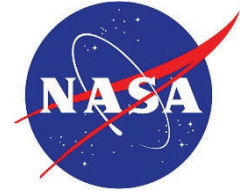


National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
2101 NASA Parkway  
Houston, Texas 77058-3696



June 4, 2026

Reply to Attn of: JE-26-038

Mr. Brad Patterson  
State Historic Preservation Office  
Texas Historical Commission  
P.O. Box 12276  
Austin, TX 78711-2276

Subject: Initiation of Consultation Project Review  
Removal of Solar Simulators from B32 Chamber B

Dear Mr. Patterson:

The National Aeronautics and Space Administration (NASA), Lyndon B. Johnson Space Center (JSC) is proposing to remove the solar simulators and replace some of the supporting pumps around Chamber B in Building 32, the Space Environment Simulation Laboratory, a National Historic Landmark (NHL). The Project is located entirely within a NASA NHL and, as such, has been determined to be a federal undertaking subject to consultation under the NHL Programmatic Agreement. Please see the attached enclosures for additional information. JSC is proposing a determination of "Conditional No Adverse Effect" for this project. JSC welcomes your comments on this project and the proposed determination.

If you have any questions or need additional information, please contact me at 346-686-5332 or by email at [jennifer.l.morrison@nasa.gov](mailto:jennifer.l.morrison@nasa.gov).

Sincerely,

**Jennifer  
Morrison**

Digitally signed by  
Jennifer Morrison  
Date: 2026.06.05  
10:43:33 -05'00'

Jeni Morrison  
JSC Cultural Resources Manager  
JSC Environmental Management Office

Enclosures:

1. Project Description
2. Site Map and Proposed Project Area
3. APE Analysis Photos

cc:

Ms. Miranda Grieder  
Historic Preservation Project Reviewer  
Federal and State Review Program  
Division of Architecture  
Texas Historical Commission  
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Historian, National Historic Landmarks  
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Lakewood, Colorado 80225

Mr. John Olson  
Historical Architect  
National Park Service  
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**ENCLOSURE 1**  
Project Description

## Project Description

The National Aeronautics and Space Administration (NASA), Lyndon B. Johnson Space Center (JSC) is proposing to remove the solar simulators, replace some of the supporting pumps, and excess peripheral equipment around Chamber B in Building 32, the Space Environment Simulation Laboratory. Chamber B, historically used for life systems and astronaut training studies, as well as single module tests of the Apollo spacecraft, was designated, along with Chamber A, as a National Historic Landmark (NHL) on December 24, 1985. JSC is transitioning usage of Chamber B to support commercial crews and Artemis missions through thermal vacuum testbed and crew training for the next generation of spacesuits. As the only manned thermal vacuum chamber in the United States capable of performing these tests, this project will update the support technology for the chamber to ensure safety and performance needs are met for future testing, while also reducing visual obstruction of the chamber and minimizing intrusion on the chamber itself.

The twelve diffusion pumps surrounding Chamber B (Figure 1) on the sides, which serve as peripheral support equipment for the chamber, will be replaced with four turbo pumps (Figure 2) with new controls (Figure 3) on the top of the chamber. The current configuration is outdated, with only two diffusion pumps still operational. Two were removed over a decade ago and replaced with cryopumps (Figures 4, 5) and associated controls (Figure 6, 7). The diffusion pumps are oil-based, which will pose a safety risk with the increase in water vapor that will be required for future testing. Oil spills outside the chamber have also been an issue in the past at this location. The new turbo pumps will be visually less intrusive as they are approximately 2-3 feet tall and visible only from the third floor of the building. They will improve both efficiency and performance, and unlike the diffusion pumps, they will be placed on top of Chamber B to open up space around the side of the chamber and to avoid modifying the pressure vessel. This will require removal of the solar simulators currently located on top of the chamber (Figure 8), which are specifically named on the Nomination Form prepared when the chambers were designated as an NHL. These original components simulated solar radiation on test articles as they were subjected to vacuum conditions within the chamber. They were installed in a modular design to allow for changes in configuration and beam size. These solar simulators are outdated and have not been used in over a decade.

There are approximately fifty solar simulators on top of Chamber B, seated on removable flanges that allow detachment and reattachment of the simulators based on individual testing needs. Peripheral support equipment for the simulators will also be removed and excessed, including metal cable trays (Figure 9) and cabling (Figure 10, 11), thermal control power transformers (Figure 12, 13), a chiller (Figure 14) and associated hoses, remote-control units for the simulators (Figure 15), control consoles (Figures 16-21), a monitor (Figure 22), and miscellaneous obsolete equipment stored on a nearby platform (Figure 23, 24). The original white metal catwalk (Figure 25) will be preserved on top of the chamber, as it is still in use. The mirrors that reflected light from the solar simulators have been stored on elevated platforms around the chamber since their removal over fifteen years ago (Figure 26). These will also be excessed, with two stored in a nearby onsite location. JSC will manage all excessed equipment in accordance with Stipulation III.B of the Programmatic Agreement

among the National Aeronautics and Space Administration, the National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation (NHL PA), applying its agreement with the Smithsonian Institution to determine appropriate retention and curation activities. Museums will be given priority for placement of excess equipment through JSC's Artifact Disposition Process.

Standard metal covers (Figure 27, 28) will be installed over the existing penetrations in the chamber after the diffusion pumps and solar simulators are removed. These metal covers will allow for any needed future equipment to be added through penetrations in the covers, rather than modifying the original pressure vessel by adding penetrations to the chamber itself. These modifications, made in support of NASA's continuing mission, will ultimately enhance the historic significance of the property, rather than diminish it, by allowing it to maintain use for its original purpose and facilitate future significant accomplishments. The alternative to meet safety requirements was to install the new turbo pumps on the sides of the chamber, where diffusion pumps will be removed, but this would have required new penetrations in the original pressure vessel. NASA has selected the alternative with the least impact on the major, listed components of the NHL. As part of a critical path for upcoming testing of new spacesuit designs, these changes will need to be implemented by August 2026.

JSC met with Texas Historical Commission (THC) on April 23, 2026, to discuss this project and gather initial questions. THC requested information on the internal components of the solar simulators. As documented in the NHL nomination form, "the solar simulation modules are on-axis with xenon lamp sources. The source collection optics are outside the chamber, with the collimating optics inside the chamber." JSC confirmed these simulators are of the same design and function as those removed from Chamber A during the previously consulted and mitigated changes in support of the James Webb Space Telescope (JWST) testing.

JSC collected supplemental photographs of the simulators that were previously removed and still housed on site. Each of the modules has a removable panel (Figure 29) on the side of the xenon lamp source and collection optics housing, and removable electronic components on the top. Removing the electronic components associated with the light source (Figure 30, 31) from one of the simulator module housings allows a view inside the solar simulator module, which reveals a frame on which the xenon lamp source and collection optics sit (Figure 32).

Documentation from the JWST modifications identified that the solar simulators of a modular design are mounted to the exterior of the top of the chamber. The slots on top of the chamber "allow variability for number and array pattern. The xenon solar modules are controllable from 622 to 1353 W/m<sup>2</sup> and consist of a xenon short arc lamp, throat, primary and secondary mirrors, and first and second fill-in lenses... In operation, the system provides a collimated, uniformly intense, spectrally matched solar beam in the work zone of the chamber." A schematic (Figure 33) and model simulator assembly (Figure 34) from the documentation provide useful visualizations. It also found that:

Merely removing the solar modules and placing the associated hardware in storage does not constitute an irreparable, unintended change. Therefore, in light of the fact

that Chamber A is an operating space simulation laboratory needed for the historic JWST project and the proposed removal of solar simulation modules is well within the original intended purpose, it is felt that this modification does not infringe on the historical properties of the facility. In addition, the proposed modification does not change function, purpose, or use of the facility, so the characteristics of the facility which were specified as the reason for its National Historic Landmark designation will not be affected.

Similarly, removing the Chamber B solar simulators to support ongoing use of the equipment for mission critical purposes will continue its contributions to the programs and projects that actively make history. The removal of the simulators aligns with their modular, reconfigurable purpose. Finally, similar to the changes to Chamber A, this project will not negatively impact the characteristics for which the chamber was designated as an NHL. The excess of the simulators will be handled as per the stipulation in the NHL PA, and the same considerations will be applied to the peripheral equipment even though it is not required per the NHL PA.

Building 32 is located on Second Street east of Building 25 and was constructed in 1964. Building 32 was designated an NHL as part of the “Man in Space” theme study for its historically significant contributions to manned and unmanned spaceflight. Additionally, in 2017, NASA JSC completed the Historic and Architectural Survey and Evaluation of Facilities, identifying and making recommendations of significance on all 459 of JSC’s assets. The survey found that Building 32 is eligible for listing on the NRHP under Criteria A, B, and C, and that Criteria Consideration G applies, because the facility achieved exceptional significance within the past 50 years. In 2013, NASA JSC conducted a 100 percent pedestrian and reconnaissance archaeological survey of the approximately 1,670-acre campus. This study identified no archaeological sites or resources within the direct APE. The interior nature of the project will also avoid any potential impacts on archeological resources.

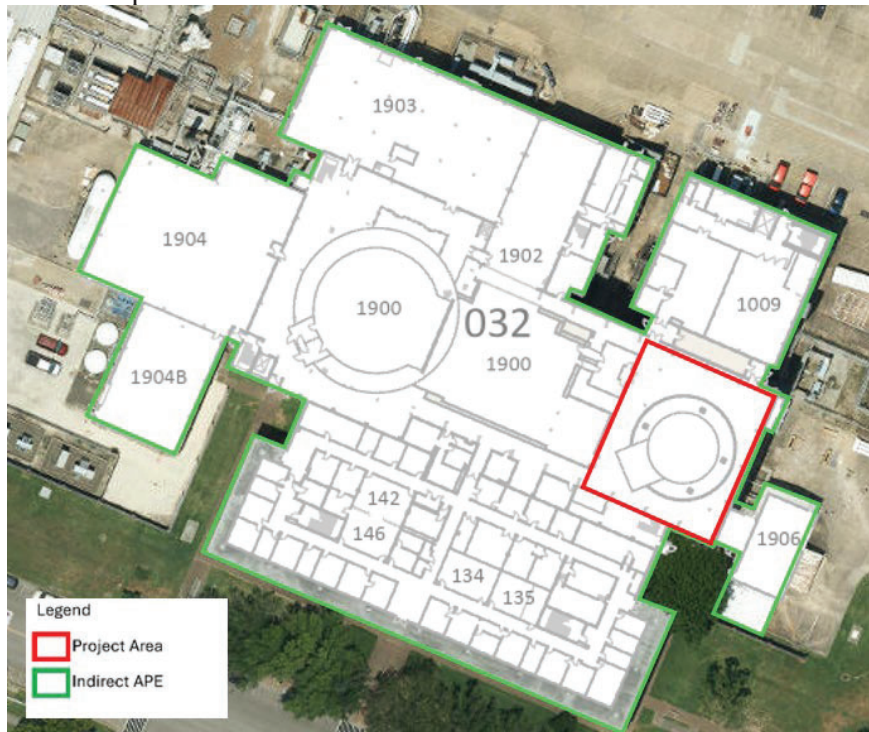
The proposed Project would lie within the National Register of Historic Places (NRHP)-eligible JSC Historic District. However, as the project is confined to the interior of Building 32, there will be no impacts to the building exterior and no additional historic properties affected in the visual Area of Potential Effect (APE) or the historic district. However, NASA has determined that the removal of original features around Chamber B falls under Category A.2, “Removal or excessing of significant elements of the Landmarks specifically named on the National Register nomination forms,” per Stipulation I of the NHL PA. As such, NASA is consulting with the SHPO. NASA has taken measures to reduce impacts, including minimizing intrusiveness to the chamber itself and avoiding modification of the original pressure vessel. NASA has also previously prepared HAER Level I documentation for the NHL. While the narrative covers both chambers, the photography focuses mainly on Chamber A. NASA proposes to supplement the HAER recordation package with additional large format negatives of Chamber B, including the solar simulators mounted on the chamber and internal components of a solar simulator behind a removable panel on the side, done in accordance with the Secretary of Interior’s Standards for Architectural and Engineering Documentation. With this additional documentation, NASA proposes a determination of Conditional No Adverse Effect and requests concurrence to proceed.

Consistent with the obligations under the NHL PA, NASA JSC will seek input from interested parties and the public on this project. These notices are in progress concurrently with this consultation with your office. Should outreach result in an opinion that conflicts or provides useful information as it pertains to the determination of Conditional No Adverse Effect, we will supplement the file with your office. NASA JSC requests your concurrence to proceed with supplemental mitigation measures and modifications to Chamber B.

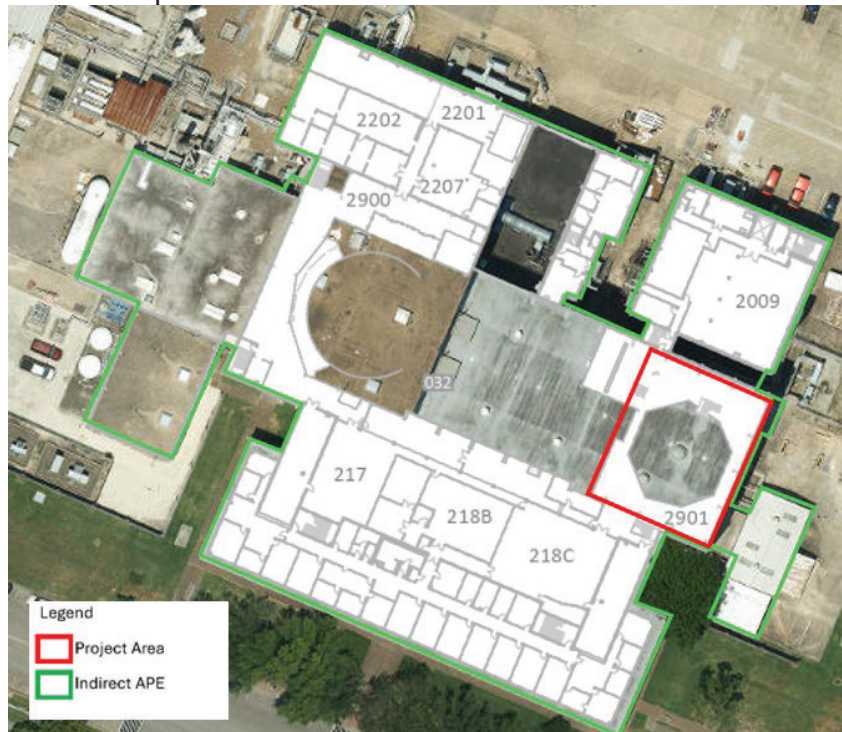
**ENCLOSURE 2**  
Site Map and Proposed Project Area

### Site Map and Proposed Project Area

First Floor Site Map:



Second Floor Site Map:



Third Floor Site Map:



**ENCLOSURE 4**  
APE Analysis Photos

## APE Analysis Photos

APE Photos:



Figure 1. Two of the twelve diffusion pumps surrounding Chamber B to be removed and excessed, with chamber wall and viewing window visible behind.

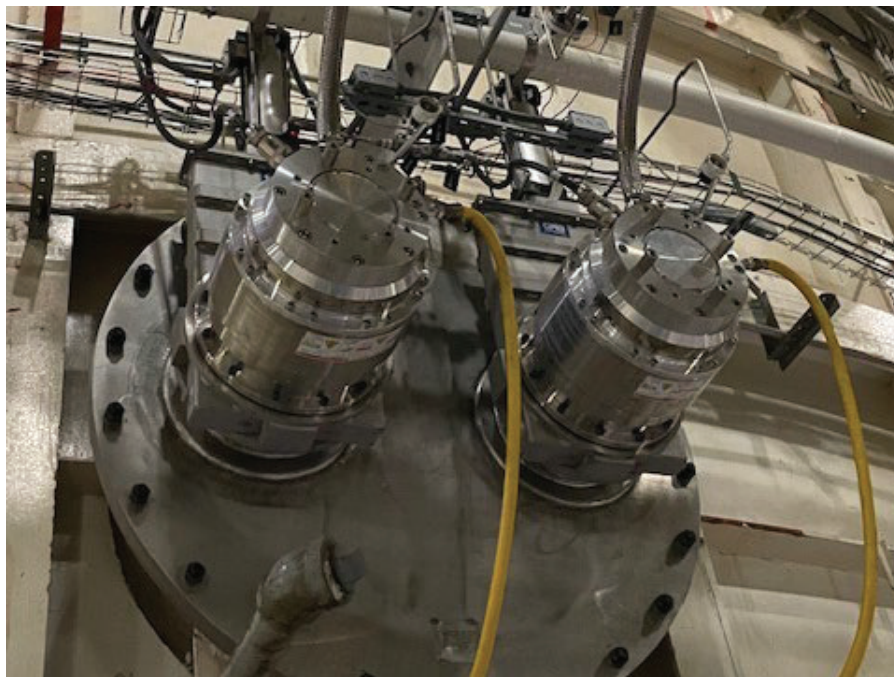


Figure 2. Example for reference of turbo pumps installed on Chamber A as part of the previously consulted and mitigated modifications in support of James Webb Space Telescope.



Figure 3. Example for reference of turbo pump controls at Chamber A.



Figure 4. Top view for reference of cryopump installed on Chamber A.



Figure 5. Bottom view of cryopump previously installed on Chamber B.

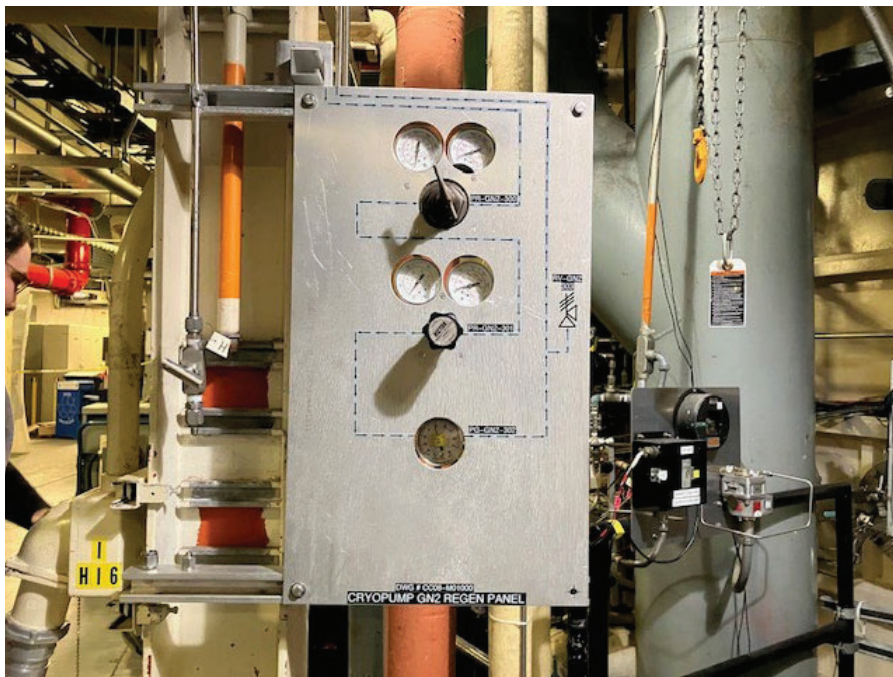


Figure 6. Cryopump controls previously installed next to Chamber B.



Figure 7. Cryopump controls previously installed next to Chamber A, for reference.



Figure 8. Solar simulators located on the top of Chamber B.



Figure 9. Metal cable trays (dark colored) below Chamber B catwalk to be removed and excessed.

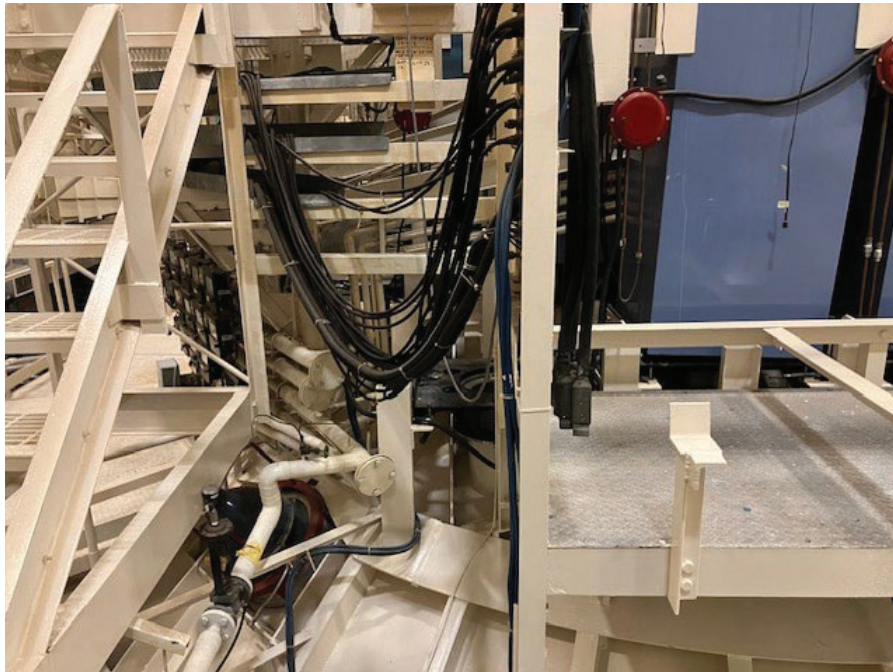


Figure 10. Cabling associated with solar simulators on Chamber B to be removed and excessed.



Figure 11. Cabling associated with solar simulators on Chamber B to be removed and excessed.



Figure 12. Front view of thermal control power transformers at Chamber B to be removed and excessed.



Figure 13. Back view of thermal control power transformers at Chamber B to be removed and excessed.



Figure 14. Supporting chiller for Chamber B to be removed and excessed.



Figure 15. Example of peripheral remote control unit for solar simulators on Chamber B to be removed and excessed.

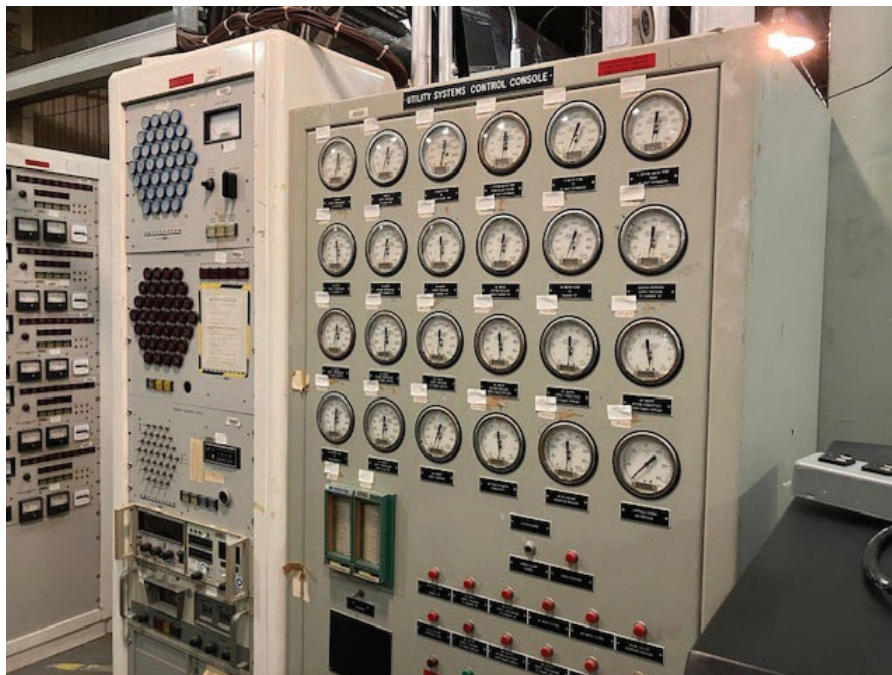


Figure 16. Peripheral control consoles for Chamber B to be removed and excessed.



Figure 17. Additional peripheral control consoles for Chamber B to be removed and excessed.



Figure 18. Additional peripheral control consoles for Chamber B to be removed and excessed.



Figure 19. Additional peripheral control consoles for Chamber B to be removed and excessed.



Figure 20. Additional peripheral control consoles for Chamber B to be removed and excessed.



Figure 21. Additional peripheral control consoles for Chamber B to be removed and excessed.



Figure 22. Peripheral control monitor for Chamber B to be removed and excessed.

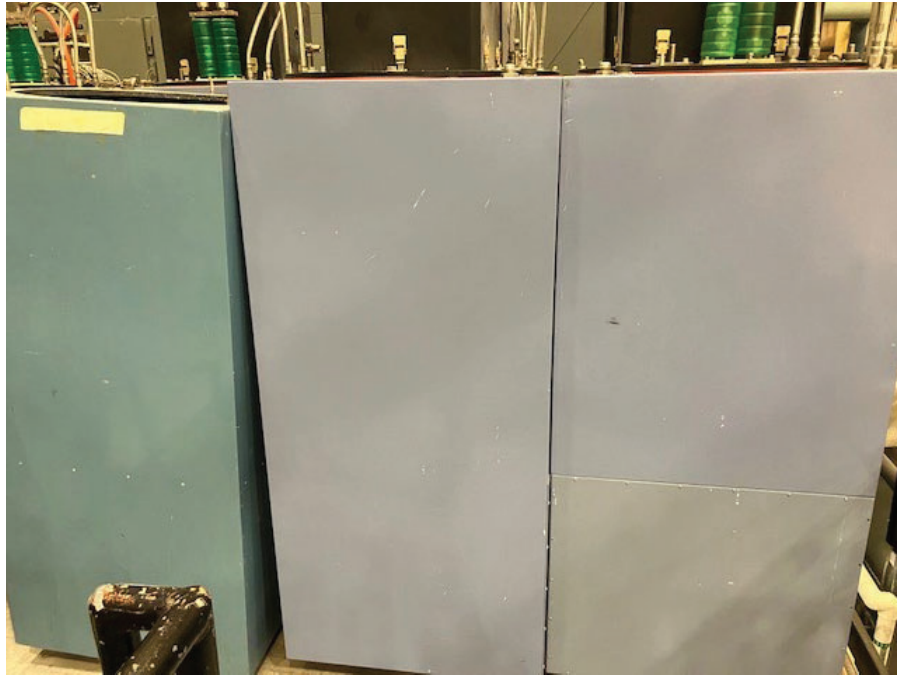


Figure 23. Miscellaneous obsolete equipment stored on platform to be removed and excessed.



Figure 24. Additional miscellaneous obsolete equipment stored on platform to be removed and excessed.



Figure 25. White metal catwalk on top of Chamber B to remain in place (blue solar simulators visible).



Figure 26. Mirrors for solar simulators on Chamber B, removed over 15 years ago, to be excessed.



Figure 27. Example of metal cover to be installed over existing penetrations after solar simulator removal, allowing for future equipment to be added without modifications to the pressure vessel.



Figure 28. Metal cover installed to cover existing penetration on Chamber A, for reference.

## Solar Simulator Photos and Schematics:



Figure 29. Solar simulator module xenon lamp source and collection optics housing showing removable panel on one side.

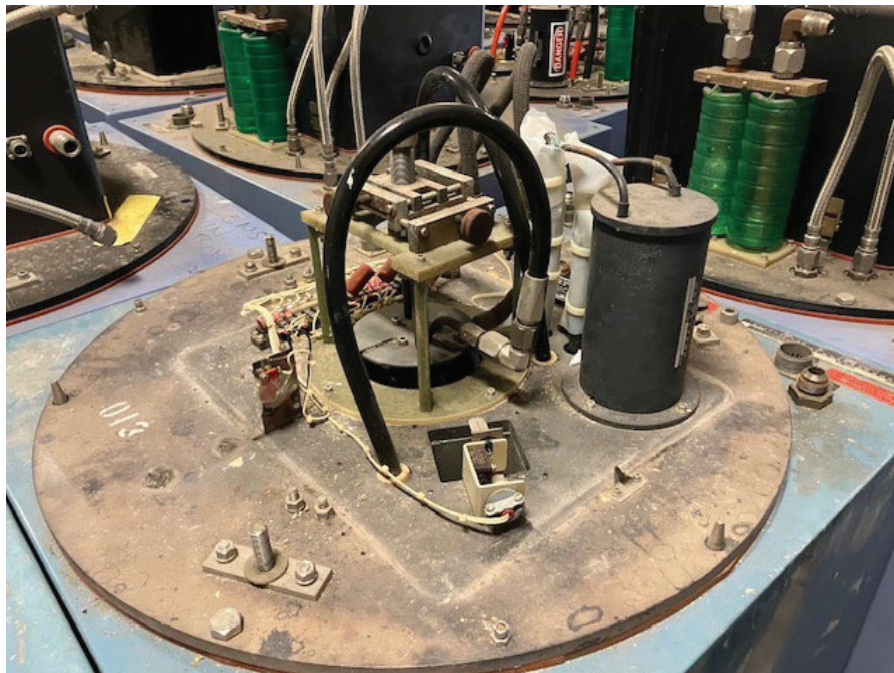


Figure 30. Source and collection optics housing (external to chamber) of solar simulator module with electronic elements on top.

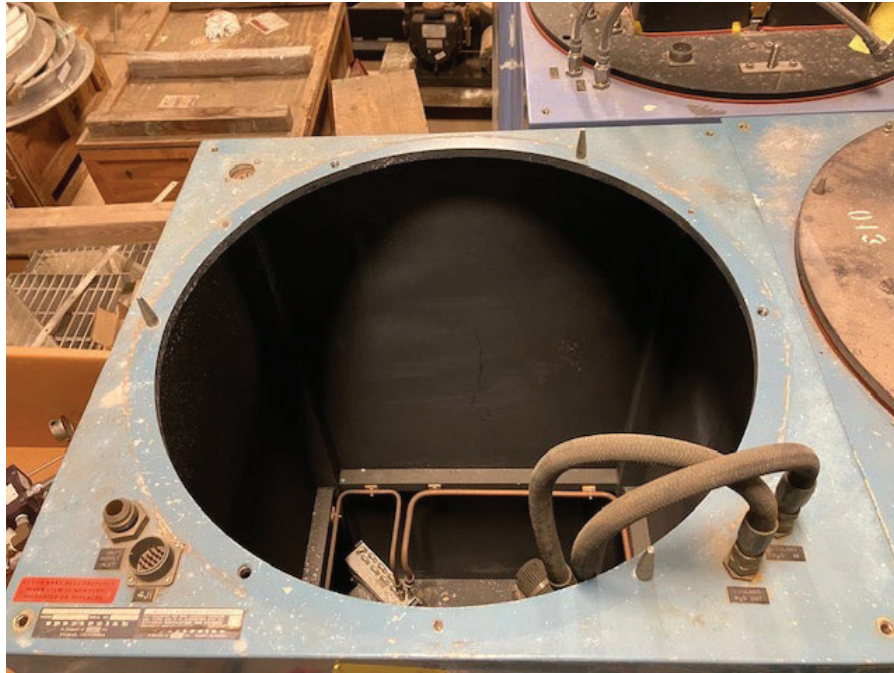


Figure 31. Top of source and collection optics housing of solar simulator module with electronic elements removed, allowing a view of the internal components.



Figure 32. Solar simulator module source and collection optics housing internal components, showing frame for xenon lamp source and collection optics.

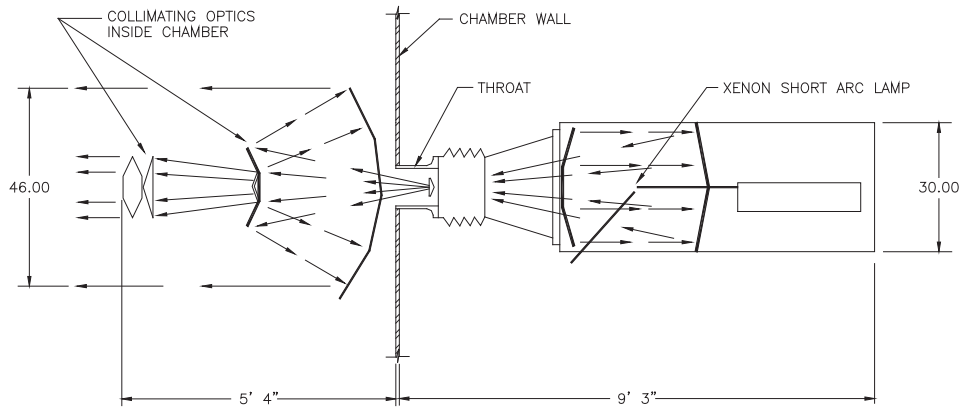


Figure 33. Solar simulator module schematic.

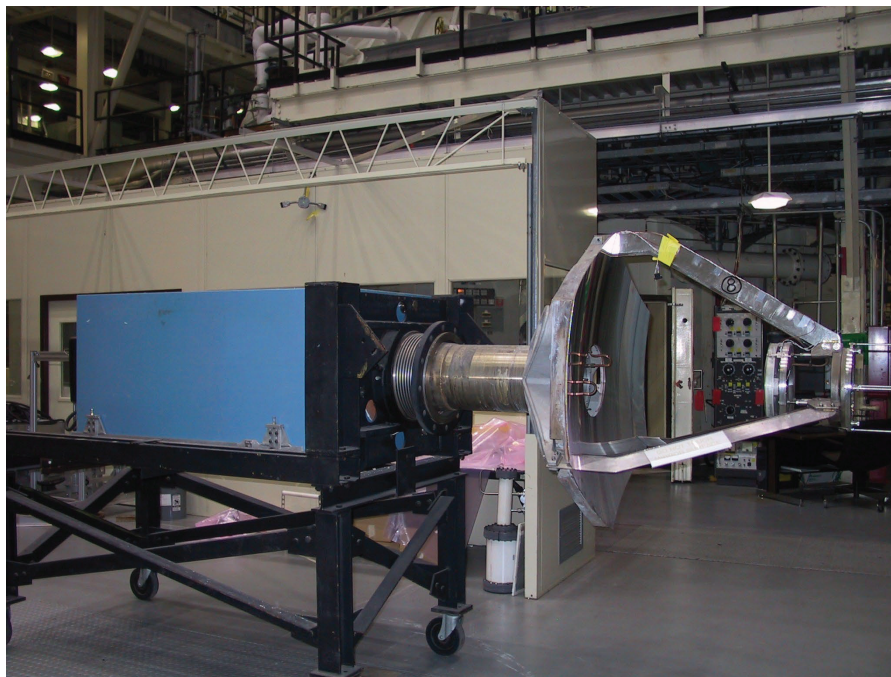


Figure 34. Typical solar simulator module assembly.