

IG-97-005

**AUDIT
REPORT**

UTILIZATION OF SPACE HARBOR

JOHNSON SPACE CENTER

NOVEMBER 7, 1996



National Aeronautics and
Space Administration

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National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001



November 7, 1995

Reply to Attn of: **W**

TO: Johnson Space Center
ATTN: AA/Director

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final Audit Report
Utilization of Space Harbor
Assignment No. A-JS-95-006
Report No. IG-97-005

We have completed an audit of the Utilization of Space Harbor. The overall purpose of this audit was to determine whether Space Harbor is efficiently utilized and evaluate NASA's future requirements for the facility. Our review disclosed that Space Harbor is effectively used to support astronaut flight training for Shuttle landings. However, the review also showed that NASA could save \$2.7 million by eliminating Space Harbor as the Second Alternate Landing Site.

A written response to the recommendation was received on October 7, 1996. This response is summarized in the recommendation section of this report and is included in its entirety in the Appendix.

Management concurred with the report recommendation to reassess the need for White Sands Space Harbor (WSSH) to serve as a Second Alternate Landing Site. The Shuttle Program determined that maintaining WSSH as a landing site provides an insurance policy for contingencies when the two other sites are unusable. The decision to retain Space Harbor as the Second Alternate Landing Site means the projected cost savings of \$2.7 million over the life of the program will not be realized.

We have reviewed the data and management's response to the recommendation. Based on our review of the analysis provided by the Shuttle Program, we agree that the net annual investment (cost) of the program is \$182,000. We, therefore, consider this recommendation closed upon issuance of this final report.

If you have any questions or need additional information, please call Janice Goodnight at extension 34773; or Robert Wesolowski, Director, Audit Division-A, or me at (202) 358-1232.

Robert J. Wesolowski

for

Debra A. Guentzel

Enclosure

cc:

HQs-JM/P. Chait

JSC-BQ/P. Ritterhouse

MA/T. Holloway

RA/G. McCright

UTILIZATION OF SPACE HARBOR

JOHNSON SPACE CENTER
HOUSTON, TX

INTRODUCTION

NASA selected White Sands Space Harbor (WSSH) as a Shuttle pilot training area in early 1976 and it was configured to serve as an alternate orbiter landing site in 1981. The original 10,000-foot runway was lengthened to 35,000 feet and two other runways were added. NASA currently maintains 15,000 feet with 50-foot shoulders. The runways include landing aids necessary for a Shuttle landing and Shuttle Training Aircraft (STA) training. The only Shuttle landing was made in March 1982 by the Columbia. WSSH operates two shifts daily and is staffed by AlliedSignal employees, quality assurance personnel, Kennedy Space Center (KSC) employees during Shuttle missions, and crash and rescue personnel during STA operations. Its operations are funded primarily under the White Sands Test Facility contract. The STAs, however, operate out of El Paso International Airport and are funded and maintained under Flight Crew Operations.

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OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The overall purpose of this survey was to determine whether the Space Harbor is efficiently utilized and evaluate NASA's future requirements for the facility. The specific survey objectives were to determine:

- ▶ the necessity of Space Harbor functions and operations;
- ▶ whether resources allocated to Space Harbor are effectively used; and
- ▶ the future role of Space Harbor in support of space flight.

SCOPE AND METHODOLOGY

We performed our audit field work at Johnson Space Center (JSC) and WSSH between March 21, 1995, and March 31, 1996. The audit was performed in accordance with generally accepted government auditing standards. Our review identified current functions and operations and evaluated the role of Space Harbor in support of space flight. To accomplish our review, we:

- ▶ Travelled to WSSH to view the orbiter alternate landing site and support equipment. We met with NASA officials and contractor representatives to discuss Space Harbor site operations and toured the facilities.
- ▶ Visited NASA's radar monitoring station at Holloman Air Force Base to observe technicians tracking aircraft in and about White Sands Missile Range (WSMR) through radar feeds from the military.
- ▶ Joined a flight crew training official and observed STA training flights at WSSH over the three runways as they simulated landing at KSC, Edwards Air Force Base (EAFB), and a transatlantic abort site.
- ▶ Met with the WSSH site manager and reviewed NASA/Army and NASA/Air Force site use agreements.
- ▶ Reviewed the WSSH role in providing astronaut training. Astronauts are required to fly approximately 500 landing approaches prior to an actual Shuttle mission.

- ▶ Met with managers of Customer and Flight Integration to discuss manifest, flight payload requirements, and the WSSH role in support of Space Station.
- ▶ Reviewed cost history and budgetary support for WSSH operations including funding provided by KSC directly to WSMR for Shuttle support. We evaluated the cost impact of discontinuing orbiter support operations at WSSH.
- ▶ Reviewed the National Facilities Study to evaluate its findings and recommendations regarding WSSH. We contacted members of the facilities' task team to discuss findings, recommendations, and implementation.
- ▶ Reviewed and evaluated plans for use of WSSH in the development of the National Aerospace Plane Program, Assured Crew Return Vehicle, and Reusable Launch Vehicle Program.

***MANAGEMENT
CONTROLS REVIEWED***

WSSH is funded and managed under contract NAS9-95682 awarded to AlliedSignal. This contract is administered by JSC procurement officials and managed by JSC technical personnel located at White Sands. We reviewed NASA's organizational structure, contract language (statement of work), and the procurement guidelines that direct and provide oversight to the contractor. We reviewed White Sands' internal and external studies that highlight potential weaknesses to management controls.

OBSERVATION AND RECOMMENDATION

OVERALL EVALUATION

Our review disclosed that WSSH functions and operations are a necessary component of the astronaut STA training process, resources allocated to WSSH are consistent with NASA guidelines, and the future role of WSSH is limited in support of space flight. However, we also found that NASA is spending \$730,000 annually to maintain WSSH as a Second Alternate Landing Site while the Primary and First Alternate Sites could be adequate. The total cost to maintain WSSH as the Second Alternate Landing Site will exceed \$2.7 million through the year 2012, the estimated life of the Shuttle Program.

WSSH is necessary to effectively support astronaut flight training for Shuttle approach and landings. Runway 20 at WSSH is the only training location where astronaut pilots can fly approaches to the narrow, shorter-type runway typical of a transoceanic abort landing site. WSSH is a highly desirable STA training site and easily accessible from JSC. It is easy to schedule and the weather is consistently acceptable. The lake bed runways and landing aids provide numerous training options in a well-controlled range that ensures a safe environment. WSSH will play a vital role in the future of STA training.

Resources allocated to WSSH have been reduced due to funding constraints. NASA has reduced funding for WSSH Shuttle landing operations from approximately \$1.5 million annually during fiscal year (FY) 1994 to approximately \$730,000 for FY 1996. This reduction represents the elimination of several tracking and mission support requirements.

WSSH's role in support of other space flight activities is limited. The reusable launch vehicles X-33 and X-34, when completed, will be operated out of Dryden. Only the DC-XA aircraft is undergoing testing at WSSH. The International Space Station will fly in an orbit of 51.6 degrees inclination. Shuttle launches into this inclination will use Space Harbor as an alternate Abort-Once-Around (AOA) landing site and alternate End-of-Mission (EOM) site as opposed to the primary landing site.

NEED FOR WSSH AS SECOND ALTERNATE LANDING SITE

NASA management has not demonstrated the critical need for WSSH as a Second Alternate Landing Site. KSC and EAFB are both superior to WSSH for EOM sites and maintain the ground support equipment (GSE) required for post-landing operations. NASA

management has not adequately assessed whether a Second Alternate Landing Site is required. Consequently, NASA will incur approximately \$2.7 million for orbiter support operations that could otherwise be avoided.

National Space Transportation Systems Manual 07700, Volume X - Book 1, Section 3.4.1, Primary and First Alternate Landing Sites, classifies KSC and EAFB as the preferred EOM and AOA Sites. Further, KSC is classified as the Return to Launch Site. A significant amount of GSE is needed to support orbiter landings. Both, KSC and EAFB maintain the GSE required for post-landing operations, while WSSH requires GSE transport to site.

The National Facilities Study Report, dated April 29, 1994, recommended that the Office of Space Flight "downmode" or eliminate WSSH as an orbiter landing site. NASA reviewed WSSH support and subsequently reduced tracking and mission support expenditures. However, WSSH is still maintained as the Second Alternate Landing Site.

Because NASA management designated WSSH as a Second Alternate Landing Site, WSSH, with 24-hour notice, must be prepared to accept an orbiter landing during an in-flight emergency or as a Weather Alternate to the Primary Landing sites at KSC and EAFB during each Shuttle mission. Specific requirements include communication, tracking, and range scheduling support during every mission. Additionally, visual observation of the landing site is required for coordinating rescue and safety personnel along with emergency operations for other than normal landing and post-landing operations of the orbiter and conventional aircraft. Flight crew egress and ground crew ingress must also be provided in the event of a landing.

WSSH has only been used once for EOM during STS-3 in 1982. That landing resulted in severe engine and thruster contamination from the gypsum runway surface. Further, extensive mobilization of GSE was required to extract the orbiter after landing. NASA has since relocated the service pad and believes the risk of contamination has been significantly reduced.

We believe NASA management has not adequately assessed whether WSSH can be used effectively for orbiter landing operations. NASA only partially implemented the National Facilities Study recommendation to "downmode" WSSH as a landing site. Further, the NASA Shuttle Program requirements do not reflect the lack of use of the WSSH facility for orbiter landing operations and the inherent disadvantages of using the site for EOM.

NASA will incur approximately \$2.7 million to maintain WSSH as a Second Alternate Landing Site. To remain a Second Alternate Landing Site, WSSH must be prepared to accept an orbiter landing for an in-flight emergency or as a Weather Alternate to the Primary Landing Sites at KSC and EAFB during each Shuttle mission.

RECOMMENDATION

The Deputy Associate Administrator for Space Flight (Space Shuttle) should reassess the need for WSSH to serve as a Second Alternate Landing site based on future flight requirements and consider removing the designation of WSSH as alternate EOM site. The declassification of WSSH as an alternate EOM would result in \$182,000 annual cost savings and total savings of \$2.7 million through the year 2012, the projected life of the Shuttle Program.

Management's Response

We concur with the recommendation, and have reassessed the need to retain White Sands Space Harbor (WSSH) as a second alternate landing site and as an alternate end of mission (EOM) site. As stated in your report, Space Harbor is effectively used to support astronaut flight training for Shuttle landings. Our review determined the total annual costs currently paid by the Shuttle Program that would have to be absorbed by the Shuttle Training Aircraft (STA) Program to continue training support at WSSH is \$548,000.

The Shuttle Program has made the decision to maintain WSSH as an alternate landing site as an insurance policy which provides a landing site for contingencies when the other two EOM landing sites are unusable. The \$182,000 annual investment protects a \$3.0 Billion Orbiter, lives of the crew and the future of the Space Shuttle Program. A breakdown of the \$548,000 necessary to retain WSSH as a STA facility is found in the attached letter. With the decision to retain the current designation of WSSH, the projected savings of \$2.7 Million will not be realized.

***Evaluation of
Management's Response***

We have reviewed the information (Appendix) related to the recommendation and management's response. Based on our review of the analysis provided by management, we agree that NASA has accurately identified the annual net cost of \$182,000 for retaining the WSSH facility. The decision to retain WSSH as an insurance policy for contingencies eliminates the projected cost savings of \$2.7 million over the life of the program. As a result of management actions and response, we consider this recommendation closed.

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MAJOR CONTRIBUTORS TO THIS AUDIT

Johnson Space Center

Janice Goodnight, Program Director, Human Exploration and
Development of Space

Ellis Lee, Jr., Auditor-in-Charge

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



APPENDIX

OCT 17 1996

Reply to Attn of:

BQ-96-050

TO: W-JS/Audit Field Office Manager
FROM: AA/Director
SUBJECT: Management Response to OIG's Draft Audit Report, Utilization of Space Harbor, Johnson Space Center, A-JS-95-006

Enclosed is our response to the findings and recommendations contained in the subject audit report. Following an exit conference held May 14, 1996, additional information was provided to your office that determines the overall cost to NASA to retain Space Harbor as a second alternate landing site and as an alternate end of mission site. While the draft audit report does reflect the information for the projected cost savings of \$2.7 million over the life of the Shuttle Program, the annual cost should be \$182,000 in lieu of \$730,000 as stated in the report. We have taken this opportunity to reiterate the actual costs to the Space Shuttle Program.

As discussed with your office and the Office for Space Flight, we request that the final audit report be addressed to the Johnson Space Center, with the recommendation addressed to the Shuttle Program Manager. With actions already taken in response to the recommendation, and with your acceptance of those actions, we will consider the recommendation and the audit closed upon issuance of the final report. If you have any questions regarding this response, please contact Pat Ritterhouse at 713-483-4220.


George W. S. Abbey

Enclosure

cc:
MA/T. W. Holloway
HQ/JM/P. I. Chait
HQ/MA-8/S. Oswald
HQ/ME/H. Roseman

BQ/PRitterhouse:lsd:9/24/96:34220

**Management Response to OIG's Draft Audit Report, Utilization of Space Harbor,
Johnson Space Center, A-JS-95-006**

Audit Findings

"Our review disclosed that WSSH functions and operations are a necessary component of the astronaut STA training process, resources allocated to WSSH are consistent with NASA guidelines, and the future role of WSSH is limited in support of space flight. However, we also found that NASA is spending \$730,000 annually to maintain WSSH as a Second Alternate Landing site while the Primary and First Alternate sites could be adequate. The total cost to maintain WSSH as the Second Alternate Landing site will exceed \$2.7 million through the year 2012, the estimated life of the Shuttle Program."

Recommendation

"The Deputy Associate Administrator for Space Flight (Space Shuttle) should reassess the need for WSSH to serve as a Second Alternate Landing site based on future flight requirements and consider removing the designation of WSSH as alternate EOM site. The declassification of WSSH as an alternate EOM would result in \$730,000 annual cost savings and total savings of \$2.7 million through the year 2012, the projected life of the Shuttle Program."

JSC Comments

We concur with the recommendation, and have reassessed the need to retain White Sands Space Harbor (WSSH) as a second alternate landing site and as an alternate end of mission (EOM) site. As stated in your report, Space Harbor is effectively used to support astronaut flight training for Shuttle landings. Our review determined that the total annual costs currently paid by the Space Shuttle Program that would have to be absorbed by the Shuttle Training Aircraft (STA) Program to continue training support at WSSH is \$548,000. Thus, the difference between the \$730,000 annual costs now expended, and the \$548,000 that must continue, is a real cost of \$182,000 annually to retain the alternate EOM designation.

The Shuttle Program has made the decision to maintain WSSH as an alternate landing site as an insurance policy which provides a landing site for contingencies when the other two EOM landing sites are unusable. The \$182,000 annual investment protects a \$3.0 Billion Orbiter, lives of the crew and the future of the Space Shuttle Program. A breakdown of the \$548,000 necessary to retain WSSH as a STA facility is found in the attached letter. With the decision to retain the current designation of WSSH, the projected cost savings of \$2.7 Million will not be realized.

Enclosure

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



Reply to Attn of : MT-96-027

JUL 11 1996

TO: W-JS/Ellis Lee, Jr.
FROM: MT2/Deputy Manager, Customer and Flight Integration Office
SUBJECT: Review of White Sands Space Harbor (WSSH) A-JS-95-006

Your memorandum dated May 31, 1996, same subject, requested clarification of WSSH costs currently paid by the Space Shuttle Program that would have to be absorbed by the Shuttle Training Aircraft (STA) Program if the WSSH was no longer maintained as a Space Transportation System (STS) landing site. Your specific questions are answered below:

1. "Please explain why \$250K would be required for base operations in the absence of STS landing requirements, and itemize the individual cost elements."

The \$250K are costs that are paid to the White Sands Missile Range (WSMR) to assist in maintaining the runways in a suitable training condition and to keep the site accessible and habitable. The individual cost elements are itemized below.

	<u>Costs (\$K)</u>
Fuel	\$31
Sewage Collection (Service)	6
Potable Water (Service)	3
Heavy Equipment Operators (Labor)	148
Administrative Support (Labor)	<u>62</u>
Subtotal	\$250

The fuel is required for the vehicles/heavy equipment used to maintain the access roads and runways. The sewage collection and potable water are services required to support the operation of the facility. The operators are those personnel (2 MYE contracted through the range) required to operate the heavy equipment. The administrative support is for personnel required to dispatch these duties.

WSMR markup of 23 percent	<u>\$58</u>
Total	\$308

Attachment

2. "\$240K has been identified as STS requirements performed by the White Sands Test Facility contractor that would be retained by the STA program. Explain why these costs would be retained, and what are the individual cost elements?"

\$240K is the STS portion of the costs paid to Allied-Signal to maintain and operate the Space Shuttle landing aids and the support facilities. All of these landing aids are required for STA training; so if WSSH STS operations were deleted, the STA program would have to pick up these costs. The individual cost elements are itemized below.

	<u>Costs (\$K)</u>
Facility Maintenance (Heavy Equipment, WSSH Operations Control Center) and Landing Aids Maintenance and Operations (Xenon lights, MSBLS, TACAN, PAPI, Ball Bar, strobe lights, runway lighting, and runway markings):	\$220
Telecommunications Maintenance and Operations:	<u>20</u>
Total:	\$240

The total annual costs to be continued for STA Training Support if the STS Landing Support is eliminated at WSSH is \$548K.

If you have any questions, please call me at 483-3658, or Mr. Harold Loden at 483-0503.



T. R. Loe

- cc:
 JSC/MA/T. W. Holloway
 JSC/MA2/R. D. Dittmore
 JSC/MT/R. M. Swalin
 JSC/MT3/H. A. Loden
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