NPS Form 10-900
(7-81)

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
received
date entered

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic Space Environment Simulation Laboratory (SESL)

and/or common Space Environment Simulator Laboratory (SESL)

2. Location

street & number Lyndon B. Johnson Space Center ___ not for publication

city, town Houston ___ vicinity of **congressional district**

state Texas **code** 48 **county** Harris **code** 201

3. Classification

Category	Ownership	Status	Present Use	
___ district	_X_ public	___ occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
_X_ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	_X_ yes: restricted	___ government	___ scientific
	___ being considered	___ yes: unrestricted	___ industrial	___ transportation
		___ no	___ military	_X_ other: Inactive

4. Owner of Property

name National Aeronautics and Space Administration (NASA)

street & number

city, town Washington ___ vicinity of **state** D.C. 20546

5. Location of Legal Description

courthouse, registry of deeds, etc. National Aeronuatics and Space Administration (NASA)

street & number Real Property Management Office Code NXG

city, town Washington **state** D.C. 20546

6. Representation in Existing Surveys

title None **has this property been determined eligible?** ___ yes ___ no

date ___ federal ___ state ___ county ___ local

depository for survey records

city, town **state**

7. Description

Condition		Check one	Check one
X excellent	___ deteriorated	X unaltered	X original site
___ good	___ ruins	___ altered	___ moved date _____
___ fair	___ unexposed		

Describe the present and original (if known) physical appearance

The Space Environment Simulation Laboratory (SESL) is in building 32 at the Lyndon B. Johnson Space Center (JSC) in Houston, Texas. The SESL contains two large man-rated chambers, instrumentation and data systems, and support facilities.

Chamber A is the largest of the JSC thermal-vacuum test facilities. Its usable test volume and high-fidelity space simulation capabilities are adaptable to thermal-vacuum tests of a wide variety of test articles.

The major structural elements of the chamber are the rotatable floor, the 40 foot diameter access door, and the dual manlocks at the floor level and at the 31 foot level.

The chamber floor, which is 45 feet in diameter, can be rotated by manual control $\pm$ 180° about its vertical axis at continuously variable angular velocities up to a maximum of 0.8 rpm.

Test articles are normally inserted into the chamber by means of overhead cranes and a dolly and track structure that extends from the high-bay area into the chamber. Two 100,000 lb cranes are used outside the chamber and four independently operated 50,000 lb cranes, lowered through removable sections of the top head, are employed inside the chamber.

The dual manlocks provide a means for the test crew to move from ambient air pressure to the thermal-vacuum environment and back. They also provide for the maintenance of rescue crewmen at convenient intermediate pressures during manned test operations. When the inner door is bolted, either of the manlocks can be used as an altitude chamber for independent tests.

In Chamber A, a test article can be irradiated from either the top or the side with high-fidelity solar simulation. The solar simulation modules can be arranged in various dimensional configurations to meet most requirements. This chamber can also generate thermal plasmas simulating those found in low Earth orbit.

Chamber B, the smaller man-rated chamber, has the same basic capability as Chamber A and can accommodate a variety of smaller scale tests more economically and with faster response. Major structural elements of the chamber are the removable top head, the fixed chamber floor, and a dual manlock at the floor level.

The load-bearing floor area is 20 feet in diameter and will support a concentric load of 75,000 lb.

Two rolling bridge cranes with a capacity of 100 000 lb. are used to remove the chamber top and to insert large test articles.

The dual manlock provides easy access to the test articles as well as a means of transporting test crewmen to the test environment and back during manned tests. The manlock can also be used as an altitude chamber for independent tests. In addition, one manlock is equipped with a water deluge system and other features that permit its use for manned operations with oxygen-rich residual atmospheres.

A solar simulation array, mounted on the top head, is modular in design to facilitate changes in location and beam size to accommodate test requirements.

The solar simulation modules are on-axis with xenon lamp sources. The source and collection optics are outside the chamber, with the collimating optics inside the chamber. Solar incident angles other than vertical can be achieved by installing mirrors in the chamber to redirect the solar beam.[1]

Only Chambers A and B are within the boundary of the National Historic Landmark.

8. Significance

Period	Areas of Significance—Check and justify below				
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion	
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science	
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture	
___ 1600–1699	___ architecture	___ education	___ military	___ social/ humanitarian	
___ 1700–1799	___ art	X engineering	___ music	___ theater	
___ 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	___ transportation	
X 1900–	___ communications	___ industry	___ politics/government	X other (specify) Space Exploration	
		___ invention			

Specific dates 1965-Present **Builder/Architect** NASA

Statement of Significance (in one paragraph)

The Space Environment Simulation Laboratory (SESL) has a significant association with the manned spacecraft program of the United States. The SESL was designed, built, and used to conduct thermal-vacuum testing for all United States manned spacecraft of the Apollo-era. The large size of both chambers in the SESL meant that full scale flight hardware could be tested for a variety of design and development problems involving such factors as operating temperatures, fluid leak rates, changes in absorptive or emissive properties of thermal coatings and other materials. This testing was absolutely essential to man rate flight hardware. The safety of the astronauts and the success of the manned space program depended on information that resulted from these tests in the SESL.

Since it was constructed in 1965, the SESL has tested all Apollo command and service modules, Apollo lunar modules, spacesuits for extra-vehicular activity, the Skylab/Apollo telescope mount system, various Space Shuttle systems, the Apollo/Soyuz docking module, and various large scale scientific satellite systems such as the parabolic reflector subsystem of the Applications Technology Satellite. The thermal vacuum testing done at the SESL since 1965 has been a significant factor contributing to the success of both the manned and unmanned space program of the United States.

Footnotes

1. Thermal Vacuum Laboratories User Guide (Houston, Texas: Lyndon B. Johnson Space Center, 1981), pp. 4-5.

Bibliography

Brooks, Courtney G., Grimwood, James M., and Swenson, Loyd S. Chariots for Apollo: A History of Manned Lunar Spacecraft. Washington, D.C.: National Aeronautics and Space Administration, 1979.

Brooks, Courtney G., Ertel, Ivan D., and Newkirk, Roland W. The Apollo Spacecraft: A Chronology Vol. IV. Washington, D.C.: National Aeronautics and Space Administration, 1978.

Major Test Facilities of the Engineering and Development Directorate. Houston, Texas: Manned Spacecraft Center, 1966.

Technical Facilities Catalog Vol. II. Washington, D.C.: National Aeronautics and Space Administration, 1974.

Thermal Vacuum Laboratories User Guide. Houston, Texas: Lyndon B. Johnson Space Center, 1981.

9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acreage of nominated property Less than 1 acre

Quadrangle name League City **Quadrangle scale** 1:24,000

UMT References

	Zone	Easting	Northing
A	15	295700	3271740
B			
C			
D			
E			
F			
G			
H			

Verbal boundary description and justification

The boundary of the Space Environmental Simulation Laboratory is defined by the outside perimeters of both Chambers A and B located within Building 32 at the Lyndon B. Johnson Space Center.

List all states and counties for properties overlapping state or county boundaries

state	code	county	code
state	code	county	code

11. Form Prepared By

name/title Harry A. Butowsky

organization National Park Service **date** May 15, 1984

street & number Division of History **telephone** (202) 343-8168

city or town Washington, D.C. 20240 **state**

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

___ national ___ state ___ local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature

title **date**

For NPS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest: **date**

Chief of Registration