



STATEMENT OF BASIS
SPACEFLIGHT TRACKING AND DATA NETWORK STATION
SWMU 86
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PURPOSE OF STATEMENT OF BASIS

This Statement of Basis (SB) has been developed to inform and give the public an opportunity to comment on a proposed remedy to address contamination at the Spaceflight Tracking and Data Network Station¹ (STDNS). A Kennedy Space Center (KSC) Remediation Team consisting of National Aeronautics and Space Administration (NASA) and Florida Department of Environmental Protection (FDEP) personnel has determined that the proposed remedy is cost effective and protective of human health and the environment. However, prior to implementation of the proposed remedy, the KSC Remediation Team would like to give an opportunity for the public to comment on the proposed remedy. At any time during the public comment period, the public may comment as explained in the "How Do You Participate" section of this SB. After the end of the public comment period, the KSC Remediation Team will review all comments and issues raised in the comments and determine if there is a need to modify the proposed remedy prior to implementation.

WHY IS A REMEDY NEEDED?

The results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) indicated that the volatile organic compounds (VOCs) benzene, chlorobenzene, and isopropyl benzene (listed in

Table 1) are present in groundwater at levels that could be potentially harmful to human health if this water is used for human consumption now or in the future.

HOW DO YOU PARTICIPATE?

The KSC Remediation Team solicits public review and comment on this SB before implementing the proposed remedy. The remedy for the STDNS will eventually be incorporated into the Hazardous and Solid Waste Amendments (HSWA) Permit for KSC. The public comment period for this SB and proposed remedy will begin on the date of publication for notice of availability of the SB in major local newspapers of general circulation and end 45 days thereafter.

If requested during the comment period, the KSC Remediation Team will hold a public meeting to respond to any oral comments or questions regarding the proposed remedy. To request

a hearing or provide comments, contact the following person in writing within the 45-day comment period:

The Cleanup Remedy
The proposed cleanup remedy for the STDNS includes the following components:
• Natural Attenuation of groundwater to remove contaminants through natural processes.
• Monitoring of groundwater to document water quality and contaminant levels.
• Implementation of institutional controls to prohibit the use of groundwater as a potable water supply.

¹ In accordance with RCRA §7004(b), this Statement of Basis summarizes the proposed remedy for the NASA STDNS Site. For detailed information on the site, consult the STDNS Site RFI Report, which is available for review at the information repository located at the North Brevard Library, 2121 South Hopkins Avenue, Titusville, FL 32780, telephone: (321) 264-5026.

Mr. John R. Armstrong, P.G.
 FDEP - Bureau of Waste Cleanup
 2600 Blair Stone Road, MS 4535
 Tallahassee, FL 32399-2400
 Email: John.Armstrong@dep.state.fl.us
 Telephone: (850) 245-8981
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The HSWA Permit, SB, and associated administrative file, including the RFI Report, will be available to the public for viewing and copying at:

NASA Document Library
 North Brevard Library
 2121 South Hopkins Avenue
 Titusville, FL 32780
 Telephone: (321) 264-5026

To request further information, you may contact one of the following people:

Mr. Harold Williams
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 Mail Code: TA-C3
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 E-mail: Harold.G.Williams@nasa.gov
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FACILITY DESCRIPTION

NASA established the KSC as the primary launch site for the space program. These operations have involved the use of toxic and hazardous materials. Under the RCRA and applicable HSWA permit (Permit No. FL6800014585) issued by the FDEP and/or

EPA, KSC was required to perform an investigation to determine the nature and extent of contamination from Solid Waste Management Unit (SWMU) No. 86, the STDNS.

SITE DESCRIPTION AND HISTORY

The STDNS (Figures 1 and 2) was constructed in 1966 to provide tracking, data acquisition, and pre-flight communication checks for both manned and unmanned spacecraft. The facility has been referred to as the Unified S-Band Station (S-BAND) and the Merritt Island Launch Annex (MILA). Operations at the STDNS are classified as hazardous due to the use of radio frequency/microwave-producing equipment and equipment operating over frequencies which pose potentially hazardous sources of non-ionizing radiation (RF radiation). Since the Apollo Program, the station has evolved into a multi-purpose communications center. The STDNS allows for receiving and transmitting voice, tracking, telemetry, television, and command data to a spacecraft. The STDNS operates two 30-foot-diameter dish antennas and several other antennas which provide tracking information for the Space Shuttle and other unmanned spacecraft.

Records from the KSC Real Property office indicate that fourteen structures were constructed from 1966 to 1992 at the STDNS facility. Facilities that have been or are currently located at the Site include the Operations Building (M5-1494), AN-Power Building (M5-1444), Hydromechanical Building (M5-1544), Collimation Tower Equipment Building (M5-791), Sewage Treatment Plant (STP) Number 11 (M5-1494A), Transmitter Building (M5-1545), TDRS Antenna Site (M5-1695), Engineering Support Building (M5-1495), Hazardous Waste Staging Facility (M5-1594), Gate House (M5-1394), Lift Truck Shelter (M5-1595), Support Service Building (M5-1443), Backup Generator

Building (M5-1494B), and MILA Relay System Building (M5-1546). A 25,000-gallon aboveground storage tank (AST) containing diesel fuel is also located approximately 30 feet north of the AN-Power Building. A secondary concrete containment structure was installed around the AST in 1992. Prior to 1992, containment consisted of an earthen dike surrounding the tank.

The 1962 aerial photograph indicates that the area was undeveloped prior to the construction of the STDNS. The site is currently surrounded by a chain link security fence with a guard gate.

Investigations conducted at the STDNS include:

- May 1990: Soil samples were collected from the area surrounding the 25,000 gallon AST and the areas surrounding two 30-foot dish antennas south of the Operations Building (Antenna #1 and Antenna #2). The sampling was conducted due to concerns of possible contamination from diesel fuel and from paint chips from the sand-blasting and refurbishment of Antennas #1 and #2. Field screening results from samples collected around the AST indicated that excessively contaminated soil (OVA concentrations greater than 50 ppm for a diesel fuel source) was identified in this area. Analyzed constituents from samples collected near the antennas did not exceed screening criteria.
- June/July 1991: Soil and groundwater samples were collected near the 25,000 gallon AST. The laboratory results from the soil samples indicated that that analyzed constituents did not exceed screening criteria. The groundwater analytical data indicated that the concentrations of 1-methylnaphthalene, 2-methylnaphthalene, total hydrocarbons, benzene, ethylbenzene, naphthalene, and phenanthrene were above the FDEP groundwater cleanup target levels (GCTLs).
- January 1992: A soil vapor survey was conducted in the area of the 25,000-gallon AST to refine the extent of the soil contamination. OVA field screening revealed excessively contaminated soil, with the highest OVA readings near the southwestern corner of the AST.
- March/May 1992: In March 1992, a containment area was constructed for the 25,000 gallon AST. In May 1992, four monitoring wells were installed around the AST containment area. Field screening using an OVA was conducted on samples collected from the four wells, and the concentrations of organic vapors were less than 50 ppm.
- August 1992: Contamination assessment activities continued in the area of the 25,000 gallon AST. During the secondary containment upgrade, further delineation of soil contamination was conducted, and 126 cubic yards of petroleum-affected soil were removed. Following completion of the secondary containment, four shallow monitoring wells were installed around the AST. Filtered groundwater samples were collected, and the results indicated that the concentration of lead exceeded the maximum contaminant level. However, the FDEP issued a Site Rehabilitation Completion Order (SRCO) for this area in October 1992.
- March to November 1995: In March 1995 an environmental assessment was conducted at the AN-Power Building to identify potential environmental impacts associated with the site. The investigation was completed to help develop strategies for future sampling events at the site. In No-

vember 1995, a preliminary assessment (PA) was conducted at the AN-Power Building to determine if historical operations at the facility may have impacted the soils, groundwater, and surface waters adjacent to the facility. Di-n-butylphthalate was detected in soil above the FDEP Soil Cleanup Target Level (SCTL) at a background location 350 feet north of the AN-Power Building, and TRPH was detected in soil above the SCTL at the location of a 250-gallon waste oil AST. The results of the groundwater analyses indicated that bis(2-ethylhexyl)phthalate was detected above the GCTL at a depth of 26 feet below land surface (bls) in a background sample located 350 feet north of the AN-Power Building. The analytical results for metals indicated that the concentrations of aluminum, iron, and manganese exceeded GCTLs.

- December 1995: STP-11 was removed from service at STDNS due to the high cost of splitting and refurbishing the existing percolation/evaporation pond as required by Chapter 62-610, F.A.C. The replacement of STP-11 with a lift station was also part of the regionalization of the KSC domestic wastewater systems. Prior to the removal of the STP, a KSC environmental check list was completed that indicated trench work and trench dewatering may be required during the removal and upgrades at the STP-11 location. No other environmental concerns were noted. While in operation, sampling was required of the influent and effluent at the STP. Flow, chlorine residual, and pH were collected daily. Total Suspended Solids (TSS) and CBOD were sampled monthly from the influent and effluent. Fecal coliforms were sampled monthly from the effluent. Reports were submitted to FDEP on a monthly basis as required under the permit to operate STP-11.

- August 1995-September 1995: From August to September 1995, tank closure activities were conducted during the removal of a 250-gallon used oil underground storage tank (UST) located at the southeast corner of the AN-Power Building. As part of the closure assessment, soil samples were collected for field screening using an OVA. No excessively contaminated soil was detected, and no visible staining was observed in the soil. A temporary monitoring well was installed in the center of the former tank location, and a groundwater sample was collected for laboratory analyses. Laboratory results indicated that none of the analyzed parameters exceeded screening criteria.
- August 1995-January 1996: From August 1995 to January 1996, tank closure activities were conducted during the removal of an abandoned 6,000 gallon UST located east of the Operations Building. During the tank removal, soils surrounding the tank were excavated and stockpiled. Soil and groundwater assessment activities were conducted as part of the tank closure. Field screening with an OVA revealed excessively contaminated soil between 2 and 6 feet bls from the tank pit. A composite soil sample was collected, and the concentration of TRPH exceeded the SCTL. A temporary monitoring well was installed at the center of the former tank location, and a groundwater sample was collected. Laboratory analytical results indicated that the analyzed constituents did not exceed screening criteria.
- April 1997: Additional tank closure activities were conducted at the former location of the 6,000 gallon UST. Soil was sampled from 12 locations in and around the former tank location at depths of 2, 4,

and 6 feet bls. One boring yielded an OVA response of 56 ppm at a depth of 4 feet bls. No other readings above 50 ppm were recorded.

- 2002: A SWMU Assessment (SA) was conducted at the site. Eleven Locations of Concern (LOCs) were identified in the SA and Confirmatory Sampling (CS) was recommended.
- 2004 through 2005: Three phases of CS were conducted, and the results indicated that the soil and shallow ground water at STDNS have been negatively impacted. PCBs were detected at concentrations exceeding the industrial, residential and/or leachability to groundwater SCTLs at three antenna locations and one transformer location. VOCs were detected in above GCTLs at the one transformer location.
- 2005 through 2006: RFI activities were conducted in multiple phases to identify, characterize, and delineate identified chemicals of potential concern (COPCs). Analytical data from the field investigation were used to estimate the potential human health risks at the Site. PCBs were detected in the soil at concentrations exceeding applicable human health screening criteria. An Interim Measure Work Plan was prepared and approved by the FDEP and EPA to excavate impacted soils exceeding the residential SCTL. The interim measure was implemented in December 2005, and the PCB-affected soil exceeding the screening criteria was excavated and properly disposed of off-site. An Interim Measure Report documenting the soil removal activities was submitted to the FDEP and EPA, and no further action for soil was approved by the FDEP in March 2006.

The concentrations of benzene, chlorobenzene, and isopropyl benzene in groundwater exceeded the GCTLs, but were below natural attenuation default concentrations (NADCs). These constituents were retained as COPCs.

SUMMARY OF SITE RISK

As part of the RFI activities a Preliminary Risk Evaluation (PRE) was completed in accordance with KSC's Remediation Team Risk Assessment Decision Process Document (DPD).

The Chemicals of Concern (COCs) identified for human health from the RFI are benzene, chlorobenzene, and isopropyl benzene in groundwater (Table 1). No COCs are identified for soil.

The only contributor to the lifetime excess cancer risk for groundwater at the STDNS facility is benzene, and the PRE estimated the lifetime excess cancer risk for the hypothetical future resident was 1.7×10^{-5} , which exceeds the threshold value of 1×10^{-6} used by FDEP. The contributors to the non-cancer risks (by target organ) for groundwater at the STDNS include chlorobenzene and isopropyl benzene. The PRE results for potential non-cancer risks indicated that chlorobenzene (6.8) and isopropyl benzene (1.4) each exceed the calculated total Hazard Quotient of 1.0 for multiple target organs used by FDEP. The total Hazard Index was 8.2, which is also above the threshold value of 1.0 used by FDEP to indicate potentially significant non-cancer risks. Both of these scenarios assume use of site groundwater as a drinking water source. However, there is no current use of site groundwater and no exposure or current risks.

WHAT ARE THE REMEDY OBJECTIVES AND LEVELS?

The remedial action objective (RAO) is to protect humans from exposure to groundwater contaminants that exceed FDEP residential-use cleanup target levels by restricting use of site groundwater as a drinking water source. Table 1 lists the COCs present in groundwater. The first column lists the chemical name, the second column lists the range of concentrations detected in groundwater, and the last column presents the FDEP cleanup target level.

Table 1

Site-Related Chemical of Concern (COC)	Range of Detections (µg/L)	Site-Specific Cleanup Level ¹ (µg/L)
Benzene	<0.23 to 17	1
Chlorobenzene	<0.15 to 680	100
Isopropyl benzene	<0.64 to 1.1	0.8

¹ Cleanup levels are GCTLs from Florida Administrative Code 62-777

REMEDIAL ALTERNATIVES FOR THE STDNS

Remedial alternatives are different combinations of plans or technologies to restrict access, and to contain or treat contamination to protect human health and the environment. Because of the low levels of groundwater contamination present at the STDNS only one remedy was considered for the STDNS.

Land Use Controls and Natural Attenuation with Long-Term Monitoring:

Under this alternative, material processes such as biological degradation, dispersion, advection, and adsorption will reduce COCs concentrations to cleanup levels over time. Groundwater will be regularly sampled and analyzed to monitor and document the decrease in contaminant concentrations. Data collected during the RFI indicated that natural attenuation mechanisms will likely reduce contaminant concentrations below cleanup levels within five years. In the long-term this alternative will meet the RAO. Ongoing evaluation of the alternative will be conducted to determine whether the remedy is working and provide an opportunity for change if necessary. In addition, institutional controls will be implemented to limit the use of groundwater as a drinking water source. NASA, EPA, and the FDEP have entered into a Memorandum of Agreement (MOA) that outlines how institutional controls will be managed at NASA². Controls will include periodic inspection, condition certification and agency notification. The area of the site that will be under institutional control is shown on Figure 2.

EVALUATION OF REMEDY

The selected remedy was evaluated to determine if it will comply with EPA’s four threshold criteria for corrective measures.

² By separate MOA effective February 23, 2001, with the EPA and FDEP, KSC, on behalf of NASA, agreed to implement Center-wide, certain periodic site inspections, condition certification, and agency notification procedures designed to ensure the maintenance by Center personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Center's substantial good faith compliance with the procedures called for herein, reasonable assurances would be provided to EPA and FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by NASA KSC, EPA and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Center's substantial good faith compliance with the specific LUC maintenance commitments reflected herein. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

The four threshold criteria for corrective measures are:

- overall protection of human health and the environment;
- attain media cleanup standards;
- control the sources of releases; and
- comply with standards for management of wastes.

Land Use Controls and Natural Attenuation with Long-Term Monitoring meet the threshold criteria and were determined to be the best overall approach with respect to the balancing criteria.

WHAT IMPACTS WOULD THE REMEDY HAVE ON THE LOCAL COMMUNITY?

There would be no impacts to the local community because groundwater is not used for potable water at KSC. The natural attenuation and long-term monitoring alternative includes administrative actions to limit the use of groundwater until the cleanup levels have been reached.

WHY DOES THE KSC REMEDIATION TEAM RECOMMEND THIS REMEDY?

The team recommends the proposed remedy because the naturally occurring processes observed at the site are sufficient for the removal of low concentrations of VOCs. The long-term monitoring will be used to monitor and document reduction in contamination concentrations to the cleanup target levels.

The institutional controls will also prevent exposure to contaminants prior to the cleanup levels being achieved. The proposed remedy meets the four general standards for corrective measures and was determined to be the best overall approach with respect to the balancing criteria.

NEXT STEPS

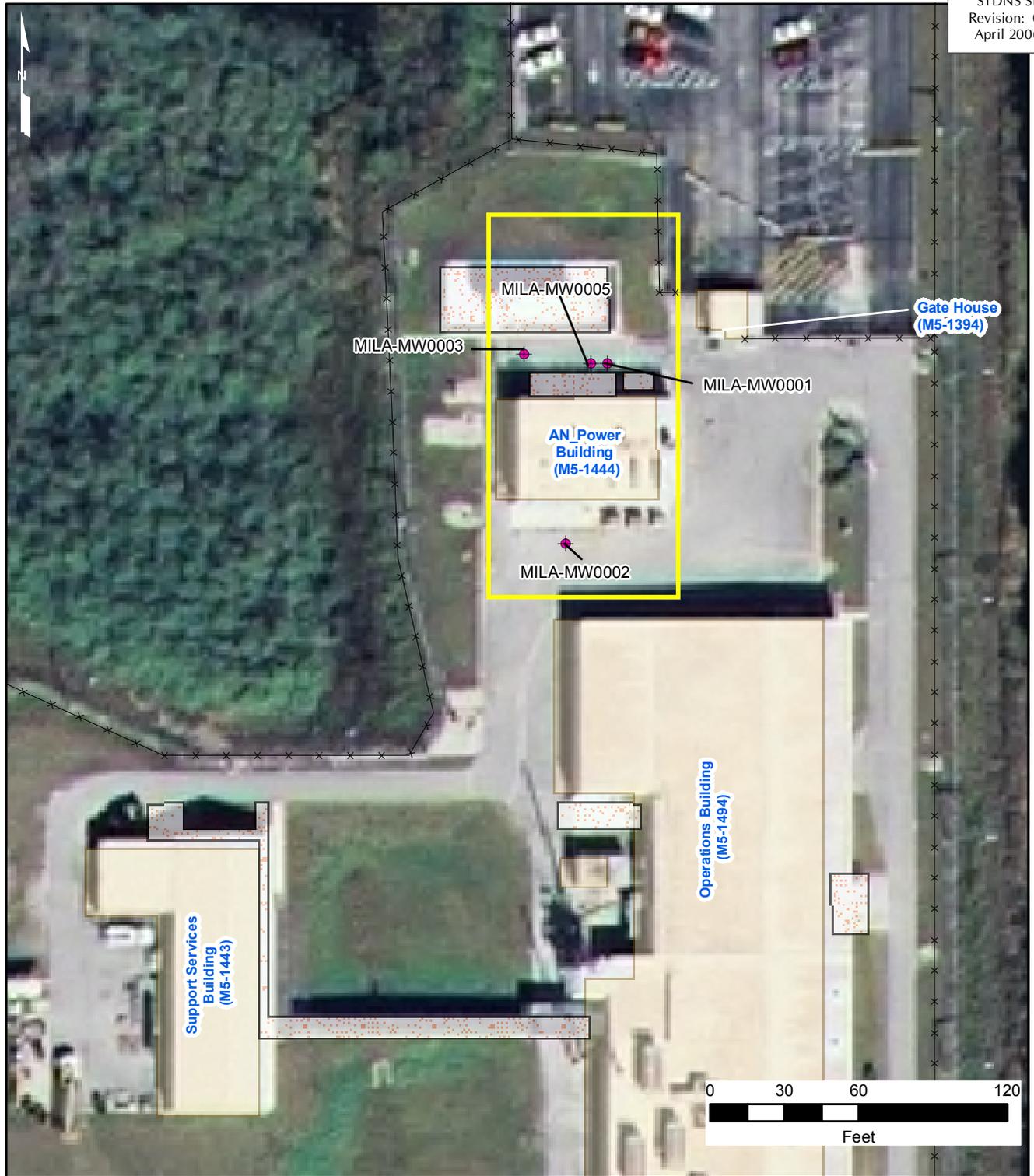
The KSC Remediation Team will review all comments on this SB to determine if the proposed remedy needs modification prior to implementation and prior to incorporating the proposed remedy into KSC's HSWA permit. If the proposed remedy is determined to be appropriate for implementation, then a long-term monitoring program will be initiated, and a Land Use Control Implementation Plan will be developed to incorporate the institutional controls at this site.



**Site Location Map
STDNS
Statement of Basis**

NASA Kennedy Space Center, Florida

Note:
KSC - Kennedy Space Center
NASA - National Aeronautics and Space Administration
SB - Statement of Basis
STDNS - Spaceflight Tracking and Data Network Station (MILA)
VAB - Vehicle Assembly Building



Legend

- Structure
- Groundwater LUC Area
- Fence
- Monitoring Well Location
- Concrete

Notes:
 LUC - Land Use Control
 SB - Statement of Basis
 STDNS - Spaceflight Tracking and Data Network Station (MILA)

**Site Plan
 STDNS
 Statement of Basis**

NASA Kennedy Space Center, Florida