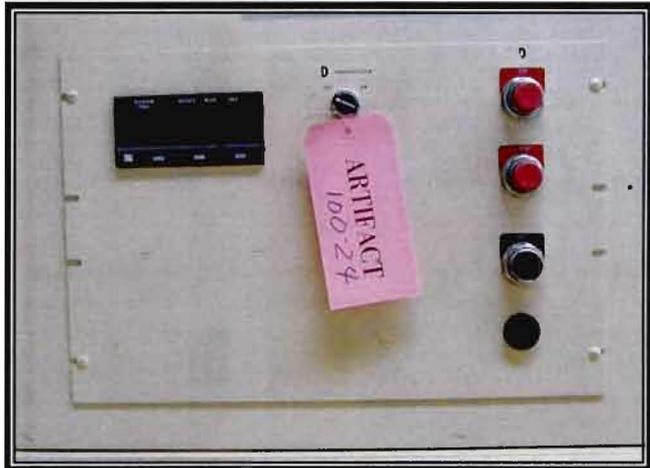


24. 100-24 (Category 2) A-Stand Button Panel -----

Artifact Description:

** A-Stand metal button panel*

The description of this artifact is similar to that of Item 100-23. It likely dates from early 1980s.



25. 100-25 (Category 2) A-Stand Red Telephone -----

Artifact Description:

** Emergency phone*

This plastic phone was for use in case of emergency. It is a wall-mounted unit and contains extensive instruction graphics. The phone likely dates from the early 1980s. It is fixed to the wall in its original position.

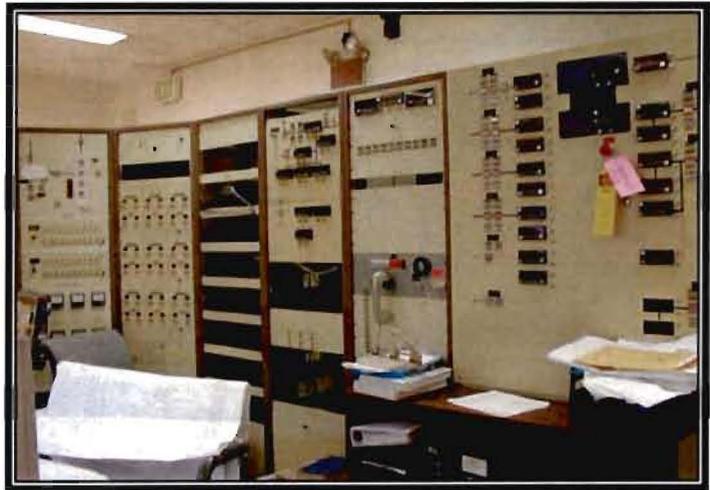


26. 100-26 (Category 1 or 2) C-Stand Panels -----

Artifact Description:

** Metal console used to control C-Stand testing procedures*

Due to its association with C-Stand, this panel clearly dates from the late 1980s or later. It is a large metal control panel structure with various plastic buttons, switches, and digital displays. It remains in its original position.



27. 100-27 (Category 2) B-Stand Panels -----

Artifact Description:

** Metal console used to control B-Stand testing procedures*

This item is similar to 100-26, but it was used to control B-Stand testing. It appears to be in its original location. Due to its association with B-Stand it likely dates from circa 1985 or later.

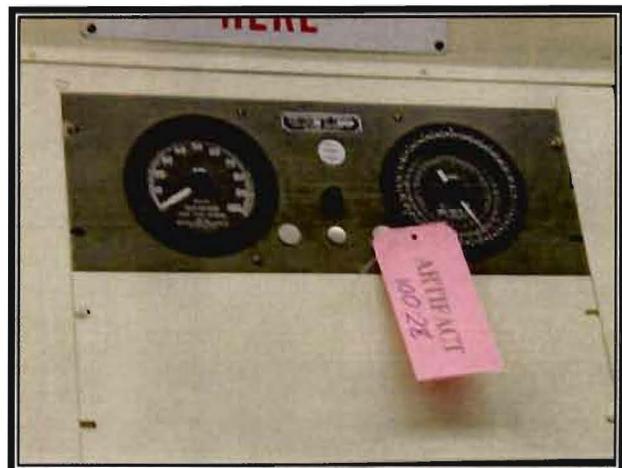


28. 100-28 (Category 2) Electric Speed Indicator Panel for A-Stand -----

Artifact Description:

** Wall-mounted, metal electric speed indicator panel*

This item is vertically screw-mounted to a metal control panel structure. It consists of metal painted beige with plastic dials. It was originally used for A-Stand testing and remains in its original location. The instrument is visible in a 1976 photograph of the control room.

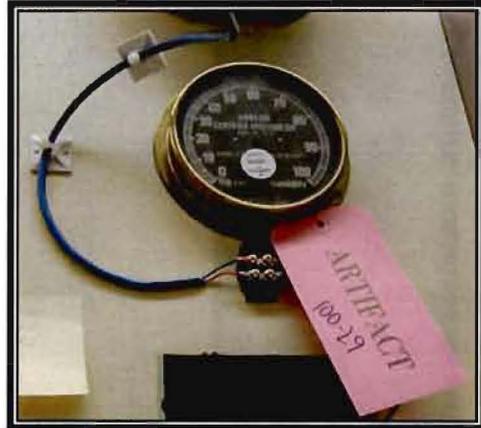


29. 100-29 (Category 2) ABBEAN Certified Hygrometer -----

Artifact Description:

** Wall-mounted, circular ABBEAN certified hygrometer*

This instrument was associated with A-Stand testing and is visible in a 1976 photograph of the control room. The instrument consists of a brass bezel, glass cover and black metal dial. It appears to be in its original position in the control room. It appears to have measured humidity and possibly other environmental conditions in the control room. Nearly identical instruments are used currently in museums to measure environmental conditions to facilitate preservation of artwork.



30. 100-30 (Category 2) Thermometer ----

Artifact Description:

** Wall-mounted thermometer*

This thermometer consists of a black painted metal bezel with a glass cover and white metal painted dial. It is vertically mounted to a control panel structure and appears to be in its original location. This item appears in a 1976 photograph of the control room.

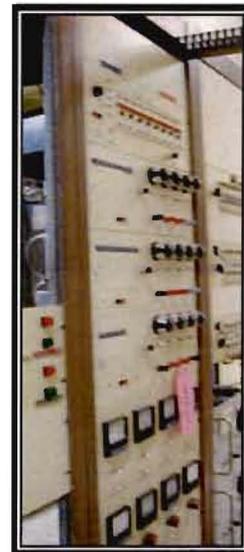


31. 100-31 (Category 3) Ramp Generators -----

Artifact Description:

** A-Stand ramp generators*

This artifact consists of control panels and electronic equipment related to the A-Stand power supply. The components are mounted on a metal control panel structure and consist of beige painted metal with plastic buttons, indicators and digital displays. The item remains in its original position. It may date from the 1970s or early 1980s.

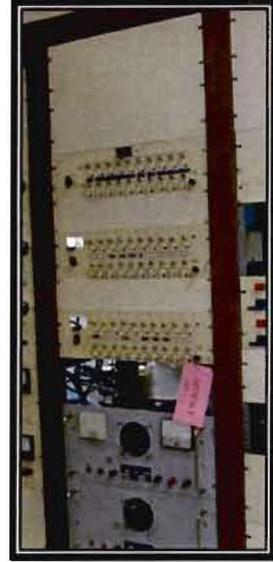


32. 100-32 (Category 3) Abort Panel -----

Artifact Description:

** Abort panel for A-Stand*

This item is a beige painted metal panel mounted on a metal control panel frame structure. The panel has metal and plastic switches and lighted status indicators. It appears to be in its original location. It may date from the 1970s or early 1980s.



33. 100-33 (Category 3) Telephone -----

Artifact Description:

** Gray wall-mounted telephone*

This item is a small gray plastic and metal telephone fixed to a wall. It appears to date from the 1970s or early 1980s and is in its original location.

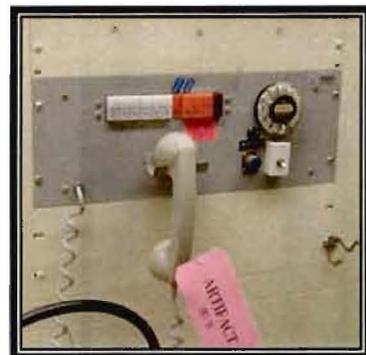


34. 100-34 (Category 2) Telephone -----

Artifact Description:

** Wall-mounted, metal paneled phone*

This item is a small gray plastic and metal telephone affixed to a metal control panel structure. It appears to date from the 1970s or early 1980s and is in its original location.



35. 100-35 (Category 3) Ramp Generator Panel -----

Artifact Description:

** Wall-mounted metal ramp generator panel*

This item consists of control panels and electronic equipment related to A-Stand, and it is mounted on a metal control panel structure. The item is composed of beige painted metal with plastic buttons, indicators, and digital displays, and is in its original position. "These ramp-generators were used to provide reference electrical signals to the controllers which then positioned the valves that provided the LOX (liquid oxygen) and LH2 (liquid hydrogen) to the rocket engine being tested" (Doug Bewley).



36. 100-36 (Category 4) Original RETF Terminal Panel -----

Artifact Description:

** RETF terminal panel, located in basement of Building 100*

This control panel is located in the basement of Building 100 and is largely surrounded by other items. The panel is metal painted a medium dull-green, a color characteristic of the 1950s-early 1960s. The front of the panel consists of a series of metal switches and indicator lights. Controls are marked by painted stenciled numbers and by hand-printed paper labels that are now heavily yellowed.

The panel was identified by former RETF engineer Neal Wingenfeld as a piece of original RETF equipment, presumably dating to ca. 1957. Mr. Wingenfeld stated that this panel was in use when he started working at the RETF in the 1960s. The visual characteristics and relatively primitive technology of this panel are consistent with origins in the 1950s or early 1960s. The panel has permanent electrical connections above it that appear to be part of the original construction phase. Mr. Wingenfeld also indicated that this panel has always been in this position in the Building 100 basement. Although it was never actually located in the control room, this panel was a piece of supporting electronic equipment for the RETF control room. It is also significant as one of the few elements of RETF technical equipment that dates from the facility's main period of historical significance (1957-1969) and appears to have survived largely unaltered.



37. 100-37 (Category 4) South 40 Testing Schedule Sign -----

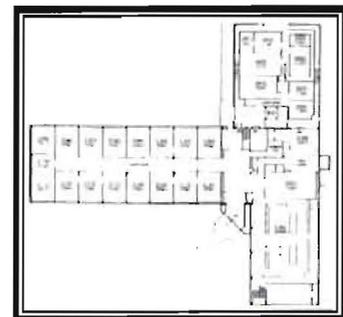
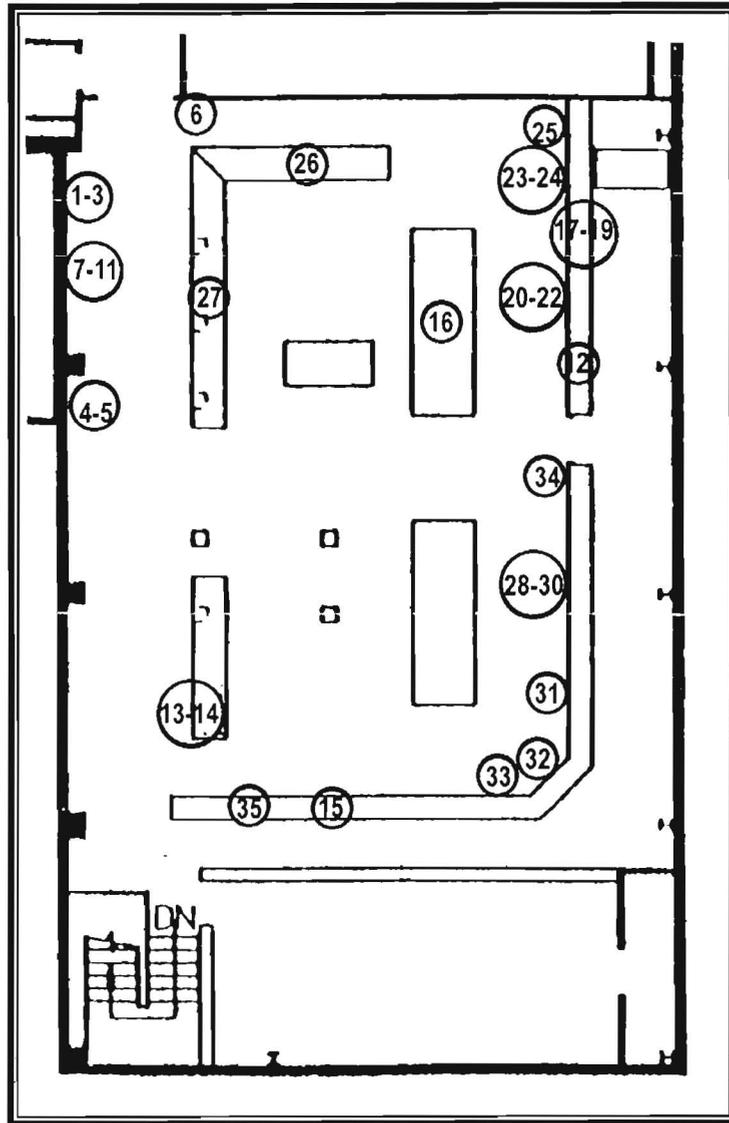
Artifact Description:

** Formerly wall-mounted paper and plastic schedule calendar*

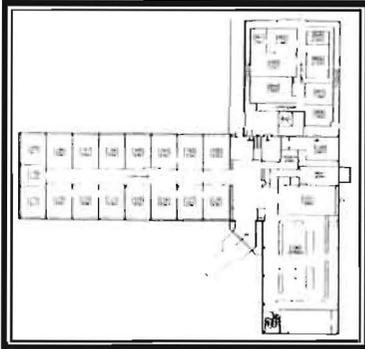
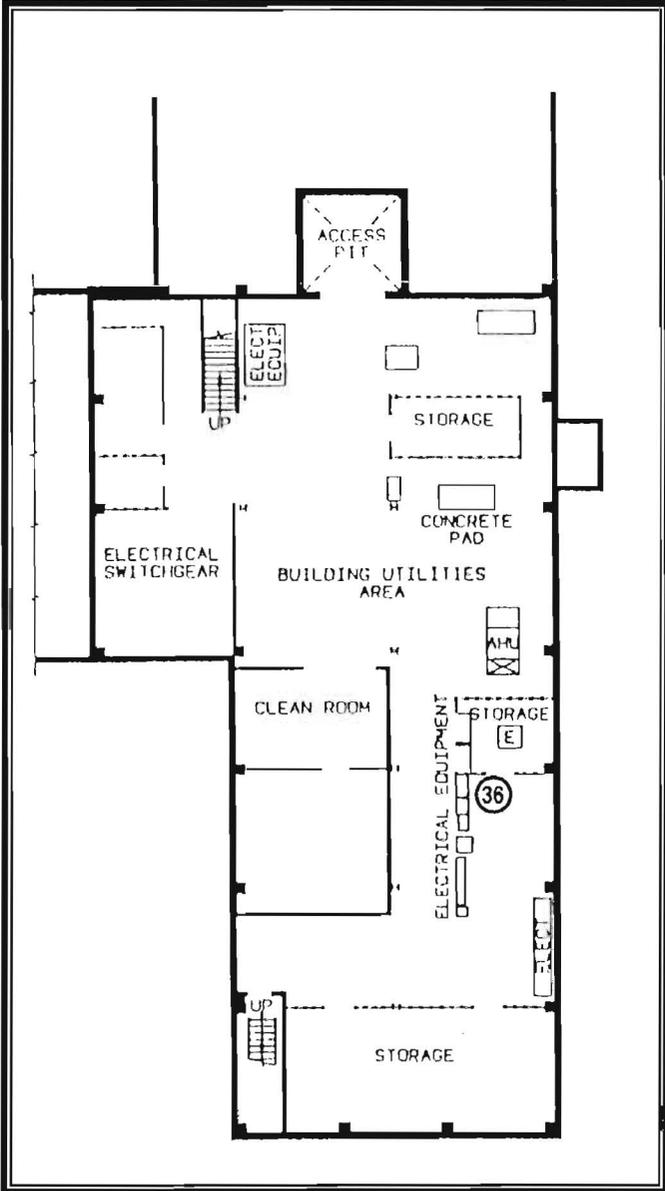
This testing schedule calendar was found stuffed into steel framing behind control panels in the Building 100 control room. It is composed of white paper with plastic covering. The chart was used to display the RETF run schedule for the Chemical Rocket Division management. It was mounted on an easel in the control room entrance. The sign is visible in a 1976 photograph, hanging on a control panel (Figure B.2).



BUILDING 100 ARTIFACT LOCATION KEY (CONTROL ROOM)



BUILDING 100 ARTIFACT LOCATION KEY (BASEMENT)



SECTION C
BUILDING 202: TEST STANDS A, B, AND C



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BUILDING 202: TEST STANDS A, B, AND C

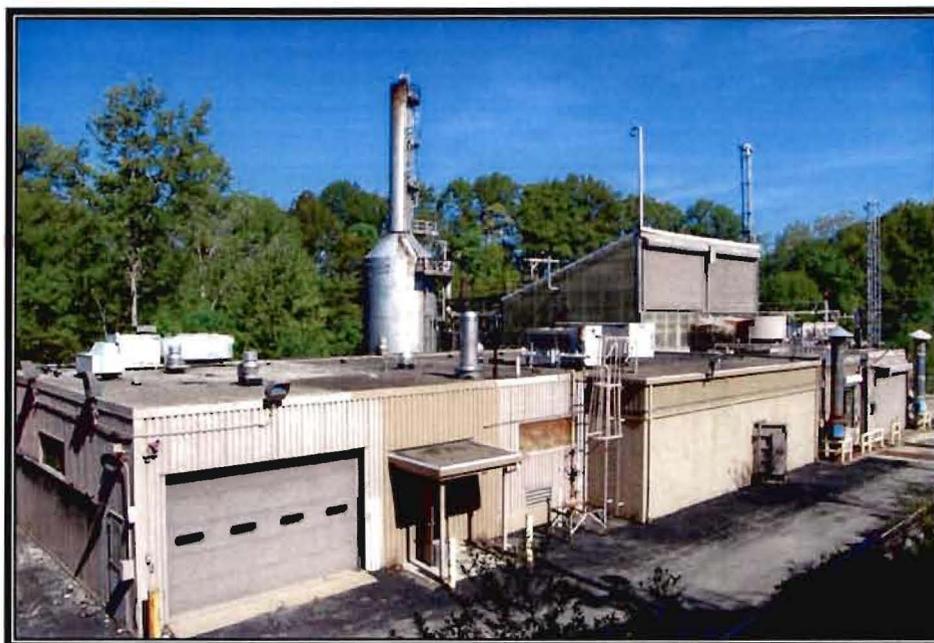


Figure C.1: Southeastern corner of Building 202.

Building 202 Description

Rocket Engine Test Facility Building 202 is a one-story complex of corrugated metal and concrete-block structures with varying roof levels. The facility consists of a sub-basement, basement, and a first-floor test facility.

The sub-basement of Building 202 consists of the lower regions of the Fuel and Oxidant Pits, foundations, and a pump house. The basement is located directly underneath the first floor, and it spans the entire length and width of the floor above, except for the extreme southeastern portion of the first floor. The plan of the basement consists of storage areas, an electrical vault, the intermediate sections of the Fuel and Oxidant Pits, and the treatment basins.

The first floor includes a test cell that houses Test Stands A and B. The facility also includes pressurized propellant-run tanks, propellant-flow line systems, a rocket exhaust gas treatment combination scrubber, and a silencing muffler. The RETF Test Stand A (built in 1957) was used for sea-level testing of vertically mounted rocket engines, while Test Stand B (installed in 1984) served as space simulation testing of horizontally mounted rocket engines (Butowsky 1984).

Test Stand A is located in the center of the test cell, adjacent to the Fuel and Oxidant Pits, which are located on the other side of a solid wall. Vertical rocket engines would have been placed on the A-Stand, with exhaust guided downward. Exhaust from the A-Stand was released into the scrubber/silencing muffler to reduce sound and to filter out waste products. The exhaust was sprayed with water drawn from a large steel reservoir located on top of an adjacent hill. Water from the scrubber was routed to detention tanks. Engine exhaust from B-Stand was released out the side into an outside capsule, which could be rolled in and out on wheels before going to the scrubber.

A concrete enclosed observation room with blastproof doors and a bulletproof observation window is located immediately south of the test cell. Adjoining the observation room is a terminal room with electronic monitoring equipment, an office/lecture room space and a shop/storage area. Other important parts of Building 202 include a pump room, concrete collector, and treatment basins for wastewater, the scrubber and exhaust stack, pump house, and a large wastewater retention tank. The facility also originally contained a number of tanks containing nitrogen and other substances. Some tanks are still in position, while others have been removed to be reused at other test facilities.

Table C.1: Artifacts in and around RETF Building 202A Main Structure.

Artifact #	Category	Description	Artifact #	Category	Description
1. 202A-1	1	1000:1 High Area Ratio Nozzle (B-Stand)	11. 202A-11	2	Wall Telephone
2. 202A-2	1	400:1 Ration Nozzle Skirt made of Hastelloy X	12. 202A-12	2	Temperature Gauge
3. 202A-3	2	Nitrogen Gas Panel	13. 202A-13	2	Door Monitor Control
4. 202A-4	4	A-Stand Test Stand	14. 202A-14	2	Crane Sign on Blast Door
5. 202A-5	4	Blastproof Observation Window	15. 202A-15	2	Blast Door
6. 202A-6	4	Blastproof Observation Window Mirror	16. 202A-16	2	Blast Door
7. 202A-7	4	A-Stand Date Indicator Sign	17. 202A-17	1	A-Stand Ignition Panel
8. 202A-8	2	Purge Instrument Panel for A & B Test Stands	18. 202A-18	1	B-Stand Ignition Panel
9. 202A-9	2	Blast Door	19. 202A-19	2 or 4	Engine Pressure Panel
10. 202A-10	2	Liquid Nitrogen Pipe	20. 202A-20	2	Abort Button

Artifact #	Category	Description	Artifact #	Category	Description
21. 202A-21	2	Gray Telephone	32. 202A-32	1	Electroformed Nickel A-Stand Engine
22. 202A-22	2	Red Telephone	33. 202A-33	1	Electroformed Nickel A-Stand Engine
23. 202A-23	3	B-Stand Control Panel	34. 202A-34	1	Electroformed Nickel A-Stand Engine
24. 202A-24	2	A-Stand Control Panel	35. 202A-35	1	Electroformed Nickel A-Stand Engine
25. 202A-25	2	Rendering of the RETF	36. 202A-36	1	Electroformed Nickel A-Stand Engine
26. 202A-26	2	Exterior sign on NE corner of Building 202	37. 202A-37	1	Instrumented Copper Spool Piece
27. 202A-27	2	Blast Door	38. 202A-38	1	Instrumented Copper Spool Piece
28. 202A-28	1	High Pressure Gaseous Hydrogen-Liquid Oxygen Injector (A-Stand)	39. 202A-39	1	Water-Cooled Plug for Spool Piece Testing
29. 202A-29	1	Electroformed Nickel Calorimeter Engine	40. 202A-40	1	Electroform Nickel Plated Engine in 202 Basement
30. 202A-30	1	Electroformed Nickel Calorimeter Engine	41. 202A-41	1	Electroformed Nickel Spool Piece
31. 202A-31	1	Electroformed Nickel Calorimeter Engine			

Table C.2 Artifacts in and around RETF Building 202C C-Stand.

Artifact #	Category	Description	Artifact #	Category	Description
1. 202C-1	1	Water-Cooled B-Stand Nozzle	10. 202C-10	4	Wire Wrapped Channel Nozzle
2. 202C-2	3	A-Stand Rocket Engine	11. 202C-11	1	Water Cooled Electroform Nickel Nozzle Skirt
3. 202C-3	3	RETF Sign	12. 202C-12	1	Conical Nozzle Skirt
4. 202C-4	1	Electroformed Nickel Nozzle	13. 202C-13	2	Aluminum Cutting Practice Piece
5. 202C-5	1	Electroformed Nickel Nozzle	14. 202C-14	1	200:1 Carbon Steel Skirt for B-Stand
6. 202C-6	1	Carbon Steel B-Stand Skirt	15. 202C-15	1	400:1 Carbon Steel Skirt for B-Stand
7. 202C-7	1	Electroformed Nickel A-Stand Engine	16. 202C-16	1	B-Stand Diffuser Plate
8. 202C-8	1	Carbon Steel B-Stand Nozzle Skirt	17. 202C-17	2	Water-Cooled Acoustic Resonator in Box
9. 202C-9	1	High Ratio Nozzle Skirt	18. 202C-18	2	Water-Cooled Acoustic Resonator in Box

Artifact #	Category	Description	Artifact #	Category	Description
19. 202C-19	2	Liquid Hydrogen-Cooled Spool Piece	22. 202C-22	2	Experimental Liquid Hydrogen-Cooled Spool Piece
20. 202C-20	2	Liquid Hydrogen-Cooled Spool Piece	23. 202C-23	2	Experimental Liquid Hydrogen-Cooled Spool Piece
21. 202C-21	2	Load Cell Mount for TRW Engine	24. 202C-24	2	Heat Sink Copper Nozzle for LOX Cooling Injectors

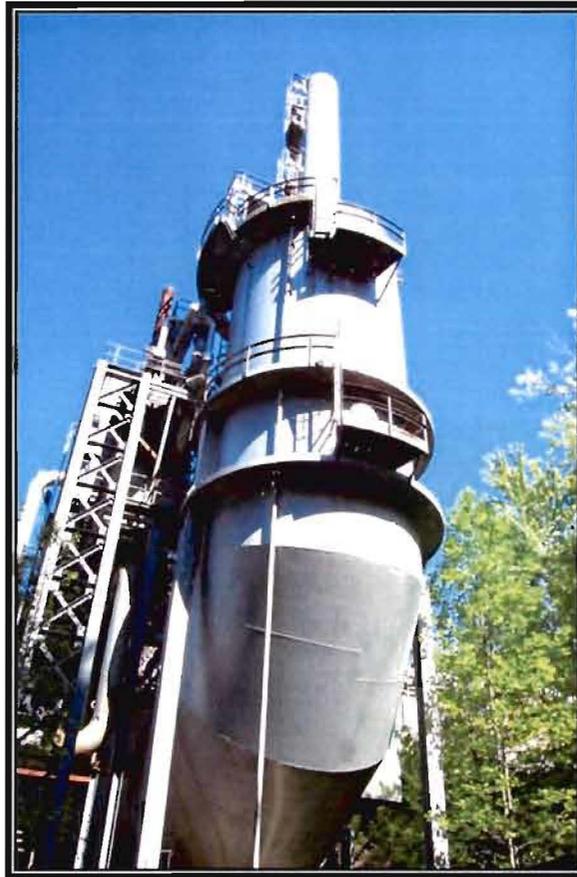


Figure C.2: RETF Building 202 scrubber stack, looking southeast.

During a walk-through tour of the RETF in the summer of 2001, NASA History Office officials and personnel of the OHPO identified the scrubber stack for RETF Building 202 as a structure that may have historical significance. Since then, NASA Glenn has determined that this stack does not meet the definition of an artifact under NASA's NPG 4310.

Although the stack may be considered as historically significant as a part of the A-Stand facility, this stack was not a research instrument and is not historically significant on its own. It used conventional, pre-existing technology that would have been found in hundred of industrial applications in the country at that time. The stack basically sprayed water on the exhaust gases as they escaped in the air stream, and was not unique in its material or design.

A photograph of this structure has been included in this report, but this structure was not inventoried as an artifact. Apart from NASA Glenn's determination that it does not qualify as an artifact, the logistics and difficulty of relocating such a huge structure to a museum or other location would make it so expensive that it would be prohibitive. It is anticipated that this stack will be removed and recycled as a part of the Building 202 demolition.

BUILDING 202A MAIN BUILDING ARTIFACT PHOTOGRAPHS

1. 202A-1 (Category 1) 1000:1 High Area Ratio Nozzle (B- Stand) -----

Artifact Description:

- * Large carbon steel nozzle skirt, rusted surface, metal wires or lines visible on surface
- * Found in the Building 202 fuel pit

"This is a 1000:1 High Area Ratio Nozzle Skirt. This program was run at the B-Stand and was used to verify and correct computer models' predictions on the efficiency of rockets in space. E.g., it is worth the extra weight and space of a large nozzle for the extra thrust transmitted by the expanding rocket exhaust through the large nozzle skirt" (Doug Bewley). This skirt likely dates to the late 1980s or early 1990s. It is a portable object and is not in its original location.



2. 202A-2 (Category 1) 400:1 Ratio Skirt Made of Hastelloy X-----

Artifact Description:

- * Found in the fuel pit area

George Repas stated that "This 400:1 ratio skirt was made out of Hastelloy X and is conical. It was supposed to be used for checkout of the facility but was never tested." Presumably, the skirt was fabricated for B-Stand but was never used. The item is a portable object and is not in its original location. Its associations with B-Stand would date it to 1985 or later.



3. 202A-3 (Category 2) Nitrogen Gas Panel -----

Artifact Description:

- * Located in Building 202 fuel pit

This artifact is a silver colored metal panel attached to a wall of the fuel pit. The date of this object, which remains in its original location, is unknown. The panel appears to have been used to monitor data associated with fuel levels or pressure.

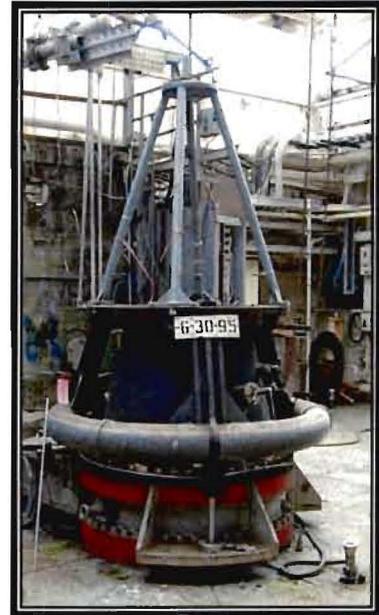


4. 202A-4 (Category 4) A-Stand Test Stand -----

Artifact Description:

- * Conical test stand posted with test date sign of 6-30-95
- * Used for sea level testing of vertically mounted rocket engines

The A-Stand is one of the surviving pieces of equipment dating from the original construction of the RETF in 1955-1957. This large metal structure was the site of all vertical rocket engine tests at the RETF during the history of the facility. A rocket engine would have been mounted in the gray metal tripod visible at the top of the stand. This is one of the most significant artifacts of the RETF complex, since it was directly associated with engine testing that supported the Apollo Program. While a large amount of piping and other equipment have been removed from the area behind A-Stand, the test stand itself appears to be relatively intact. The stand is in its original position and is attached to the top of the scrubber facility, which is positioned below the test cell floor. "While the lower portion of A-Stand is original equipment, it should be noted that the silver tripod visible at the top of the stand (above the test date sign) was used to test the High Aspect Ratio Nozzle and dates from the last years of RETF operations" (George Repas).

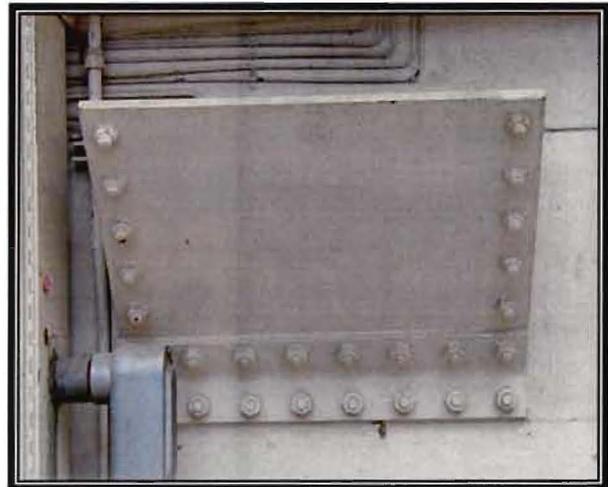


5. 202A-5 (Category 4) Blastproof Observation Window -----

Artifact Description:

- * Painted steel blastproof window in test cell
- * Part of a window/mirror combination to monitor the test cell

This blastproof window was used to observe activity in the test cell. The observer was positioned in a heavy concrete observation room with steel doors. The window was protected with a heavy steel barrier so the window would not suffer a direct hit from an explosion in the test cell. As a result, the view of the test cell was not a direct view through the window, but was instead reflected through a mirror mounted at an angle above the window. This exact window and mirror arrangement is visible in historic photos of the test cell dating to as early as 1957, so this appears to be an original feature of Building 202 that remains largely unchanged.



6. 202A-6 (Category 4) Blastproof Observation Window Mirror -----

Artifact Description:

This mirror allowed personnel in the Observation Room to monitor testing activity through the blastproof window. It is wall-mounted and is in its original location. Although it is possible that explosions shattered the original mirror glass, a mirror mounted in this position in the test cell is visible in photos dating to as early as 1957. The angled wall-mounted mirror is clearly an original design feature of Building 202.



7. 202A-7 (Category 4) A-Stand Date Indicator Sign -----

Artifact Description:

** A-Stand date sign indicating the date 6-2-99*

This artifact is a small metal sign painted white with black stenciled letters. It appears to be an "extra" test date indicator sign for A-Stand. A similar sign is currently mounted on A-Stand and indicates the date of the last test there in June 1995. It is unknown why the sign shows a date in 1999. The item is portable and was found lying on top of A-Stand.

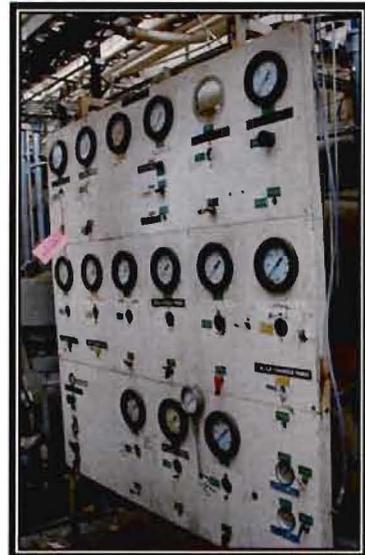


8. 202A-8 (Category 2) Purge Instrument Panel for A and B Test Stands -----

Artifact Description:

- * Painted metal purge instrument panel used for A and B Test Stands*
- * Located behind B-Test Stand*

This panel may have been used in both A-Stand and B-Stand testing. The date of manufacture is unknown, and it remains in its original position. It does not appear in 1957 NASA photos of the Building 202 test cell, but a similar, much smaller gauge panel is visible.



9. 202A-9 (Category 2) Blast Door -----

Artifact Description:

- * Painted steel blast door
- * Blastproof glass window

This large steel blast door is located on the south wall of the Test Cell. The door can be shut to isolate the Test Cell from an adjacent hallway and from the shop area. A small blastproof glass window is situated at the far left side of the door, which is still attached to the original track and still opens and closes. This door may be an original c. 1957 feature of the structure.



10. 202A-10 (Category 2) Liquid Nitrogen Pipe -----

Artifact Description:

- * Liquid nitrogen pipe in the test cell

This pipe is located in the area behind A-Stand on the east wall of the test cell.



11. 202A-11 (Category 2) Wall Telephone -----

Artifact Description:

- * Wall telephone located in the test cell hallway

This wall-mounted phone appears in a photo of the RETF test cell taken in the late 1970s. Based on its design, it appears to date to some time in the 1970s. The phone appears to be in its original position.



12. 202A-12 (Category 2) Temperature Gauge -----

Artifact Description:

** Metal temperature gauge located in the hallway of the test cell*

This artifact consists of a gauge and switch to monitor the temperature inside the test cell during testing procedures. Its date of origin is unknown.



13. 202A-13 (Category 2) Door Monitor Control -----

Artifact Description:

** Painted, wall-mounted door monitor found in the hallway of the test cell*

Five buttons control this door monitor. The monitor may be original equipment dating to c. 1957.



14. 202A-14 (Category 2) Crane Sign on Blast Door -----

Artifact Description:

** Metal crane sign located on the blast door to the test cell*
** Illustrates the operation procedures to maneuver the crane*

The graphic style and colors of this sign may date it to 1957-1969, the main period of significance for the RETF as defined by the National Park Service (1957-1969). It is a metal painted sign, beige in color with medium-green graphics. It is attached to the blast door (Item 202A-9) of the test cell.



15. 202A-15 (Category 2) Blast Door -----

Artifact Description:

** Painted steel blast door leading into the observation room from the shop area.*

This blast door may date to the original construction of Building 202 in 1956-1957. The door remains in its original position at the entrance into the observation room.



16. 202A-16 (Category 2) Blast Door -----

Artifact Description:

** Painted steel blast door adjacent to the terminal room*

Like Item 202A-15, this artifact is a steel blast door that may date to the RETF's original 1956-1957 construction period. The door remains in its original position leading from the shop area into a large room that contained computer equipment for test monitoring.



17. 202A-17 (Category 1) A-Stand Ignition Panel -----

Artifact Description:

** Metal, wall-mounted A-Stand ignition panel in the terminal room*

This ignition panel is mounted in the observation room below a small control panel, which was positioned below a blastproof observation window into the test cell. The gauges and switches on this panel were used to monitor the ignition of A-Stand testing procedures. The age of the piece is not known.



18. 202A-18 (Category 1) B-Stand Ignition Panel -----

Artifact Description:

** Metal, wall-mounted B-Stand ignition panel located in the terminal room*

This ignition panel is mounted in the observation room below a small control panel, which was positioned below a blastproof observation window into the test cell. The gauges and switches on this panel were used to monitor the ignition of B-Stand testing procedures.

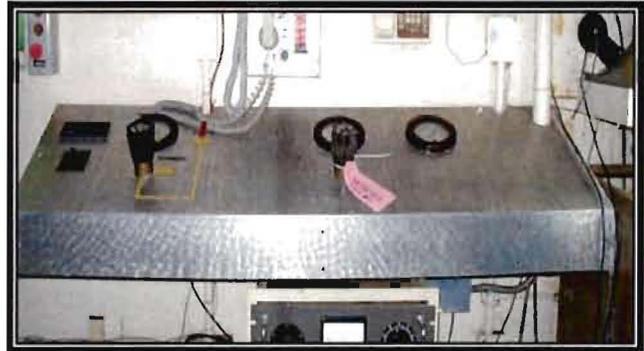


19. 202A-19 (Category 2 or 4) Engine Pressure Panel -----

Artifact Description:

** Panel located in the observation room*

This artifact is a small control panel located to the right of the blastproof observation window in the observation room. The gauges and controls monitored engine pressure in the test cell. The exact age of the panel is unknown.

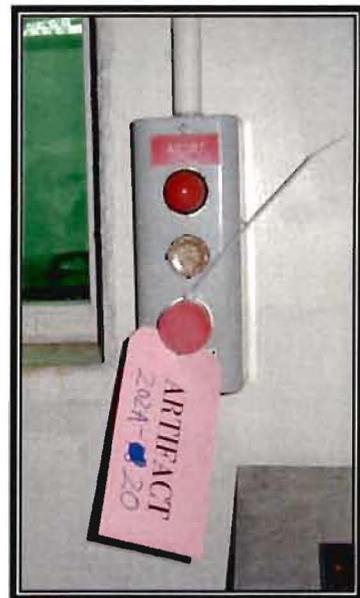


20. 202A-20 (Category 2) "ABORT" Button -----

Artifact Description:

** Metal-plated "ABORT" button found in the observation room*

This button was used to terminate testing procedures conducted in the test cell. The unit is located to the right of the blastproof observation window.



21. 202A-21 (Category 2) Gray Telephone -----

Artifact Description:

** Metal-plated gray telephone located in the observation room*

This telephone is located inside the observation room. A similar phone was visible in a late 1970s photograph of the RETF test cell, so this phone likely dates from the 1970s. The phone is wall-mounted in its original position.



22. 202A-22 (Category 2) Red Telephone -----

Artifact Description:

** Metal-plated red telephone*

This telephone is hanging on a wall inside the observation room. From its design it appears to date from the 1970s or 1980s.



23. 202A-23 (Category 3) B-Stand Control Panel -----

Artifact Description:

** Metal-paneled B-Stand control panel in the observation room*

The specific date of this panel is unknown, although as a B-Stand item it likely dates to the mid-1980s. It appears to have been involved in monitoring data from B-Stand tests and transferring this data to the control room in Building 100. The panel appears to be located in its original position.



24. 202A-24 (Category 2) A-Stand Control Panel -----

Artifact Description:

** Metal-paneled A-Stand control panel in the observation room*

The specific date of this panel is unknown, although it bears some resemblance to the 1970s/1980s control room equipment in Building 100. It appears to have been involved in monitoring data from A-Stand tests and transferring this data to the control room in Building 100. The panel appears to be located in its original position.



25. 202A-25 (Category 2) Rendering of the RETF-----

Artifact Description:

** Wood-framed, black and white rendering of the RETF*

This black and white rendering of the RETF is identical to the color renderings found in Building 100. The image is mounted in a wooden frame with mounting legs, but it is not covered with glass. This item is portable and is currently leaning against a wall. It does not appear to be an original rendering, but is likely a black and white reproduction. A NASA record photograph appears to date this rendering to 1985.



26. 202A-26 (Category 2) Exterior sign on northeastern corner of Building 202 -----

Artifact Description:

** Metal building sign for Building 202*

This artifact is a small metal sign for Building 202 that is no longer attached to the building. The sign is currently stored in the fuel pit.



27. 202A-27 (Category 2) Blast Door -----

Artifact Description:

* Painted steel blast door on the exterior of Building 202

This steel blast door is located in its original position on the eastern elevation of Building 202. The door may date to the building's original construction phase (1956-1957).



28. 202A-28 (Category 1) High Pressure Gaseous Hydrogen-Liquid Oxygen Injector (A-Stand) ----

Artifact Description:

* Stainless steel A-Stand injector
* Located in the basement of Building 202

RETF retirees identified this artifact as an A-Stand injector. George Repas stated "This is a high pressure gaseous hydrogen-liquid oxygen injector that was designed to be used on the High Pressure Low Cycle Fatigue Program run in the early 1970s." The injector was run with the engine described in text on Artifacts 100-8 and 100-10 in this report. The injector metal surfaces on the injector were very bright, possibly indicating that it was an unused item or that it had been thoroughly cleaned after use. The injector is a portable item that is not fixed to any floor or wall.



29. 202A-29 (Category 1) Electroformed Nickel Calorimeter Engine with Radiating Stainless Steel Tubing-----

Artifact Description:

* Electroformed nickel calorimeter engine
* Has radiating stainless steel tubing

George Repas stated "In the late 1970s, NASA Lewis directed a program with Aerojet to explore LOX cooling. Part of the program was for them to build two calorimeter engines which could provide a heat flux profile while the engine was running I was put on the Aerojet team and supervised the fabrication. Since NASA paid for these calorimeters, they were returned to Lewis after they were tested at Aerojet" (George Repas). According to Mr. Repas, this calorimeter was fabricated at RETF in the late 1970s, but was tested elsewhere. This calorimeter is a portable item currently located in the basement of Building 202.



30. 202A-30 (Category 1) Electroformed Nickel Calorimeter Engine with Radiating Stainless Steel Tubing-----

Artifact Description:

- * *Electroformed nickel calorimeter engine*
- * *Has radiating stainless steel tubing*

See above description for Artifact 202A-29. This calorimeter was apparently built at RETF but tested elsewhere. It is a portable item currently located in the basement of Building 202. The artifact dates from the late 1970s, according to information provided by George Repas.



31. 202A-31 (Category 1) Electroformed Nickel Rocket Engine with Stainless Steel Tubing-----

Artifact Description:

- * *Electroformed nickel rocket engine*
- * *Has radiating stainless steel tubing*

George Repas stated the following in reference to this item: "I built this water-cooled engine in the late 1960s. It was supposed to be used on an in-house program to test the FLOX-Methane engine, but the program never materialized and this unit was never used." This item is a loose piece of equipment that is currently stored in the basement of Building 202.



32. 202A-32 (Category 1) Electroformed Nickel A-Stand Engine -

Artifact Description:

- *Electroformed nickel A Stand engine*
-

George Repas stated, "This is a LOX cooled engine. Since it is not instrumented, it was probably never run." This item is currently stored in the basement of Building 202 and is a portable item. See description of Artifact 100-5 for additional information on the LOX Cooled Engine Program. Based on its association with the LOX Cooled Engine Program, this item dates from the 1980s. Considering its relatively late date of manufacture and the fact that it was never tested, this item does not appear to have exceptionally high historic significance.



33. 202A-33 (Category 1) Electroformed Nickel A-Stand Engine -----

Artifact Description:

- * Electroformed Nickel A-Stand engine
- * Central hollow tube, circular steel top and bottom, extensive wiring

See above description for Item 202A-32. This engine was associated with the LOX-Cooled Engine research project of the 1980s. George Repas indicated that an examination of the interior of this engine for soot might determine whether it was used for testing. This item is currently stored in the basement of Building 202 and is fully portable.



34. 202A-34 (Category 1) Electroformed Nickel A-Stand Engine -

Artifact Description:

- * Electroformed nickel A-Stand engine

This item is currently stored in the basement of Building 202. It is a portable item. George Repas identified it as a LOX-cooled engine, which dates this item to the 1980s. Due to its fairly pristine condition, it is possible that this engine was not used for testing. See description for Artifact 100-5 for a description of the LOX-Cooled Engine Program.

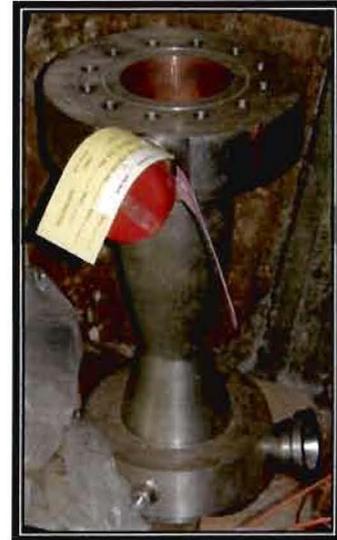


35. 202A-35 (Category 1) Electroformed Nickel A-Stand Engine -

Artifact Description:

- * Electroformed nickel A-Stand engine

This item is currently stored in the basement of Building 202 and is a portable item. George Repas identified this engine as a LOX-cooled engine, which dates it to the 1980s. Due to its fairly pristine condition and the fact that it has no instrumentation, it is possible that this engine was not used for testing. See description for Artifact 100-5 for a description of the LOX-Cooled Engine Program.



36. 202A-36 (Category 1) Electroformed Nickel A-Stand Engine -----

Artifact Description:

- * *Electroformed nickel A-Stand engine*
- * *Hollow central tube, circular top and bottom*

This item is currently stored in the basement of Building 202 and is a portable item. George Repas identified the item as a LOX-cooled engine, which dates it to the 1980s. Due to its fairly pristine condition and the fact that it is not instrumented, it is possible that this engine was not used for testing. See description for Artifact 100-5 for a description of the LOX-Cooled Engine Program.

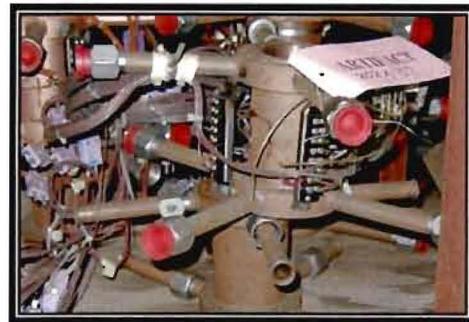


37. 202A-37 (Category 1) Instrumented Copper Spool Piece, Copper Tubes, and Wiring -----

Artifact Description:

- * *Instrumented copper spool piece, copper tubes and wiring*

This item is currently stored in the basement of Building 202 and is a portable item. According to George Repas, this artifact was associated with testing related to low cycle fatigue, tests in which spool pieces were fired for a large number of cycles until they began to leak. A spool piece could be fired as many as 300 times in this type of test. The spool piece was "... a cylindrical liquid hydrogen cooled copper engine ... " (George Repas). Repas indicated that he built a total of 135 spool pieces. He also indicated that many different copper alloys were used for the spool pieces. One piece had a silver liner, while others had differing cooling passage configurations or ceramic coatings (George Repas). The artifact is a portable item and is currently located on the control room floor. The item likely dates from the 1970s or 1980s.



38. 202A-38 (Category 1) Instrumented Copper Spool Piece -----

Artifact Description:

- * *Instrumented copper spool piece*

This item is currently stored in the basement of Building 202. According to George Repas, this artifact was associated with testing related to low cycle fatigue, tests in which spool pieces were fired for a large number of cycles until they began to leak. A spool piece could be fired as many as 300 times in this type of test. The spool piece was "... a cylindrical liquid hydrogen cooled copper engine ... " (George Repas). Repas indicated that he built a total of 135 spool pieces. He also indicated that many different copper alloys were used for the spool pieces, one piece had a silver liner, while others had differing cooling passage configurations or ceramic coatings (George Repas). The artifact is a portable item and is currently located on the control room floor. The item likely dates from the 1970s or 1980s.

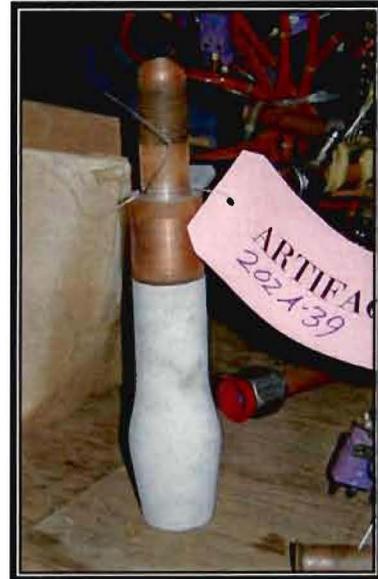


39. 202A-39 (Category 1) Water-Cooled Plug for Spool Piece Testing -----

Artifact Description:

** Copper plug with white ceramic section*

George Repas stated that this item is a water-cooled plug used for spool piece testing. See description of Artifact 100-9 for more description of spool piece testing. The item likely dates from the 1970s or 1980s. This item is currently stored in the basement of Building 202 and is a portable item.



40. 202A-40 (Category 1) Electroformed Nickel Spool Piece -----

Artifact Description:

** Electroformed nickel spool piece with stainless steel tubes, stainless steel tubes that wrap around the body of the piece*

George Repas stated this concerning Artifacts 202A-40 and 202A-41: "These two engines were built in the mid-1960s when the concept of electroform nickel plating was being explored. The top engine (202A-40) is a water-cooled calorimeter engine to measure the heat at various places in the cylindrical section of a rocket." The items were fabricated for use on A-Stand. However, it is not clear if these engines were ever used for testing, since Mr. Repas stated that "... all three items passed a pressure check which showed the fabrication technique was sound, but I do not remember us ever testing these items on Stand A." This is a portable item stored in the basement of Building 202.



41. 202A-41 (Category 1) Electroformed Nickel Spool Piece -----

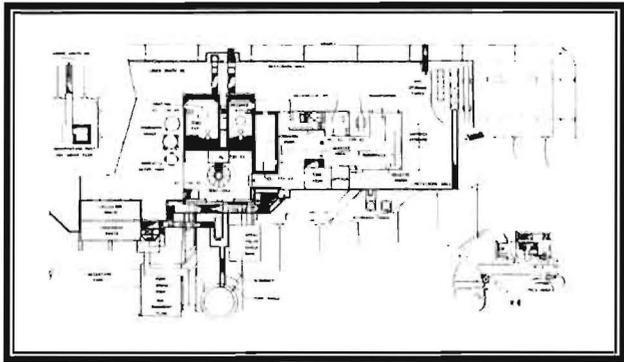
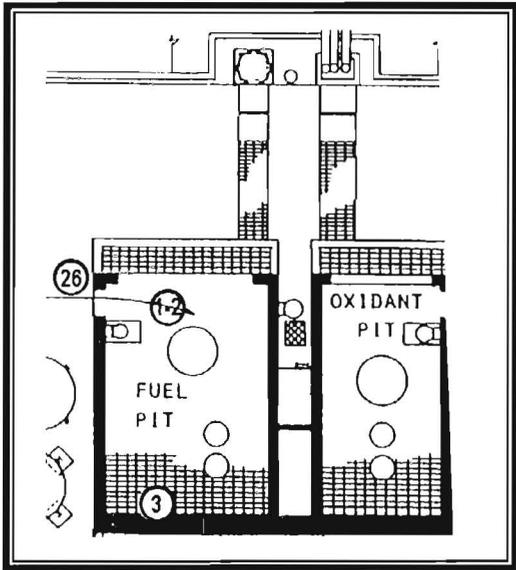
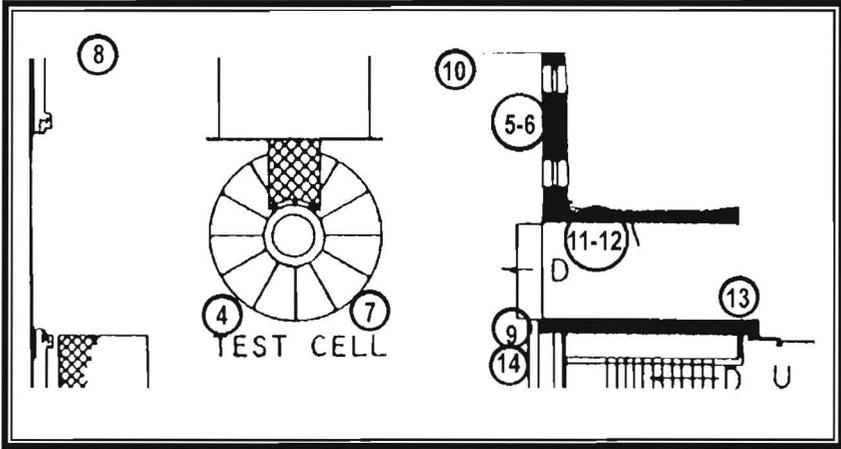
Artifact Description:

** Electroformed nickel spool piece with stainless steel tubes*

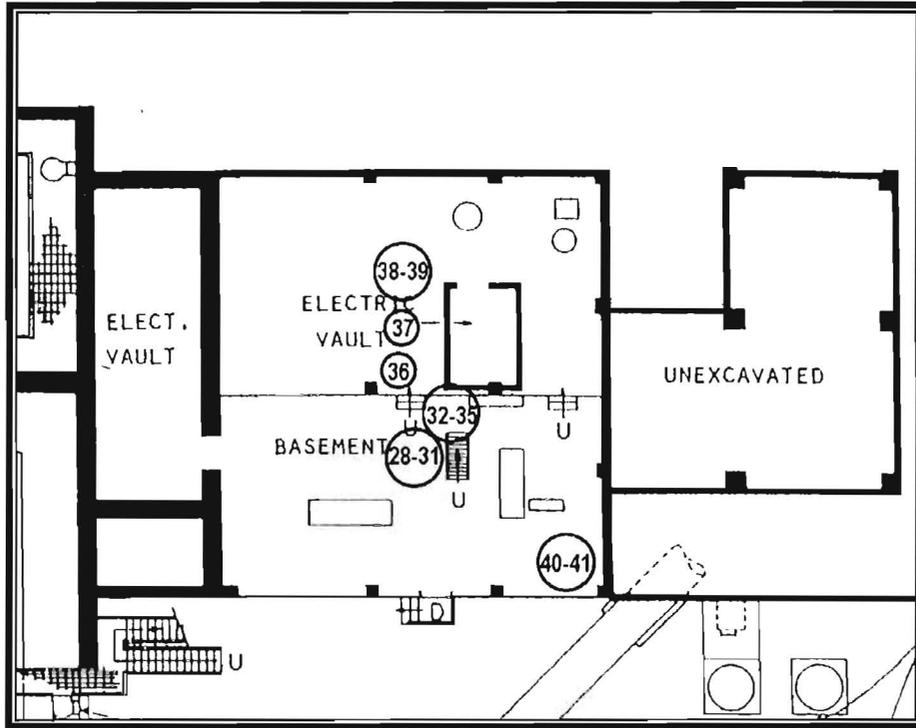
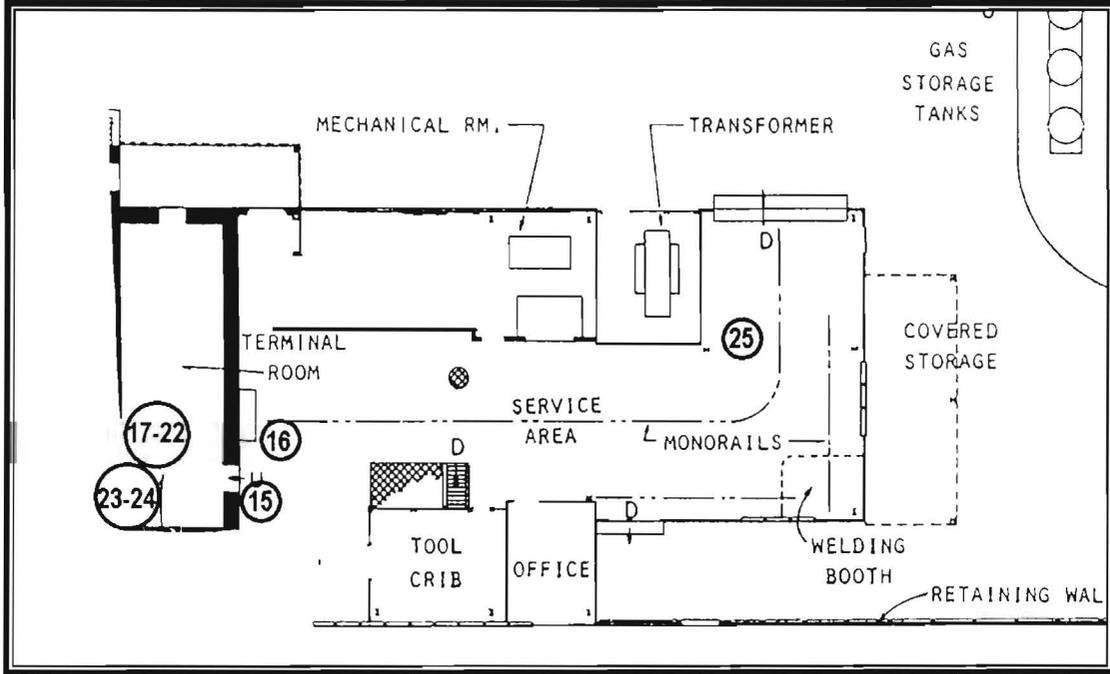
See above description of Item 202A-40. George Repas stated that this item was "... simply a water-cooled cylindrical part of a rocket engine." The item dates from the mid-1960s and may not have been tested on A-Stand. This item is in the basement of Building 202.



BUILDING 202A MAIN BUILDING ARTIFACT LOCATION KEY
(TEST CELL AND FUEL PIT)



BUILDING 202A MAIN BUILDING ARTIFACT LOCATION KEY
(TERMINAL ROOM, FIRST FLOOR AND BASEMENT)



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BUILDING 202C C-STAND ARTIFACT PHOTOGRAPHS

1. 202C-1 (Category 1) Water-Cooled B-Stand Nozzle -----

Artifact Description:

- * Carbon Steel High Area Ratio Nozzle
- * Water-cooled electroformed nickel nozzle on top

George Repas stated the following about this item: "This is a water-cooled nozzle bolted to a 400:1 area ratio skirt that was tested in Stand B." This item may be associated with a B-Stand program used to verify and correct computer models' predictions on the efficiency of rockets in space (Doug Bewley). This nozzle likely dates to the late 1980s or early 1990s. The nozzle is fully portable and was found stored on the floor of the C-Stand.



2. 202C-2 (Category 3) A-Stand Rocket Engine -----

Artifact Description:

- * Metal A-stand rocket engine
- * Wire wrapped stainless steel channel nozzle

George Repas stated the following regarding this item: "In the early 1960s, our fabrication shop experimented with building a rocket by stacking up channels on a mandrel and closing the outside by wrapping wire and braze material and putting it all in a furnace. After many tries, they got the process down pat and built several engines for testing at Stand A. This engine was dump water cooled and ran at 300 chamber pressure with a thrust of 20,000 lbs." This engine also has a non-metallic curved sleeve on the outside. This engine is a piece of equipment used for actual A-Stand rocket testing during the most historically significant period of the RETF as defined by the National Park Service (1957-1969). This artifact is a loose item located on the floor of Building 202-C.



3. 202C-3 (Category 2) RETF Sign -----

Artifact Description:

- * Rocket Engine Test Facility sign, white with red lettering

This large metal sign refers specifically to the "South Forty" area where the RETF was located, and also specifically refers to rocket testing. This sign is an unattached, portable object that was found lying on the floor of C-Stand.

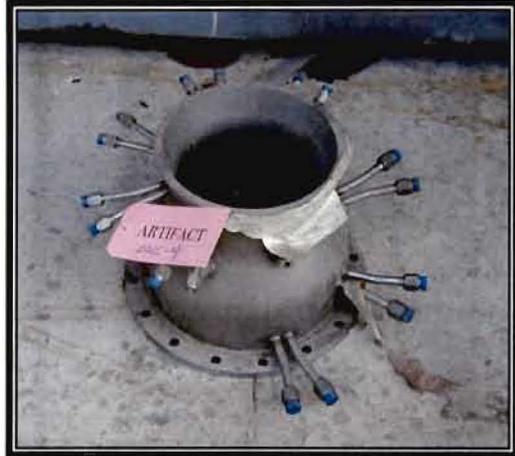


4. 202C-4 (Category 1) Electroformed Nickel Nozzle -----

Artifact Description:

** Electroformed nickel nozzle with stainless steel tubes*

RETF retirees identified this item as a piece used in A-Stand testing. The item is a water-cooled calorimeter nozzle and was built using the electroform nickel plating technique, which likely dates this item to the mid-1960s (George Repas). See description of Artifacts 202C-40 and 202C-41. This item is an unattached, portable object that was found on the floor of C-Stand.

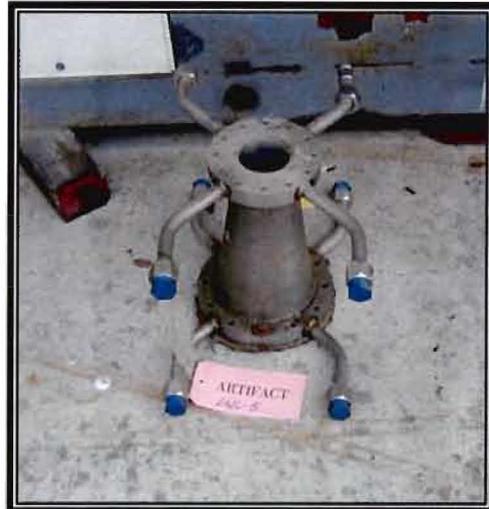


5. 202C-5 (Category 1) Electroformed Nickel Nozzle

Artifact Description:

** Electroformed nickel nozzle with stainless steel tubes*

George Repas stated the following in reference to this item: "This nozzle is the second of two that I built for a FLOX-Methane program that never got off of the ground." See the description of Artifact 202A-31 for information on FLOX-Methane testing at RETF. Based on the dates of the FLOX-Methane Program, this item dates from the 1960s. This is an unattached, portable object that was found on the floor of C-Stand. Since the item was not used for actual testing and was part of a program that was not completed, it probably does not have an exceptionally high level of historic significance.



6. 202C-6 (Category 1) Carbon Steel B-Stand Skirt -----

Artifact Description:

** Carbon steel nozzle skirt used in B-Stand testing*

This 200:1 area ratio skirt was fabricated for engine testing at B-Stand. The age of this object and its program associations are unknown, other than the fact that as a C-Stand item it does not date before 1985. The item is unattached and portable and was found on the floor of C-Stand. The main body of the nozzle is heavily rusted. George Repas indicated that this skirt was likely a spare part that was never actually tested.



7. 202C-7 (Category 1) Electroformed Nickel A-Stand Engine -----

Artifact Description:

** Electroformed nickel A-Stand engine*

George Repas identified this item as a LOX-cooled engine, which would have been tested on A-Stand. Due to the presence of instrumentation on the engine, there is a high likelihood that this item was tested on A-Stand (George Repas). The engine is a portable unattached object found on the floor of C-Stand. The identification as a LOX-Cooled engine likely dates this item to the 1980s.



8. 202C-8 (Category 1) Carbon Steel B-Stand Nozzle Skirt

Artifact Description:

** Carbon steel B-Stand nozzle skirt*

RETF retirees identified this short rocket engine nozzle as a piece of equipment used in B-Stand engine testing. George Repas identified it as a 60:1 area ratio skirt that was used for B-Stand testing. Its exact date of manufacture is unknown, but as a B-Stand item it should date from 1985 or later. This item is an unattached portable object that was found on the floor of C-Stand. The main body of the skirt is somewhat corroded.



9. 202C-9 (Category 1) High Area Ratio Nozzle Skirt-----

Artifact Description:

** High area ratio nozzle skirt with curved thermocouple wires*

This is a 1000:1 High Area Ratio Nozzle. This program was run at the B-Stand and was used to verify and correct computer models' predictions on the efficiency of rockets in space (see Doug Bewley's comments on RETF Artifact 202A-1). As a B-Stand item, the nozzle likely dates to the late 1980s or early 1990s. The nozzle is a portable object that was found on the floor of C-Stand. The main body of the nozzle is heavily rusted. George Repas thought that this nozzle was used for actual B-Stand testing.



10. 202C-10 (Category 4) Wire Wrapped Channel Nozzle -----

Artifact Description:

** Wire wrapped channel nozzle*

George Repas identified this nozzle as part of the same early 1960s project with which Artifact 202C-2 was associated (see description of 202C-1). Mr. Repas stated: "This is another vintage early 1960s nozzle made with channels stacked on a spool with wire wrap outer shell." The item is now a portable, unattached object that was found on the floor of C-Stand. As an item likely used for actual A-Stand testing in the 1960s, it may have a fairly high level of historical significance.



11. 202C-11 (Category 1) Water Cooled Electroform Nickel Nozzle Skirt-

Artifact Description:

** Water cooled electroform nickel nozzle skirt*

George Repas stated the following in reference to Artifact 202C-11: "This is a 400:1 area ratio water cooled skirt. A major fabrication job that took two years to accomplish. As far as I remember, it was never run due to more urgent programs coming into South 40 in the early 1990s." The nozzle is currently an unattached portable item located on the floor of C-Stand, although it was originally associated with RETF B-Stand.



12. 202C-12 (Category 1) Conical Nozzle Skirt -----

Artifact Description:

** Steel nozzle*

George Repas identified this item as a 400:1 area ratio skirt made of Hastelloy X material used for B-Stand testing. As a B-Stand item it dates to no earlier than 1985. The skirt is now an unattached portable item stored on the floor of C-Stand.



13. 202C-13 (Category 2) Aluminum Cutting Practice Piece -----

Artifact Description:

** Tall ribbed aluminum skirt*

George Repas stated: "This is an aluminum practice piece that was used to practice cutting the cooling passages for the above skirt (Artifact 202C-11), which had a copper inner liner. It was better to practice on a cheap aluminum piece and get your numerical controlled milling machine program right before starting in on the expensive copper liner." Based on this description, this item dates from the late 1980s or 1990s and is not highly significant since it was an inexpensive item used to practice metal cutting. The piece is now an unattached portable item sitting on the floor of C-Stand.



14. 202C-14 (Category 1) 200:1 Carbon Steel Skirt for B-Stand

Artifact Description:

** Small carbon steel skirt with scalloped details on side*

A 200:1 rocket engine skirt used for testing at B-Stand in the 1980s or 1990s. This item is now an unattached portable item sitting on the floor of C-Stand.



15. 202C-15 (Category 1) 400:1 Carbon Steel Skirt for B-Stand -

Artifact Description:

** Tall, plain silver nozzle*

This artifact is a 400:1 carbon steel rocket engine skirt used for testing at B-Stand in the 1980s or 1990s. This item is now an unattached portable item stored on the floor of C-Stand.



16. 202C-16 (Category 1) B-Stand Diffuser Plate --

Artifact Description:

- * Large circular steel object
- * Attached to wooden pallet

George Repas stated: "This was a big plate that was bolted to the Stand B diffuser to allow us to bolt on small cylindrical water cooled ducts for testing small satellite thrusters at altitude." The item appears to remain in the original packing material. This object is an unattached, portable item located on the floor of C-Stand.



17. 202C-17 (Category 2) Water Cooled Acoustic Resonator in Box -----

Artifact Description:

- * Copper ring
- * Stainless steel tubes and bolts on four sides

This item appears to be packed in its original box. According to George Repas, this item and Artifact 202C-18 are "... water-cooled acoustic resonators run on the LOX-Cooling Program." The resonators were a stabilization device, and the LOX-Cooling Program was active in the 1980s (see description for Artifact 100-5). This item may have been a replacement part or component that was never used. It is now an unattached portable item that was found on the floor of C-Stand.

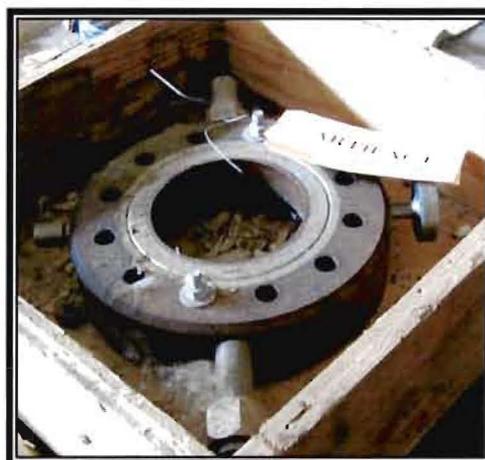


18. 202C-18 (Category 2) Water Cooled Acoustic Resonator in Box -----

Artifact Description:

- * Copper ring
- * Stainless steel tubes and bolts on four sides

This item appears to be packed in its original box. According to George Repas, this item and Artifact 202C-18 are "... water cooled acoustic resonators run on the LOX-Cooling Program." See above description for Artifact 202C-19. The item may have been a replacement part or component that was never used. It is now an unattached portable item that was found on the floor of C-Stand.



19. 202C-19 (Category 2) Liquid Hydrogen Cooled Spool Piece -----

Artifact Description:

- * Copper and silver metal object
- * Metal piping on top and bottom of the piece

According to George Repas, this item is a spool piece that was part of a project to plate copper to make the manifold joint, instead of using a welding technique. Mr. Repas thought that this artifact was not used for testing at B-Stand, but that a similar item (Artifact 202C-20) was used for actual testing. The item is currently an unattached portable item located on the C-Stand floor. Its date of manufacture is not known.



20. 202C-20 (Category 2) Liquid Hydrogen Cooled Spool Piece -----

Artifact Description:

- * Copper and silver metal object
- * Silver wiring extends from central hollow tube

According to George Repas, this item is a spool piece that was part of a project to plate copper to make the manifold joint, instead of using a welding technique. Mr. Repas thought that this artifact was used for testing at B-Stand, but that a similar item (Artifact 202C-19) was not used for B-Stand testing. Note that 202C-20 is instrumented while 202C-19 is not instrumented. Artifact 202C-20 is currently an unattached portable item located on the C-Stand floor. Its date of manufacture is not known.



21. 202C-21 (Category 2) Load Cell Mount for TRW Engine ----

Artifact Description:

- * Round stainless steel top and bottom connecting four steel legs

This item was bolted to the top of a TRW 40,000-pound thrust engine that was tested at RETF in the early 1990s. On top of this item, there was originally a load cell that measured the thrust of the engine. The item was mounted under a high tripod that was bolted down to A-Stand to hold the TRW engine (George Repas). This item is now an unattached portable object that was found on the floor of C-Stand.



22. 202C-22 (Category 2) Experimental Liquid Hydrogen-Cooled Spool Piece -----

Artifact Description:

** Copper spool piece*

This item is an experimental liquid hydrogen-cooled spool piece. The piece was used in experiments in building a rocket engine with copper tubing and an electroform copper outer shell (George Repas). The item is currently an unattached portable item stored on the floor of C-Stand. Its date of manufacture is unknown.



23. 202C-23 (Category 2) Experimental Liquid Hydrogen- Cooled Spool Piece -----

Artifact Description:

** Instrumented Copper Spool Piece*

This item is an experimental liquid hydrogen-cooled spool piece. The piece was used in experiments in building a rocket engine with copper tubing and an electroform copper outer shell (George Repas). The item is currently an unattached portable item stored on the floor of C-Stand. Its date of manufacture is unknown.



24. 202C-24 (Category 2) Heat Sink Copper Nozzle for LOX Cooling Injectors -----

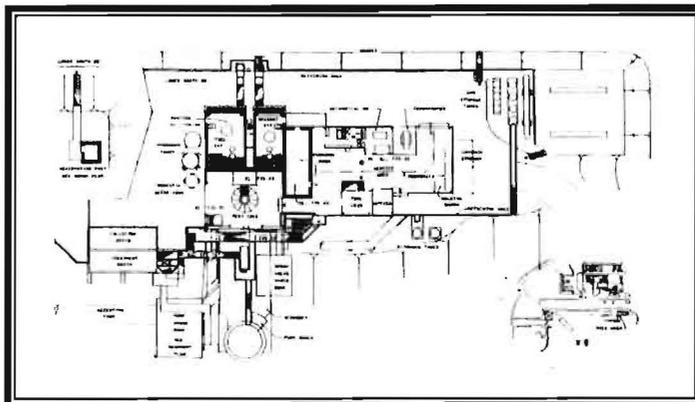
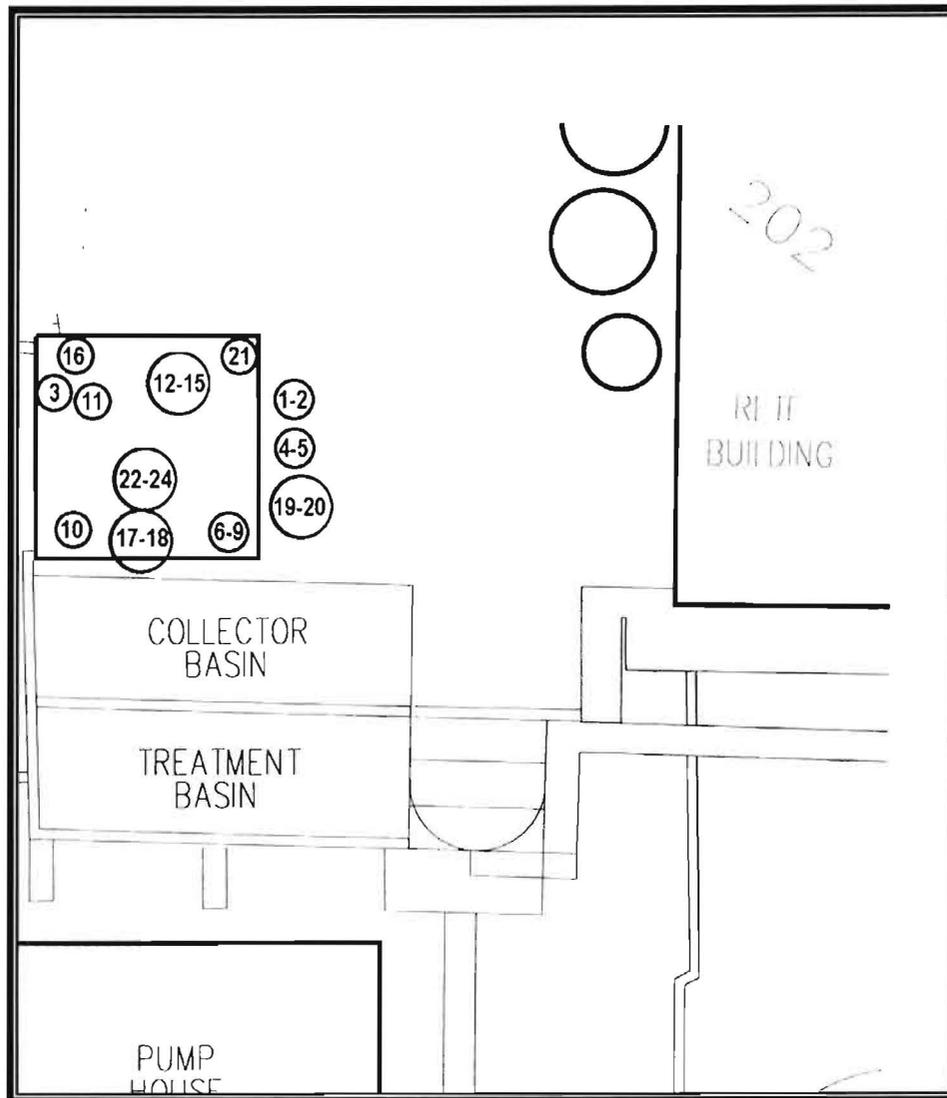
Artifact Description:

** Simple copper cylinder*

"This is a heat sink copper nozzle used to do checkout tests on LOX Cooling Program injectors" (George Repas). The LOX Cooling Program operated during the 1980s. The piece is now an unattached portable item that was found on the floor of C-Stand.



BUILDING 202C C-STAND ARTIFACT LOCATION KEY



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SECTION D

BUILDING 205: GASEOUS HYDROGEN COMPRESSION PROPELLANT TRANSFER AND STORAGE AREA



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BUILDING 205: GASEOUS HYDROGEN COMPRESSION PROPELLANT TRANSFER AND STORAGE AREA

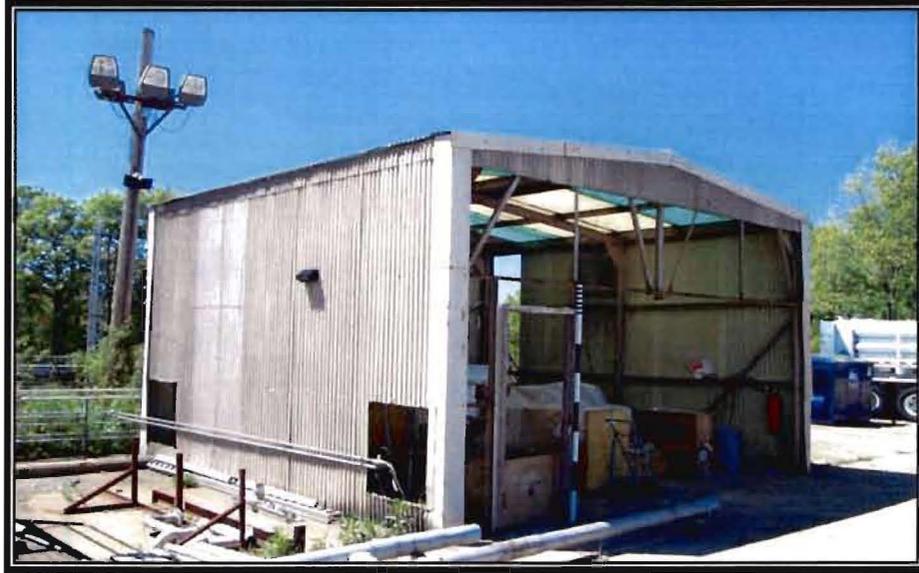


Figure D.1: Southeastern corner of Building 205.

Building 205 Description

Building 205 is located on a hill immediately to the west of the RETF. The facility is a gable-roofed, corrugated metal structure. Building 205 was used as a gaseous hydrogen propellant transfer and storage area for the RETF. Wei-Yen Hu of NASA GRC recalled that the building was used in the early 1990s to house two 6,000 PSIG Haskel (Helium) compressors. Mr. Hu also stated that one of the Haskels was exceeded, and the other was sent to NASA GRC's Plumbrook facility. Presently, the building is used for storage space.

Building 205 Artifacts

HDC identified no artifacts in, on, or around this building.

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SECTION E

BUILDING 206A: HYDROGEN VAPORIZER FACILITY



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BUILDING 206A: HYDROGEN VAPORIZER FACILITY



Figure E.1: Northwestern corner of Building 206A.

Building 206A Description

Building 206A is located on a hill immediately west of the RETF. The structure is a gable-roofed, painted concrete-block hydrogen vaporizer facility. Most of the building consists of an area for a liquid hydrogen vaporizer, with a control room in the eastern part of the building. A steel rolling curtain door is located on the northern elevation of Building 206A. A liquid hydrogen dewar stands west of the facility.

Table E.1: Artifacts in and around RETF Building 206A.

Artifact #	Category	Description
1. 206A-1	3	Explosion-Proof Telephone
2. 206A-2	2	206A Building Sign

BUILDING 206A ARTIFACT PHOTOGRAPHS

1. 206A-1 (Category 3) Explosion-Proof Telephone -----

Artifact Description:

** Black explosion-proof telephone hanging in a small monitoring room in Building 206A*

Based on its overall design and the style of lettering and graphics on the phone's metal "caution" plate, this piece appears to date from the 1950s. RETF retiree Neal Wingenfeld thought that this phone was an original RETF explosion-proof telephone that may have been relocated to Building 206A during later renovations to the RETF facility.

At the time of the assessment, the phone was still connected and had a dial tone when the receiver was lifted. This item may be an artifact from 1957-1969, the most historically significant period at the RETF as defined by the National Park Service. The phone is mounted to a wall but is certainly not in its original location.



2. 206A-2 (Category 2) 206A Building Sign -----

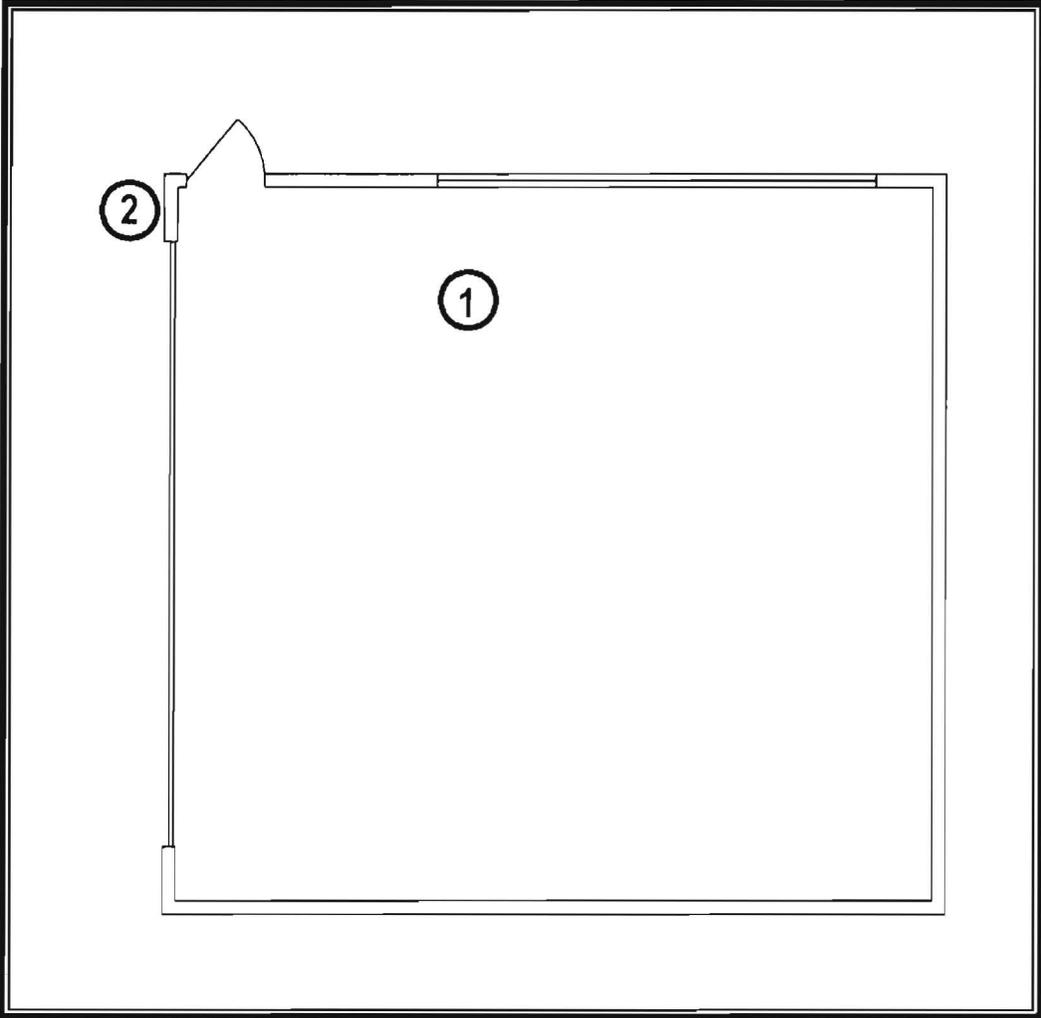
Artifact Description:

** Metal sign, white with black numbers*

This item is an exterior sign identifying Building 206A. It is located on the northern exterior elevation of the building.



BUILDING 206A ARTIFACT LOCATION KEY



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SECTION F

BUILDING 206B: CRYOGENIC VAPORIZER FACILITY



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BUILDING 206B: CRYOGENIC VAPORIZER FACILITY

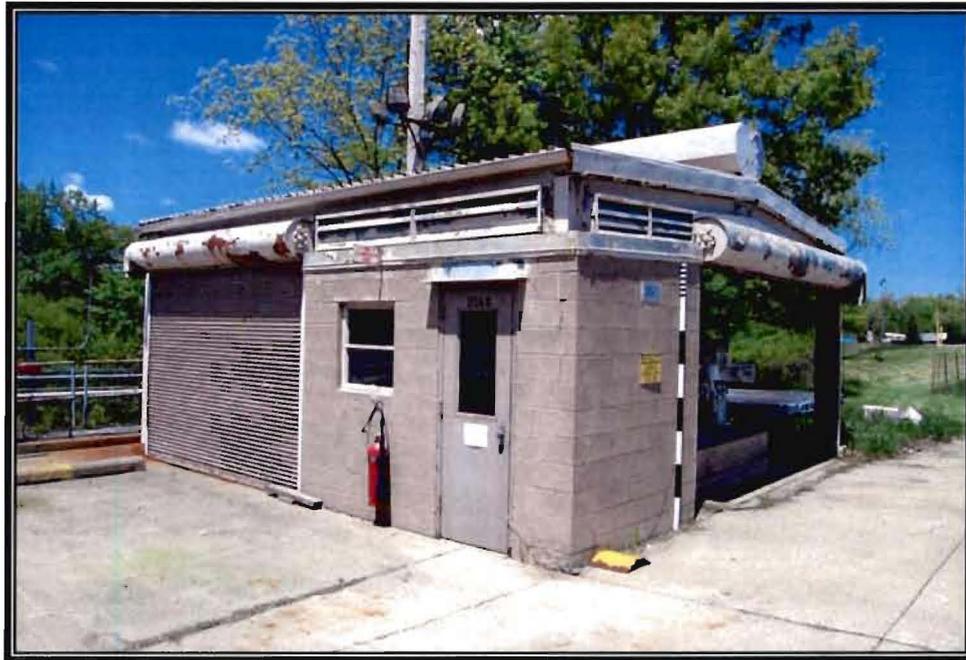


Figure F.1: Southeastern corner of Building 206B.

Building 206B Description

Building 206B is located on a hill east of RETF Building 202. The structure is a concrete-block cryogenic vaporizer facility with a corrugated metal gable roof. Most of the building consists of a vaporizer shelter located in the southeastern part of the structure. Steel rolling curtain doors are located in the southwestern and northeastern elevations of Building 206B. Wei-Yen Hu of NASA GRC recalled that this facility housed a 4,000 PSIG Paul (LV-19, Hydrogen) pump and vaporizer during the early 1990s.

Table F.1: Artifacts in and around RETF Building 206B.

Artifact #	Category	Description
1. 206B-1	2	Gray Telephone
2. 206B-2	2	206B Building Sign
3. 206B-3	2	Yellow and Black Sign
4. 206B-4	2	Entrance Sign at Gate

BUILDING 206B ARTIFACT PHOTOGRAPHS

1. 206B-1 (Category 2) Gray Telephone -----

Artifact Description:

** Gray telephone located on interior west wall of Building 206B*

This telephone unit is affixed to the wall. The unit may date from the 1970s. A similar phone was visible in a late 1970s photograph of the Building 202 test cell.



2. 206B-2 (Category 2) 206B Building Sign ---

Artifact Description:

** Metal sign, white with black numbers*

This marker identifies Building 206B. The sign is located on the eastern exterior elevation of the building.



3. 206B-3 (Category 2) Yellow and Black Sign -----

Artifact Description:

** Yellow and black "CAUTION" sign*

This sign is hanging on the entrance gate to Buildings 205, 206A, and 206B.

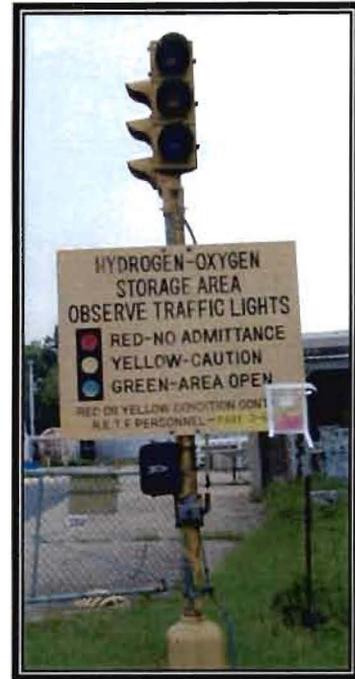


4. 206B-4 (Category 2) Entrance Sign at Gate -----

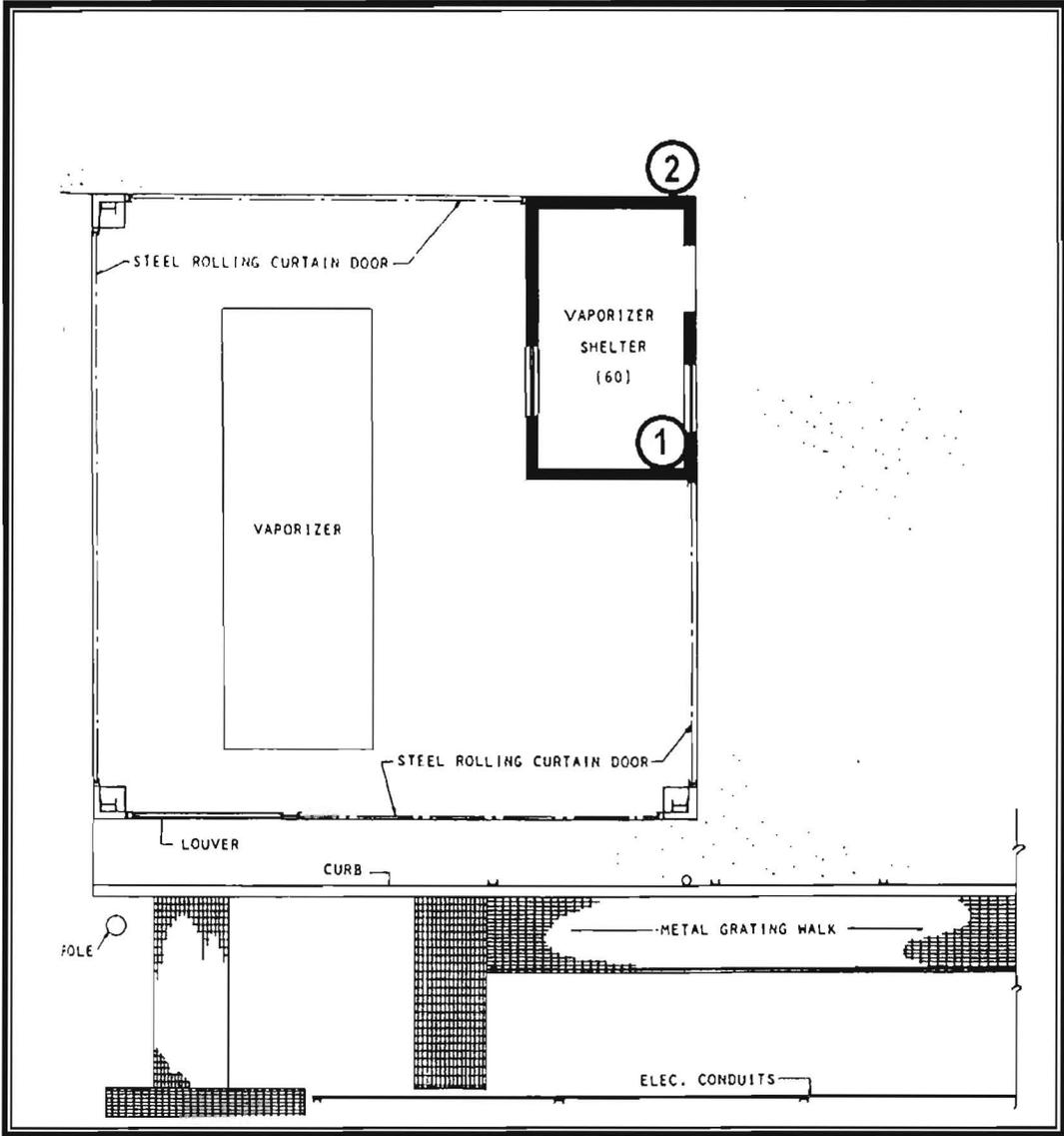
Artifact Description:

** Traffic lights and sign leading into hydrogen-oxygen storage area*

This item is a large, prominent sign and traffic signal mounted next to the entrance into the hydrogen and oxygen storage area. The ensemble is mounted on a metal pole, and the sign is a metal panel painted yellow with black lettering. This sign is unique to the RETF and is in its original location. The exact date of manufacture of the sign is not known.



BUILDING 206B ARTIFACT LOCATION KEY



SECTION G

OBSERVATION BLOCKHOUSE



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OBSERVATION BLOCKHOUSE



Figure G.1: Southeastern corner of the Observation Blockhouse.

Observation Blockhouse Description

This solid concrete explosion-proof building has one window in the southern elevation and a metal door on the northern side. A metal staircase located north of the building once provided access to the roof, where a monitoring camera was installed. Metal railings line the perimeter of the building rooftop. The Observation Blockhouse served as a live-action watch post for testing in the RETF. The building interior consisted of a control panel and room for a few individuals to monitor testing procedures.

Table G.1: RETF Observation Blockhouse Artifacts.

Artifact #	Category	Description
1. OB-1	2	Control Panel
2. OB-2	2	Telephone

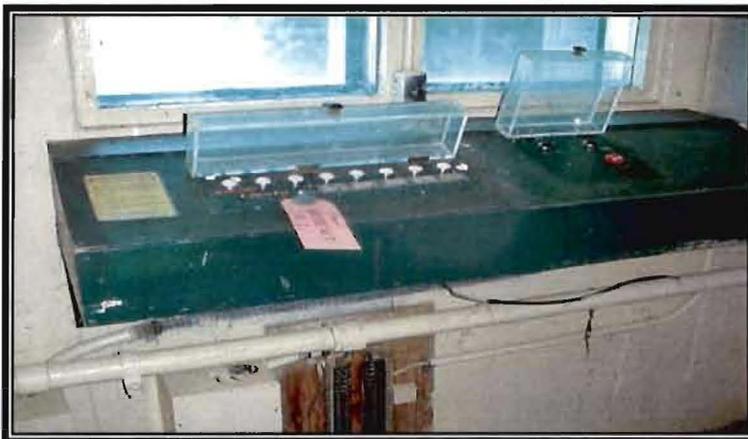
OBSERVATION BLOCKHOUSE ARTIFACT PHOTOGRAPHS

1. OB-1 (Category 2) Control Panel -----

Artifact Description:

** Metal control panel*

This control panel was used to monitor testing procedures at the RETF and may have allowed for a test abort action in the event of an accident. The panel is located beneath the only window in the blockhouse. The blockhouse dates from the original 1956-1957 construction phase of the RETF, and it is possible that this control panel dates from that era, although it may be a later addition. The panel appears to be in its original location.



2. OB-2 (Category 2) Telephone-----

Artifact Description:

** Gray telephone*

This telephone unit is located on the southern wall of the Blockhouse. It appears to date from the 1970s, based on the presence of a similar phone in a late 1970s photograph of the Building 202 test cell. This phone is similar to other units observed throughout the RETF facilities.



POLE BARN



Figure H.1: Northeastern corner of the Pole Barn.

Pole Barn Description

The Pole Barn was built in the early 1990s as a storage facility. The building was constructed with plywood panel cladding and a side-gabled roof. It stands in the outlying southwestern part of the RETF.

Table H.1: Artifacts in and around RETF Pole Barn.

Artifact #	Category	Description
1. PB-1	2	Spray Bar for 202 Exhaust Scrubber in Building 202
2. PB-2	2	Tripod for B-Stand Pulse Detonation Hardware
3. PB-3	2	Large Stainless Steel Test Tripod
4. PB-4	2	A-Stand Test Tripod
5. PB-5	1	Injector for LOX-Cooling Program

POLE BARN ARTIFACT PHOTOGRAPHS

1. **PB-1 (Category 2) Spray Bar for Exhaust Scrubber in Building 202 ----**

Artifact Description:

- * *Stainless steel spray bars developed for the exhaust scrubber in Building 202*
- * *Various sizes of hollow bars with numerous openings*

By the early 1990s, the steel spray bars inside the RETF exhaust scrubber were severely rusted. Therefore, a 'Construction of Facility' (C of F) modification of the RETF exhaust scrubber was approved in the 1990s. The spray bars visible in this photo were manufactured for a planned rehabilitation of the RETF exhaust scrubber, and they were "... purchased ahead of time in anticipation of shutting down and making the repairs" (George Repas). If used, they would have been installed inside the RETF scrubber and would have sprayed water into the exhaust as it passed through the scrubber. However, the C of F was cancelled, and the RETF closed permanently on July 1, 1995 (George Repas). These components were never used. One spray bar was tagged as an artifact, as a representative example. The spray bars are loose and are stacked in a spot north of the Pole Barn. Wei-Yen Hu of NASA GRC stated that the spray bars have been stored in this spot since delivery by the manufacturer. Mr. Hu also stated that the spray bars were delivered along with brass spray nozzles, and that ABC Piping was the contractor for the work.



2. **PB-2 (Category 2) Tripod for B-Stand Pulse Detonation Hardware -----**

Artifact Description:

- * *Stainless steel and metal tripod*

This was a small tripod used to mount pulse detonation hardware on the B-Stand (George Repas). As a B-Stand artifact, it dates from the period 1985-1995. This test tripod was lying on the ground outside the RETF Pole Barn. This item is portable.



3. PB-3 (Category 2) Large Stainless Steel Test Tripod -

Artifact Description:

** Large stainless steel tripod*

Retired RETF engineer George Repas identified this artifact as a rocket test tripod used to test a 40,000-pound thrust TRW engine in the early 1990s (see description of Artifact 202C-21). Mr. Repas recalled an incident in which this tripod was not securely fixed to A-Stand. To prevent the engine from lifting off, fuel to the rocket was cut at the moment the rocket engine began to launch. One leg of the tripod is bent because of this incident. The tripod is now a loose item lying on the ground near the RETF Pole Barn.



4. PB-4 (Category 2) A-Stand Test Tripod -----

Artifact Description:

** White A-Stand tripod*

This painted steel test tripod was used for A-Stand testing and is composed of three legs connected to a circular top plate. It was used to secure rocket engines to the test stand during firing. George Repas stated that it was used to secure the Plug Engine described as Artifact 100-9. Based on this statement, the tripod likely dates from the 1970s or 1980s (see description of Artifact 100-9 for additional information on the plugged engine type). This is a loose item that was found on the ground to the north of the Pole Barn.



5. PB-5 (Category 1) Injector for LOX-Cooling Program -----

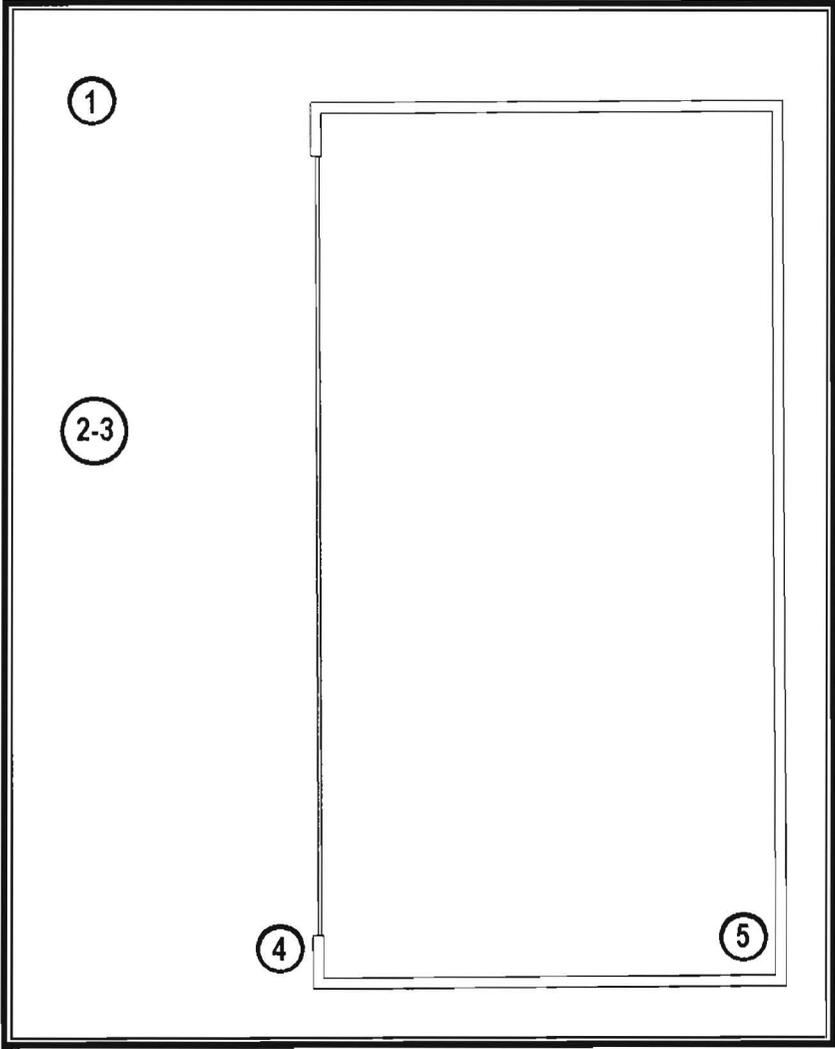
Artifact Description:

** Stainless steel injector*

This is an injector manufactured for the Lox-Cooled Engine Program that was associated with the RETF A-Stand during the 1980s. This metal injector consists of a round base with a projecting tube (see description of Artifact 100-5 for information on the LOX-Cooling Program).



POLE BARN ARTIFACT LOCATION KEY



SECTION I

REMOVAL AND TREATMENT RECOMMENDATIONS



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REMOVAL AND TREATMENT RECOMMENDATIONS

Tagged artifacts should be removed from their locations at the RETF as soon as possible to prevent theft or further deterioration from exposure to the elements. Some items show signs of rust and other forms of deterioration. A Cultural Resource Management professional or a NASA Property Management staff member should monitor the removal and storage of items to assure that artifacts are not damaged in transit. Efforts should be made to cover or cushion painted surfaces such as signs and control panels that could be scratched or damaged during transit. Workers removing the items should take care not to damage items or remove identification tags through snags or impact with doorways and walls. It is particularly critical that outdoor items and those stored in locations that are damp or susceptible to flooding or leakage be removed to a safe location as soon as is reasonably possible.

Once the items are removed from the RETF facility, they should be placed in storage in Cleveland to minimize travel damage. The items should be stored in an indoor climate-controlled location to prevent further deterioration. The items should also be in a secured repository to prevent theft or vandalism. In addition to having overall climate control, the storage location should be free of water leaks and moisture buildup. To prevent staining or spread of corrosion, rusted or otherwise corroded items should not be stored in contact with other items.

Proposed storage sites include the nearby Cleveland I-X Center. The items could also be stored in the storage facilities of a local museum if a museum could be located that would have adequate available storage space for the artifacts. When selecting potential storage sites for the items, the City should consult OHPO, appropriate NASA personnel, and other interested parties to confirm the appropriateness of the site.

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SECTION J

BIBLIOGRAPHY



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BIBLIOGRAPHY

- Bewley, Doug
2002 "Technical Comments on RETF Artifact Assessment."
Manuscript on file at Hardlines Design Company, Columbus, Ohio.
- Butowsky, Harry A.
1984 "National Register Nomination, Rocket Engine Test
Facility." Ohio State Historic Preservation Office.
- National Aeronautics and Space Administration
1999 "NASA Procedures and Guidelines NPG 4310.1: Identification and
Disposition of NASA Artifacts." National Aeronautics and Space
Administration, Washington, DC.
- National Aeronautics and Space Administration
2002 "Comments on Artifact RETF Artifact Inventory." NASA Glenn Research
Center, Cleveland, Ohio, August 9, 2002. On file at Hardlines Design
Company, Columbus, Ohio.
- National Aeronautics and Space Administration
"Historic Photographs of the Rocket Engine Test Facility, 1955-1995."
NASA Glenn Research Center, Cleveland, Ohio.
- National Park Service
2001 "Man in Space, A National Historic Landmark Theme Study."
www.cr.nps.gov/history/online_books
- Repas, George
2002 "NASA GRC South 40 Hardware Identification."
On file at Hardlines Design Company, Columbus, Ohio.
- "Tour of RETF Facility with George Repas"
2002 RETF tour videotape shot by Mr. Robert Stewart of Historical
Technologies, Inc. Tour guided by RETF retiree George Repas. Copy
in library of Hardlines Design Company.

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Subject: S40 Equipment remaining being demoed with the buildings
Date: Wed, 6 Aug 2003 12:28:14 -0400
From: "Erdmann, Jon" <jerdmann@airportpm.com>
To: "Joe Morris (E-mail)" <joseph.e.morris@grc.nasa.gov>
Cc: "Thomas, Doug" <dthomas@airportpm.com>,
"Weddendorf, Bill" <bweddendorf@airportpm.com>,
"Rich Kalynchuk (E-mail)" <Richard.S.Kalynchuk@grc.nasa.gov>,
"Debra Brooks (E-mail)" <Debra.F.Brooks@grc.nasa.gov>,
"Plassard, Greg" <gplassard@airportpm.com>,
"John Hughes (E-mail)" <John.Hughes@grc.nasa.gov>,
"Gordon Jones (E-mail)" <gordon.B.Jones@grc.nasa.gov>,
"Kevin Coleman (E-mail)" <kevin.coleman@grc.nasa.gov>,
"Sue Gaudreau (E-mail)" <sue.a.gaudreau@nasa.gov>

Joe,

For the folks interested in the status of the RETF artifacts, I offer the following:

Attached is the RETF Artifacts Report. All equipment determined to be potential artifacts was tagged and catalogued via this report. The report differentiates items that NASA wanted to keep, items that would be saved for potential use in the future RETF museum display, and items that were not considered true artifacts or items that NASA did not want to keep. This last category of items was offered to the Smithsonian and many other potential repositories. The items selected through this screening process were removed from RETF. Also removed from RETF were items NASA wanted to keep and all the potential museum display items. The attached spreadsheet put together by Debra Brooks helps outline the status of each artifact. After the conclusion of the artifact screening process, what remained were essentially non-artifacts, which were to be demoed in place.

The potential museum display items are currently stored in a trailer located near the Guerin House. These items include the following:

Bldg. 100, items 1,9,11,16,17,18,31,32,33,35

Bldg. 202A, items 1,23

Bldg. 206A, item 1 (round black phone)

I hope this helps to clear up some confusion regarding the status of the RETF "artifacts". Anyone with any questions should feel free to give me a call.

Regards,

Jon Erdmann, 216-676-9699x156

-----Original Message-----

From: Erdmann, Jon

Sent: Tuesday, August 05, 2003 4:15 PM

To: 'Joe Morris (E-mail)'

Cc: Thomas, Doug; Weddendorf, Bill; 'Rich Kalynchuk (E-mail)'; 'Debra Brooks (E-mail)'; Plassard, Greg; 'John Hughes (E-mail)'; 'Gordon Jones (E-mail)'; 'Kevin Coleman (E-mail)'; Sue Gaudreau (E-mail)

Subject: RE: Re: S40 Equipment remaining being demoed with the buildings

Joe,

For folks that were copied on my previous email and may have been confused, please allow me to clarify my previous statement concerning the demo of remaining equipment. Please pass along word that all remaining equipment not identified in the *ACS/CCL/A-Stand Equipment Relocation and Salvage Report*, which includes equipment labeled as "artifacts" (except for A-stand itself) are to be demoed in place.

Thanks,

Jon

-----Original Message-----

From: Erdmann, Jon

Sent: Tuesday, August 05, 2003 1:51 PM

To: Joe Morris (E-mail)

Cc: Thomas, Doug; Weddendorf, Bill; Rich Kalynchuk (E-mail); Debra Brooks (E-mail); Plassard, Greg; John Hughes (E-mail); Gordon Jones (E-mail); Kevin Coleman (E-mail)

Subject: RE: Re: S40 Equipment remaining being demoed with the buildings

Joe,

The South 40 Salvage and Demo Contractors were approached today by an SAIC person that was concerned with the demo of equipment labeled as artifacts. Please pass along word that all remaining equipment including equipment labeled as "artifacts" are to be demoed in place.

Thanks,

Jon

-----Original Message-----

From: Plassard, Greg

Sent: Friday, June 13, 2003 8:49 AM

To: Brown, David; Vilem, Mark; Holley, Hugh; Thomas, Doug; Weddendorf, Bill

Cc: Dobbins, John; Williams, James; Lewis, Gary; Costales, Art

Subject: FW: Re: S40 Equipment remaining being demoed with the buildings

The below is good news from NASA.

Almost all of the "junk" left in the S40 should be scrapped by our contractor.

NASA has sold (or tried to sell) anything of any real value, so I suspect IX will disposing of most as C/D debris...

Greg P

-----Original Message-----

From: Gordon Jones [mailto:Gordon.Jones@grc.nasa.gov]

Sent: Friday, June 13, 2003 8:42 AM

To: Plassard, Greg

Cc: Erdmann, Jon; James.F.Gaffney@grc.nasa.gov; John.J.Hughes@grc.nasa.gov

Subject: Fwd: Re: S40 Equipment remaining being demoed with the buildings

Greg,

Please see Joe Morris note below.

Gordon

Date: Thu, 12 Jun 2003 11:59:06 -0400
To: Gordon.B.Jones@grc.nasa.gov, Joseph.E.Begany@nasa.gov,
John.A.Selby@grc.nasa.gov
From: Joseph E Morris <Joseph.E.Morris@nasa.gov>
Subject: Fwd: Re: S40 Equipment remaining being demoed with the buildings

Gordon, John and Joe B,
I'm sending this along fyi. Gordon, please forward this e-mail to PMT for their information.
Thanks.
Joe M

X-Info: ODIN / NASA Glenn Research Center
X-Sender: esdeb@popserve.grc.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.1.1
Date: Mon, 09 Jun 2003 10:02:17 -0400
To: Joseph E Morris <Joseph.E.Morris@nasa.gov>
From: Debra F Brooks <Debra.F.Brooks@grc.nasa.gov>
Subject: Re: S40 Equipment remaining being demoed with the buildings
Cc: Wei-Yen.Hu@grc.nasa.gov, Robert.J.Vanek@grc.nasa.gov,
Edwin.Gonzalez@grc.nasa.gov

Joe:

We have removed all excess property from the S40 area, with the exception of the spray bars (artifact PB-1), Tripod for B-Stand (artifact PB-2) and Stainless Steel Test Tripod (artifact PB-3). These three items have been sold. They were originally located at the pole barn, but somebody moved them to the top of the hill. The original bidder defaulted on payment so they were awarded to another bidder. The deadline for the buyer to remove them is June 17, but we are hoping he will make arrangements with Edwin to come in this week and pick them up.

The only other item pending sale is the small Tinnius Olsen Model 120D tensile tester in 203, cell 4. GSA has a buyer for this machine, and will hopefully have the contract finalized this week. The latest word I have on this is that Tinnius Olsen will be refurbishing this machine for the buyer and will contract the movement of the machine with Norris Brothers. Since they will be moving the other two tensile testers to Langley, I would expect that they would remove the 120D at the same time.

All other property which is being kept for the new buildings, has been stored in the five rented trailers, or is in the process of being shipped to Plum Brook for storage. All artifacts left in the S40 have undergone all the necessary screening and have been approved for abandonment and destruction. The items in gate 3 are awaiting shipment to Plum Brook by the city.

Please pass this information on to anyone that needs to be kept in the loop. If there are

any special arrangements we need to make to gain access to the area to clean up these last couple of items, please let me know as soon as possible. Edwin will escort the buyer of the spray bars to the site and stay with him until he is done loading. Because of the size of these spray bars, he made need to cut some of them to transport them, or he may need to make more than one trip. He is coming in from Michigan Tuesday morning to evaluate what equipment he will need to perform the removal.

If you have any questions, please don't hesitate to contact me.

Debbie

08:30 AM 6/9/2003 -0400, you wrote:

John,

Two thoughts regarding Greg Plassard's e-mail (below):

- 1) I have asked the GRC Property Management group if we have completed their process. I'm awaiting their reply.
- 2) Artifact 202A-4 (Category 4) A-Stand Test Stand is a significant artifact from RETF, and I'm still trying to find a "home" for it - so let's instruct the City not to plan to demo it (at least not yet.) I'm hoping we'll be able to direct the City to move it to a place yet to be determined.

Joe Morris
Chief Architect
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NASA Glenn Research Center
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Subject: NASA vacation of S40

Date: Thu, 5 Jun 2003 13:45:12 -0400

From: "Plassard, Greg" <gplassard@airportpm.com>

To: "John. A. Selby (E-mail)" <John.A.Selby@grc.nasa.gov>,

"Wei-Yen. Hu (E-mail)" <wei-yen.hu@grc.nasa.gov>,

"Joseph E Begany (E-mail)" <Joseph.E.Begany@grc.nasa.gov>

John,

As our weekly Wed meetings have been reporting, June 6th is the day that all NASA equipment will removed from the S40.

City's Demo/Salvage contractor will be bidding to remove and dispose of all remaining equipment.

We of course understand that that several of the remaining vessels will be salvaged for the ACS and CCL projects.

Greg P

Debbie Brooks

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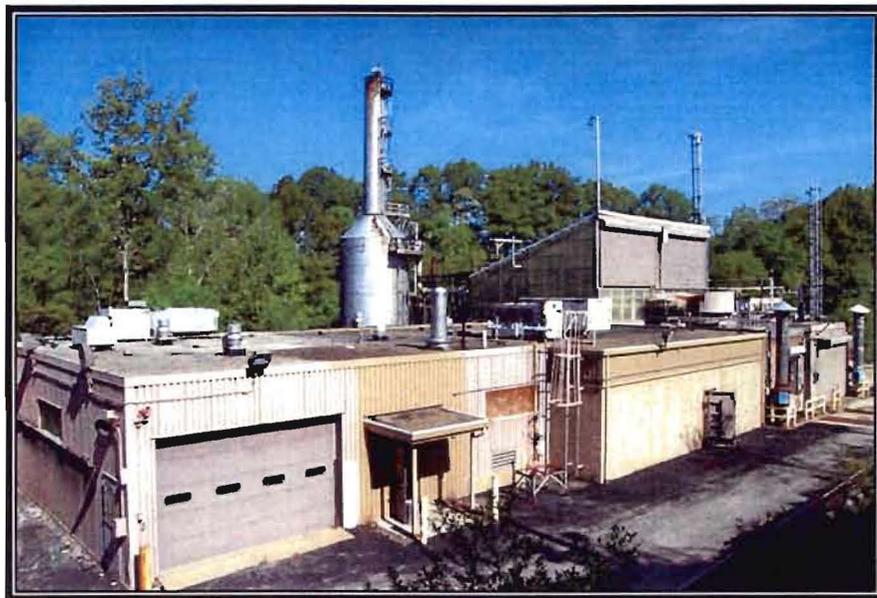
 [S40 Artifacts & Excess.xls](#)

Doug Bewley
5710

ARTIFACT INVENTORY AND EVALUATION

ROCKET ENGINE TEST FACILITY
NASA GLENN RESEARCH FACILITY

CLEVELAND, OHIO



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July 11, 2002

1) - NASA keeps for
Research needs
2) - NOT ARTIFACTS
for NPG Photo's
3) - ARTIFACTS
- MUSEUM PIECES
4) - ARTIFACTS
5) NOW NASA ARTIFACTS