WHITE SANDS SPACE HARBOR AREA 1, RUNWAY 17/35
(Space Shuttle Landing Facility Area 1, Runway 17/35)
White Sands Missile Range
Extending 35,000 feet north from Range Road 10, beginning
approximately 4.2 miles northeast of intersection with Range Road 7
White Sands vicinity
Doña Ana County
New Mexico

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
U.S. Department of the Interior
Intermountain Regional Office
12795 Alameda Parkway
Denver, CO 80225-0287
HISTORIC AMERICAN ENGINEERING RECORD

WHITE SANDS SPACE HARBOR AREA 1, RUNWAY 17/35
(Space Shuttle Landing Facility Area 1, Runway 17/35)

HAER NO. NM-28-A

Location: White Sands Missile Range
Extending 35,000 feet north from Range Road 10, beginning approximately 4.2 miles northeast of intersection with Range Road 7
White Sands vicinity
Doña Ana County
New Mexico

U.S.G.S. 7.5 Minute Las Cruces, New Mexico, Quadrangle, Universal Transverse Mercator Coordinates (center of runways): E 32.944408 N 106.41993 Zone 13S, NAD 1983


Architect: Not known

Builder: Not known

Present Owner: Commander, U.S. Army White Sands Missile Range, New Mexico 88002-5018

Present Use: Vacant

Significance: Runway 17/35 was an essential component of the White Sands Space Harbor (WSSH) from 1976-2011. It has a direct association with the U.S. Space Shuttle Program (SSP) as the site of the landing of Space Transportation System (STS)-3 Columbia in March 1982; this is the only STS landing to take place outside Edwards Air Force Base in California and Kennedy Space Center in Florida. Runway 17/35 is considered to have national significance and is eligible for listing in the National Register of Historic Places (NRHP) under Criterion A for its association with the NASA SSP with a period of significance of 1976-2011. Because it
achieved significance within the past fifty years, Criterion Consideration G also applies.

Report
Prepared by: Robbie D. Jones, Senior Historian
New South Associates
118 South 11th Street
Nashville, TN  37206

Date: September 2013

LIST OF ACRONYMS

ABGR  Alamogordo Bombing and Gunnery Range
ABS  Anti-lock Braking System
ACHP  Advisory Council on Historic Preservation
ACI  Archaeological Consultants, Inc.
AIAA  American Institute of Aeronautics and Astronautics
APE  Area of Potential Effects
ATC  Air Traffic Control
BTT  Basic Training Target
CCC  Civilian Conservation Corps
CIT  California Institute of Technology
CONEX  Container Express
DC-X  Delta Clipper, Experimental
DoD  Department of Defense
GPS  Global Positioning System
HAFB  Holloman Air Force Base
HPO  Historic Preservation Officer
HPWG  Historic Preservation Working Group
HUB  Harbor Utility Building
IGS  Inter Glide Slope
IHA  InoMedic Health Applications, LLC
JSC  Johnson Space Center
KSC  Kennedy Space Center
LC  Launch Complex
MD  McDonnell Douglas
MSBLS  Microwave Scanning Beam Landing System
MSFC  Marshall Space Flight Center
NASA  National Aeronautics and Space Administration
NAVAIDS  Navigational Aids
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<thead>
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<tr>
<td>NEPA</td>
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<tr>
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<td>NHPA</td>
<td>National Historic Preservation Act</td>
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<tr>
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<td>Precision Approach Path Indicator</td>
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<td>SCAPE</td>
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<td>White Sands Missile Range</td>
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PART I. HISTORICAL INFORMATION

A. PHYSICAL HISTORY

1. DATE OF CONSTRUCTION

Runway 17/35 was constructed in 1976 at the former site of the original 10,000’ long Northrup Strip (1948-1963).

2. ENGINEER

Not known.

3. BUILDER/CONTRACTOR/SUPPLIER

Not known.

4. ORIGINAL PLANS

Not available.

5. ALTERATIONS AND ADDITIONS

The Runway is constructed of a compacted, natural gypsum surface and has been upgraded with modern navigational aids such as lighting and asphalt directional markings.

Once the runway was abandoned in 2011, routine maintenance ceased. Due to the harsh desert environment, the runway began to deteriorate quickly. The U.S. Army initiated occupation of WSSH in the summer of 2012.
PART II. STRUCTURAL/DESIGN INFORMATION

A. GENERAL DESCRIPTION

1. CHARACTER

Located in Area 1, the three natural surface gypsum runways, including Runway 17/35, are located within a 10-square mile area at WSSH. The runways are constructed of compacted gypsum sand with a 1-2" thick soft top layer and a hard-paced under layer. Due to the harsh desert environment, the runways required constant grading, repairs, and maintenance.

Each of the three runways duplicates a shuttle landing runway: 17/35 replicates the runway at Kennedy Space Center in Florida; 23/05 replicates the runway at Edwards Air Force Base in California; and 20/02 replicates the Transoceanic Abort Landing (TAL) runways in other countries.

Runways 17/35 and 23/05 cross each other at their approximate center lines, creating an X shaped site plan. Runway 17/35 is oriented along the north-south axis and 23/05 along the east-west axis. Both runways are 15,000' in length with 10,000' overruns at either end. Both runways are 300' wide with 300' wide shoulders flanking both sides. Navigational aids such as lighting and markings made of asphalt are located along the entire length of both runways.

At 1,000' into the overruns at runways 17 and 23 are two portable xenon light trailers, one on each side of the runway. At 7,500' into each overrun are the Nominal Aimpoints; at 6,500' into the overruns are the High-Wind Aimpoints. Both High-Wind Aimpoints in Runway 17/35 and the east Aimpoint of Runway 23/05 contain PAPI lights. At 2,000' into the actual runways, at each end, are Inner Glide Slope (IGS) Indicator Bar/Ball lights, except on Runway 05.

Runway 20/02 is located in the northwest quadrant created by the intersection of Runways 17/35 and 23/05. Runway 20/02 is oriented along a northeast-southwest axis and measures 19,800' in length and 200' in width. This runway does not feature overruns.
Navigational aids such as lighting and markings made of asphalt are located along its entire length. This runway does not have maintained overruns.

At 6,500' from the northeast end of runway 20 is the Nominal Aimpoint and at 5,500' is the High-Wind Aimpoint with PAPI lights. At 2,000' into the runway at the northeast end are the IGS Bar/Ball lights.

Within the northwest quadrant of the intersection of Runway 17/35 and 23/05 is a Helicopter Staging Area, consisting of a natural surface landing pad for eight helicopters. The pad features a row of H-shaped markings made of asphalt.

A shuttle tow-way, approximately 400' wide and constructed of compacted natural surface gypsum, begins at the southern terminus of Runway 17/35 and continues southwest along Range Road 10 where it terminates at the Deservice Pad in Area 2.

2. DESCRIPTION

The following is a more detailed description of Runway 17/35, also known as “Northrup-Kennedy.”

Runway 17/35 is 35,000' long and 900' wide runway with runway markings and navigational aids, including: two sets of Precision Approach Path Indicator (PAPI) lights, IGS Ball/Bar lights, touchdown markers, distance-to-go markers, xenon lights, nominal night strobes, and runway side lights.

This runway is the site of the original 10,000' long Northrup Strip (1948-1963), which is no longer extant. Runway 17/35 was constructed in 1976 to replicate the runway located at the Kennedy Space Center near Orlando, Florida. On March 31, 1982, the Space Shuttle Columbia landed on this runway. The runway was improved in 1988 with upgraded navigational aids such as lighting.

This runway served originally as the Orbiter backup landing site and the primary abort-once-around landing site, while Edwards AFB was the primarily landing facility. Once the decision was made
in 1984 for the Orbiter to land regularly at KSC, Edwards AFB became the primary backup and WSSH would be used only in the event that the shuttle could not land at KSC or Edwards AFB. After 1984, the primary use of the runways at WSSH was astronaut training. As it replicated the Orbiter’s primary landing site at KSC, Shuttle pilots would train on Runway 17/35 for their eventual landing of the actual Orbiter at KSC.

3. CONDITION OF FABRIC

When documented in March 2012, the Runway had been abandoned for over six months and was in fair condition. Due to the harsh desert environment and lack of maintenance, the runway had quickly deteriorated due to shifting sands, flash floods, and extreme temperature variations.

B. CONSTRUCTION

The Runway is constructed of compacted natural surface gypsum with landing aid markings made of asphalt.

C. MECHANICAL/OPERATION

The Runway does not feature any mechanical equipment, with the exception of navigational aids, which are documented separately.
PART III. SOURCES OF INFORMATION

A. ENGINEERING PLANS AND DRAWINGS

There are no known engineering plans or drawings of the Runway, however, plans were created around 1988 for construction of the asphalt navigational markings.

B. EARLY VIEWS AND HISTORICAL DATA

Historic photographs and maps of the WSSH, including the Runways, are very limited. Historical views can be found on pages 21-22, 25-30 of this document. All views are captioned and dated as available. The other historical data comes from a variety of sources cited in the Bibliography below.

The historic photographs and most of the historical data used in this documentation came from sources within WSTF and WSSH. Other more current imagery was obtained from the online WSTF Media Archive. Many of the original photographs have been donated to the WSMR Museum for digitization and curation. A body of recent aerial photographs were located and photocopied for inclusion in the HAER document to supplement the current ground photography.

C. INTERVIEWS

The following NASA and WSMR employees were interviewed for this documentation.

Robert E. Mitchell, WSTF Manager, September 2011.

Frank Offutt, WSSH Manager, September 2011.

Timothy Davis, WSTF Historic Preservation Officer, September 2011 and March 2012.

Bill Godby, WSMR Historic Preservation Officer, September 2011.

Doyle Piland, WSMR Museum Archivist, September 2011.

D. BIBLIOGRAPHY


_________. “NASA-Wide Survey and Evaluation of Historic Facilities in the Context of the U.S. Space Shuttle...


United States Army. “Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range,


E. LIKELY SOURCES NOT YET INVESTIGATED

Research was conducted at WSSH and WSTF using primary and secondary sources. Sources that were not investigated that may contain secondary information are archived at NASA’s Lyndon B. Johnson Space Center in Houston, Texas.

Additional oral history interviews with other engineers and technicians could also prove useful.
PART IV. PROJECT INFORMATION

In 2011-2012, New South Associates (NSA), under contract with InoMedic Health Applications, LLC (IHA) of Kennedy Space Center, Florida, and in coordination with NASA and the U.S. Army, conducted background research and a historic architecture survey of resources at the NASA WSSH. The survey included the documentation and evaluation for NRHP eligibility for seventy-two resources located in four distinct areas. Based on this research, NSA determined that no properties remain at WSSH from the period prior to NASA acquisition in 1963 except for the footprint of the packed gypsum Runway 17/35.¹

NSA recommended that the three NASA WSSH Runways and the Control Tower in Area 1 were individually eligible for listing in the NRHP and eligible as contributing resources to the “WSSH Shuttle Landing Facility District” under Criterion A and Criterion Consideration G for their association with the NASA SSP. None of the other sixty-eight inventoried properties were recommended individually eligible for listing in the NRHP due to lack of historical association with the NASA SSP or other historic contexts, lack of unique design or construction features, or insufficient integrity; however, nineteen of these properties, all of which lie within Area 1, were recommended as contributing resources to “WSSH Shuttle Landing Facility District,” even though they were not recommended individually eligible for the NRHP. The historic district contains a total of twenty-eight resources: twenty-three are contributing and five are non-contributing.

After formally ending the SSP on August 31, 2011, NASA disposed of the WSSH and released use of the property to the U.S. Army WSMR. The property transfer was a federal undertaking on federally-owned property and subject to compliance with Section 106 of the NRHP Act of 1966, as amended. The undertaking resulted in an Adverse Effect to the NRHP-eligible WSSH Shuttle

Landing Facility District. To mitigate the adverse effects, NASA completed HAER Level II documentation of the historic district and relocated the Control Tower to the WSMR Museum for conservation, exhibition, and public interpretation.

The mitigation plan was defined in a Memorandum of Agreement (MOA), executed between NASA, the U.S. Army, and the NM-SHPO in August 2012. The properties within the historic district were documented with large format photography in March 2012.
APPENDIX- LOCATION MAPS AND HISTORICAL VIEWS
Figure 1. Map of White Sands Military Reservation showing White Sands Space Harbor (Source: U.S. Army).
Figure 1. Map of WSSH showing location of Runway 17/35 in Area 1, which delineates the NRHP boundaries of the WSSH Shuttle Landing Facility District (Base Map Source: NASA WSTF).
Figure 3. Map of WSSH showing location of all three of the Runways, with latitude and longitude, 2008 (Source: NASA WSTF).
Figure 4A. Map of Northrup Strip, USGS Topographic Map, 1971.

Figure 4B. Map of WSSH, drawn by J.A. "Andy" Dorris under the direction of NASA engineer Dennis Perrin on March 7, 1980, showing location of Runway 17/35 and Runway 23/05 (Source: NASA WSTF).
Figure 5. Map of Runways, USGS Topographic Map, 1978.
Figure 6. Aerial view of a runway showing “Normal Aimpoint” Markings, November 1999 (Source: NASA WSTF).
Figure 7A. View of Space Shuttle Columbia landing on Runway 17/35 on March 30, 1982, looking West towards the San Andres Mountain Range (Source: NASA WSTF).

Figure 7B. View of Space Shuttle Columbia taking off atop a 747 on Runway 17/35 on April 6, 1982, looking East towards Sacramento Mountain Range (Source: NASA WSTF).
Figure 8. Drawing of Runway 17/35 Landing Aids Markings, ca.1988
(Source: NASA WSTF).
Figure 9. Drawing of Runway Landing Aids Markings, ca.1988
(Source: NASA WSTF).
Figure 10. Aerial view of Runway 17/35, looking South towards the San Andres Mountain Range, April 2007 (Source: NASA WSTF).
Figure 11. Aerial view of Intersection of Runways 17/35 and 23/05, looking West towards the San Andres Mountain Range, June 2006 (Source: NASA WSTF).
Figure 12. Aerial View of Runway 17/35 (foreground) and Runway 20/02 (background), looking Southwest towards the San Andres Mountains, 2006 (Source: NASA WSTF).
Figure 13. Aerial View of Intersection of Runway 17/35 and Runway 23/05 looking Southeast, 2007 (Source: NASA WSTF).
Figure 14. Aerial View of Runway 17/35 looking North towards the Sand Andres Mountains, 2006 (Source: NASA WSTF).
Figure 15A. View of Inner Glide Slope (IGS) Indicator Ball/Bar Lights on Runway 17/35, looking West towards San Andres Mountain Range, 2011.

Figure 15B. View of an original Northrup Airstrip sign now on display at the WSMR Museum (Source: NASA WSTF).
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David Diener, Photographer
March 27-29, 2012

NM-28-A-1 CONTEXT VIEW OF RUNWAYS LOOKING NORTHWEST TOWARDS SAN ANDRES MOUNTAINS AND HUB COMPLEX FROM SOUTH END OF RUNWAY 17/35.

NM-28-A-2 VIEW OF RUNWAY 17/35 LOOKING NORTH FROM SOUTH END WITH NAVIGATIONAL PAPI LIGHTS IN FOREGROUND.

NM-28-A-3 VIEW OF RUNWAY 17/35 LOOKING NORTH FROM WEST EDGE OF SOUTH END WITH ASPHALT NAVIGATIONAL MARKING IN FOREGROUND.

NM-28-A-4 VIEW OF RUNWAY 17/35 LOOKING NORTH FROM SOUTH END WITH ASPHALT DIRECTIONAL ARROW MARKING AND NAVIGATIONAL PAPI LIGHTS IN FOREGROUND.

NM-28-A-5 VIEW OF RUNWAY 17/35 LOOKING NORTH FROM SOUTH END WITH ASPHALT “35” MARKING IN FOREGROUND.

NM-28-A-6 VIEW OF RUNWAY 17/35 LOOKING SOUTH FROM NORTH END WITH ASPHALT “17” MARKING IN FOREGROUND AND SAN ANDRES MOUNTAINS IN BACKGROUND.

NM-28-A-7 VIEW OF RUNWAY 17/35 LOOKING NORTH FROM CENTER OF INTERSECTION OF RUNWAYS 17/35 AND 23/05 WITH ASPHALT EDGE MARKING IN FOREGROUND.

NM-28-A-8 VIEW OF RUNWAY 17/35 LOOKING SOUTH FROM CENTER OF INTERSECTION OF RUNWAYS 17/35 AND 23/05 WITH ASPHALT EDGE MARKING IN FOREGROUND AND SAN ANDRES MOUNTAINS IN BACKGROUND.

NM-28-A-9 VIEW OF WEST EDGE OF RUNWAY 17/35 LOOKING SOUTH FROM CENTER OF INTERSECTION OF RUNWAYS 17/35 AND 23/05 WITH ASPHALT EDGE MARKING IN FOREGROUND AND SAN ANDRES MOUNTAIN RANGE IN BACKGROUND.
NM-28-A-10  VIEW OF TYPICAL NAVIGATIONAL EDGE LIGHTS LOOKING NORTHWEST, MARKING WEST EDGE OF RUNWAY 17/35 AT MARKER 13 NORTH OF ACCESS ROAD 15.