Appendix C: Criteria Used to Determine Historic Property Eligibility for the Space Shuttle Assets

EVALUATING HISTORIC RESOURCES ASSOCIATED WITH THE SPACE SHUTTLE PROGRAM: CRITERIA OF ELIGIBILITY FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES (NRHP)

Purpose

A "new era for the U.S. Space Program" began on February 13, 1969, when President Richard Nixon established the Space Task Group (STG). The purpose of this committee was to conduct a study to recommend a future course for the U.S. Space Program. Three years later, on January 5, 1972, the Space Shuttle Program was initiated in a speech delivered by President Nixon. During this speech, Nixon outlined the end of the Apollo era and the future of a reusable space flight vehicle, which would allow the U.S. to construct Space Station by carrying cargo to and from outer space. Subsequently, the end of the Space Shuttle Program was announced in a speech delivered by President George W. Bush in January 2004. Although plans for space exploration would advance, the technology of the Space Shuttle and its associated facilities would change or end by 2010. The significance of the Space Shuttle was noted by the National Park Service (NPS) in the 1998 National Register Bulletin, *Guidelines for Evaluating and Documenting Historic Aviation Properties.* The following excerpt is from that bulletin.

> The Space Shuttle was the U.S. space program's next generation. Key aspects of the Shuttle's design and performance were based on a rocket-powered space plane, the X-15, the world's first transatmospheric vehicle. The Space Shuttle provided a new method of space flight, taking off like a rocket and landing like an airplane. The Space Shuttle Columbia, the first reusable manned spaceship, initiated the Space Shuttle flight program in April 1981, and a new era for the U.S. Space Program (Milbrooke 1998:12).

The historic values of this program, like the Apollo-era program which preceded it, are embodied in the facilities, that is; the buildings, structures and objects within the NASA centers. The purpose of this study is to identify the NASA-controlled facilities of local, state, and/or national significance in the historic context of the U.S. Space Shuttle Program, circa 1969 to 2010. Such facilities may include, but are not necessarily limited to, those used for research, development, design, testing, fabrication, and operations. NASA will also look at certain types resources that are not facilities and are considered "personal property" under federal regulations. These resources are typically large and while they may be mobile, are

also usually associated with a geographical location, An example of this type of resource are the Mobile Launch Platforms at the Kennedy Space Center.

The evaluation of facilities within the context of the Space Shuttle Program will, in part, proceed from earlier studies of the Apollo-era resources at various NASA centers. The first step in evaluating these facilities at the NASA Centers was to establish and describe the applicable historic contexts and subcontexts. The key reference relating to the Apollo program used in this assessment was the *Man In Space Theme Study*, completed in 1984 by the National Park Service. According to the study, the purpose was to evaluate:

> *All resources which relate to the theme of Man in Space and to recommend certain of those resources for designation as National Historic Landmarks.*
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> *The Man in Space Theme Study considered resources relating to the following general subthemes:*
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> *A. Technical Foundations before 1958*
> *B. The Effort to Land a Man on the Moon*
> *C. The Exploration of the Planets and Solar System*
> *D. The Role of Scientific and Communications Satellites*
>
> *The Theme Study considered the Space Program in an integrated fashion. In any given space mission thousands of scientists, technicians, and other support personnel were necessary to insure success. These support personnel performed vital work in a variety of ways using support facilities in many parts of the country. None of these personnel in all likelihood comprehended all aspects of each space mission, yet all were vital to the success of the program. Since individual missions lasted over many years and involved a wide variety of resources and people only a few managers at the National Aeronautics and Space Administration (NASA) were able to see all of the facets of the space program. It was this coordination, cooperation, and collaboration that enabled NASA to successfully manage the American Space Program. The theme study follows this same approach and attempts to identify, inasmuch as is possible, the surviving resources of those that were necessary to accomplish the goals of landing a man on the moon and exploring the earth, planets and solar system* (Butowsky 1984).

The National Register of Historic Places (NRHP) Criteria for Evaluation and Criteria Considerations

The significance of a cultural resource is evaluated in terms of the eligibility criteria for listing in the NRHP. The National Register Criteria for Evaluation, as described in 36 CFR Part 60.4, are as follows:

The quality of significance in American history, architecture, archeology, engineering and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

A. That are associated with events that have made a significant contribution to the broad patterns of history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield information important in prehistory or history.

The significance of historic buildings, structures, objects and districts is usually evaluated under Criterion A (association with historic events); Criterion B (association with important persons); or Criterion C (distinctive design or distinguishing characteristics as a whole). Often, more than one criterion will apply to historic resources.

Some types of cultural resources are not typically considered eligible for the NRHP. These resources are religious properties (A), moved properties (B), birthplaces and graves (C), cemeteries (D), reconstructed properties (E), commemorative properties (F), and properties that have achieved significance within the past fifty years (G). As a result, a resource may meet one or more NRHP criteria and still not be eligible unless special requirements are met. These requirements are called Criteria Considerations and are labeled A-G. Of relevance to the Space Shuttle Program study are Criteria Considerations B and G, as follows:

Criteria Consideration B: Moved Properties - *A property removed from its original or historically significant location can be eligible if it is significant primarily for architectural value or it is the surviving property most importantly associated with a historic person or event.*

Criteria Consideration G: Properties that have Achieved Significance within the Past 50 Years – *A property achieving significance within the last fifty years is eligible if it is of exceptional importance.*

<u>The Space Shuttle Program: Proposed NRHP Criteria for Evaluation and Criteria Considerations</u>

In order to qualify for listing in the NRHP under this study, resources must meet all of the following general registration requirements:

- Is real or personal property owned or controlled by NASA ;
- Was constructed, modified or used for the Space Shuttle Program between the years 1969 and 2010 (or the actual end of the Space Shuttle Program);
- Is classified as a structure, building, site, object, or district;
- Is eligible under one or more of the four NRHP Criteria. All properties considered eligible for listing under;

<u>Criterion A - Events</u>

- Must be of significance in reflecting the important events associated with the Space Shuttle Program during the period of significance (1969-2010); or,
- Must be distinguished as a place where significant program-level events occurred regarding the origins, operation and/or termination of the Space Shuttle Program; or

Criterion B - Significant Persons

- Must be associated with a person whose individual significance to the goals, missions, development and design of the Space Shuttle Program can be identified and documented; or
- Must be distinguished as a place where persons of significance to the Space Shuttle Program worked or trained; or
- Best represents the important achievements or the cumulative importance of prominent persons; or
- Has consequential association with a person who gained prominence relative to the Space Shuttle Program during the period of significance.

Criterion C – Design/Construction

- Was uniquely designed and constructed or modified to support the pre-launch testing, processing, launch and retrieval of the Space Shuttle and its associated payloads; or
- Reflects the historical mission of the Space Shuttle in terms of its unique design features without which the program would not have operated; or
- Reflects the distinctive progression of engineering and adaptive reuse from the Apollo-era to the Space Shuttle-era

Criterion D – Information Value

- As this criterion is primarily used for archeological sites and this document is focused on historic properties, it is inappropriate to use this criterion as a discriminator, therefore, it will not be a valid criterion for surveys used as part of the Space Shuttle Transition activities.

- Meets appropriate Criteria Considerations - Certain kinds of property that are not usually considered eligible for listing in the NRHP, although they may meet the NRHP Criteria stated above, will require special considerations. Such properties which might fall into this category are those that have been moved (Criterion Consideration B) or properties that have achieved significance within the past fifty years (Criterion Consideration G)

  - *B: Moved Properties* – Some historic resources of significance in the context of the Space Shuttle Program may meet Criteria Consideration B since they were designed to be moved. Thus, it is not required that they, or their integral components, be at their original location in order to retain integrity. These resources are generally significant for their engineering or are significant for their association with events or persons integral to the

Space Shuttle Program. However, objects removed from their original setting and that are now located within a museum are typically excluded from NRHP-listing as the change in setting and location diminishes the resources' historic integrity (NPS 1998:36).

- *G: Properties that have Achieved Significance within the Past 50 Years* – The entire Space Shuttle Program is less than 50 years old. Therefore, Criterion G cannot be a discriminator for determining eligibility, as some properties utilized by the Space Shuttle Program may be over 50 years old. Properties that are determined to possess exceptional significance in the context of the Space Shuttle Program that are less than 50-years old must meet Criteria Consideration G.

- Retains enough integrity to convey its historical significance. The NRHP recognizes seven aspects or qualities that, in various combinations, define integrity: location, setting, materials, design, workmanship, feeling, and association. However, many original NASA Apollo-era facilities, for example, have undergone major modification and are in active use supporting the Space Shuttle Program. As a general rule, in the case of highly technical and scientific facilities, "there should be continuity in function, and thus in integrity of design and materials, and there may always be integrity of association" (ACHP 1991:33).

Criteria of Eligibility by Property Type

The following twelve property types, and the associated National Register eligibility criteria, may be used in the evaluation of all NASA owned and controlled facilities at all NASA centers. Use of these categories will help narrow the list of eligible properties to those that have true significance in the overall context of the Space Shuttle Program. Many of the facilities may have already been designated as eligible under the Apollo program. The use of these criteria on those properties in no way negates their previous designations. Rather it adds to the historical context of those properties.

1. Resources Associated with Transportation: A variety of transportation resources were constructed and/or modified to support mission and launch operations in support of the Space Shuttle Program. These resources include roadways, bridges, Crawlerways, runways and landing facilities, helipads, and waterways. Special-use vehicles also are part of the transportation network. These include Payload Transporters, Crawler Transporters, Multi-use Mission Support Equipment (MMSE) Transporters, 747 Carrier Aircraft, the astrovan, External Tank barge and recovery vessels. In order to qualify for NRHP listing, transportation resources must meet one or more of the following criteria:

- Have been used for the transportation of unique objects, structures, or significant persons associated with Space Shuttle missions;
- Have been an essential component to the Space Shuttle missions, such that the program could not function without it;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed for the transportation of the Space Shuttle or its payloads;

- Have a direct historical association with the Space Shuttle (including the Orbiter, external tank and solid rocket boosters), or a significant person associated with the Space Shuttle Program;
- Must be examples of one of the identified subtypes: road-related resources, water-related resources, rail-related resources, and air-related resources.

2. Vehicle Processing Facilities: Vehicle processing facilities include those resources which are vital to the preparation of the launch vehicle for its mission. NASA vehicle processing facilities administer such operations as assembly, testing, checkout, refurbishment, and protective storage for launch vehicles and spacecrafts. Those processing facilities which are eligible for the NRHP were essential in support of the Space Shuttle Program and include but are not limited to the "Tile Shop", the Vehicle Assembly Building, the Orbiter Processing Facility, and Hangar AF. To be considered significant, the resources must have been essential to the successful completion of Space Shuttle missions. Vehicle processing facilities were specifically designed for processing the launch vehicle and, therefore, played a major role in nationally significant events related to space exploration. In order to qualify for listing, resources must:

- Have been an essential component to the processing of the Space Shuttle;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed or modified for the processing of the Space Shuttle for launch;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

3. Launch Operation Facilities: Launch Operation Facilities support all activities which occur after the launch vehicle has been processed up to the point of launch. These facilities provide a base and support structure for the transport and launching of the vehicle, service the launch vehicle at the launch pad, control pre-launch and launch operations, and launch the vehicle. These facilities include but are not limited to launch pads, Launch Control Center (LCC) Mobile Launch Platforms (MLPs), the Rotating Service Structure (RSS), and the Fixed Service Structure (FSS). Such facilities function as the primary resources integral to the launch of the Space Shuttle. In order to qualify for listing, resources must:

- Possess engineering importance and have facilitated nationally significant events associated with space travel;
- have been integral in pre-launch and launch preparation or the launching of the Space Shuttle;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed for the Space Shuttle;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program;

4. Mission Control Facilities: Support the design, development, planning, training and flight control operations for Space Shuttle flights. These facilities provide the infrastructure that allow the planning, training and flight operations processes necessary to support the Space Shuttle from the inception of requirements through the flight execution process. In order to qualify for listing, resources must have:

- Developed integrated flight crew and flight control plans, procedures, and training;
- Established simulators and flight control ground instrumentation;
- Configured Orbiter flight software;

- Contributed to the development and integration of spacecraft and payload support system.
- Provided onboard portable computer hardware and software for the Space Shuttle.

5. News Broadcast Facilities: Press facilities provide a primary site for news media activities at NASA-owned facilities. These broadcasting facilities were essential for relating to the American public news of the Space Shuttle Program to the nation and the world. In order to qualify for listing, resources must:

- Have been an integral facility in the dissemination of information about the Space Shuttle missions to the public;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed to broadcast information;
- Be associated with a significant person associated with the broadcast of Space Shuttle events;

6. Communication Facilities: Communication facilities in support of the Space Shuttle Program provide a vital site for instrumentation to receive, monitor, process, display and/ or record information from the space vehicle during test, launch, and/or flight. Significant communication facilities were designed specifically to house computers and computer-related technology vital to the Space Shuttle mission. In order to qualify for listing, resources must:

- Have been integral to the mission of the Space Shuttle;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed for the Space Shuttle missions;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

7. Engineering and Administrative Facilities*: Engineering and Administrative Facilities include those resources which are essential to the administrative, scientific, and engineering work of the Space Shuttle Program. Engineering and Administrative Facilities administer such operations as research and development, testing, fiscal matters, procurement, planning, central management, and facilities engineering and construction, as well as providing offices for associated contractors and laboratories for engineers and scientists. These facilities which qualify for listing under the Space Shuttle context must:*

- Be places, such as test facilities, that are directly associated with activities of significance which were associated with the development, component testing, implementation and termination of the Space Shuttle Program or missions;
- Be places where persons who made lasting achievements to the Space Shuttle Program worked or convened;
- Should clearly embody the distinctive characteristics of a type or method of construction.

8. Space Flight Vehicle (or Space Shuttle): This property type includes resources that comprise and/or facilitate the space flight vehicle or Space Shuttle. These include, but are not limited to, the Orbiter, Solid Rocket Booster (SRB), and External Tank (ET) as well as mockups of these components that were used for flight tests or other important development activities. In order to qualify for listing, resources must:

- Have been an integral component of the Space Shuttle Stack in its completed form, ready for space flight;
- Have been essential to the Space Shuttle missions and should clearly embody the distinctive aspect of reusability which reflects the goals of the Space Shuttle Program;
- Have been developed and used as test components used in preparation or evaluation for flight or flight tests;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

9. Manufacturing and Assembly Facilities: This property type includes facilities where major flight components were manufactured or assembled. These would include the manufacturing plants where the major components of the Space Shuttle vehicle were fabricated and assembled. In order to qualify, these facilities must:

- Have been an essential component to the manufacturing or assembling of the Space Shuttle;
- Have been constructed or modified to house this manufacturing or assembly facility exclusively;
- Embody a design that is unique to the Space Shuttle requirements;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

10. Resources Associated with the Training of Astronauts: This property type includes resources constructed or modified for the purpose of astronaut training and preparation for Space Shuttle missions. These facilities may include but are not limited to: processing facilities, neutral buoyancy tank, flight simulators and training aircraft. In order to qualify for listing, resources must:

- Have been designed and constructed, or modified, for the unique purpose of astronaut training and be directly associated with preparing astronauts for the completion of a Space Shuttle mission;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed for aeronautical training;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

11. Resources Associated with Space Flight Recovery: This property type includes resources that facilitate the recovery of the Space Flight Vehicle or Space Shuttle and its significant components after its return to Earth. These include, but are not limited to, runways, the Mate/De-mate Facility(s) and equipment, the Solid Rocket Booster Retrieval Ships (*Liberty* and *Freedom*), the Transporter and Wash Building, and the flume that brings the SRB to the building from the ships. These resources are essential to the recovery and

subsequent reuse of the Space Shuttle and are therefore a significant resource to the program as a whole. In order to qualify for listing, resources must:

- Have been integral to the recovery of the Space Shuttle and/or its significant components;
- Clearly embody the distinctive characteristics of a type or method of construction specifically designed for the recovery of the Space Shuttle;
- Have a direct historical association with the Space Shuttle, or a significant person associated with the Space Shuttle Program.

12. Resources Associated with Processing Payloads: This property type is limited to facilities where fully assembled payloads are readied for insertion in the Space Shuttle Orbiter. In order to qualify for listing, resources must have been used in the processing of payloads for the Space Shuttle. Eligibility is restricted to resources which:

- Represent outstanding achievements in technological, aeronautical or scientific research which would otherwise not have been attainable without the use of the Space Shuttle;
- Clearly embody the distinctive characteristics of a type or method of construction, and which reflect the distinctive aspect of reusability unique to the goals of the Space Shuttle Program;
- Have a direct historical association with the Space Shuttle, or a significant person associated with scientific and/or technological advancements of national significance made as part of the Space Shuttle Program.

Archaeological Resources – Environmental Impacts

Archaeological resources can be affected adversely by the demolition and/or removal of buildings and structures that are present on top of an archaeological site. Intrusive ground disturbance can often upset the original stratigraphy of the archaeological deposits, thereby dislocating important artifacts and features from their original context. In many cases, intrusive ground disturbance will damage or destroy such artifacts and features. Where known or recorded archaeological sites are present, ground disturbing demolition and/or removals should be avoided. Where this is not feasible and intrusive ground disturbance is required, the underlying archaeological resource must be evaluated for NRHP eligibility and, if found to be NRHP-eligible, then appropriate mitigation measures would be required by the DHR. Often, archaeological sites are mitigated through scientific, controlled archaeological excavations and subsequent analyses and reports.

Disposition of real property may have minimal to no impact on archaeological resources because no ground disturbance would take place. However, if an NRHP-eligible archaeological site were to be transferred out of federal ownership and protection, such a transfer would be considered an adverse effect under Section 106 or 110 of the NHPA, because a future owner could damage or destroy the archaeological resource during future development. In such cases where NRHP-eligible archaeological sites must be transferred out of federal control, a data recovery program would be conducted before the transfer. Alternatively, the property could be transferred with appropriate deed restrictions to protect the archaeological resource from future harm.

In the event that archaeological sites are discovered in the course of demolition or construction, state and federal laws regarding inadvertent discoveries would be followed.

The other alternatives for the disposition of real property, including storage and reutilization, would also have no impact on archaeological sites, because they would not involve surface or subsurface disturbance

Historic Resources – Environmental Impacts

It is expected that many of the buildings used in the SSP would be reused for other NASA projects with the same or similar functions. If additions or alterations to NRHP-eligible or listed facilities are required as part of the transition, then KSC would be obligated to follow standard federal and state procedures regarding modifications to NRHP properties. NASA's compliance with these procedures would be accomplished by adherence to the Section 106 process on the federal level and the DHR's historic preservation compliance review program.

Mothballing the resource; that is, maintaining its functionality for reuse by NASA at a later time, also would have a minimal impact on the buildings or facilities. This scenario assumes there would be no alterations to the building before or during the low-maintenance mothball period and that the mothballing would not lead to destruction of the resource through neglect.

If a historic property were demolished or removed, there would be major impacts to that building or structure. Section 106 procedures and consultation with the DHR would be required before demolition of the property could begin. The conveyance of a property to another federal agency, through release to the GSA, probably would have minimal impacts to the structure itself, but would cause considered an adverse effect on the historic significance of the building because it would no longer be used by NASA for the space-related activities from which it gained NRHP significance. The building also could be transferred to the private sector, instead of to another federal agency. If the building were transferred to the GSA or another entity, the new use would have to be evaluated for potential impacts to the significance of the historic resource.

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