

**National Aeronautics and Space Administration**

**NASA Advisory Council Task Force  
on  
International Space Station Operational Readiness**

May 13, 1999  
NASA Headquarters  
Washington, D.C.

**MEETING REPORT**



*Original signed by*  
Philip Cleary  
Executive Secretary

*Original signed by*  
Thomas P. Stafford  
Chairman

NASA ADVISORY COUNCIL TASK FORCE ON INTERNATIONAL SPACE STATION  
OPERATIONAL READINESS

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**Meeting Report**

**Assembly and Identification of Participants**

Mr. Philip Cleary, Task Force (TF) Executive Secretary, welcomed everyone to the STS-96 TF Readiness Assessment Open Meeting and identified the participants who were attending the meeting in person or via teleconference.

**Opening Remarks**

Lt. General Thomas P. Stafford, USAF (Ret.), Chairman of the TF, thanked everyone for taking part in the STS-96 readiness assessment, which Mr. Daniel Goldin, NASA Administrator, asked us to conduct. After reviewing the agenda, General Stafford requested that Major General Joe Engle, USAF (Ret.), begin the meeting with an overview of the STS-96 mission.

**STS-96 Mission Overview**

General Engle stated that STS-96 is currently scheduled to launch on May 20, 1999, at 9:32 EDT and will dock with the mated FGB and Node on May 22, 1999. (See attachment C for the STS-96 Day-by-Day activities). General Engle explained that the Double SpaceHab module, located in the aft end of the fuselage, will be used to carry the majority of the cargo slated for transfer to the International Space Station (ISS). The other items will be carried in the payload bay on a rack in front of the Double SpaceHab Module. The Orbiter will dock with the Node via a plus R-bar rendezvous to 400 feet, followed by a fly-around with final approach and docking from above the ISS providing unobstructed ISS (FGB) communication with Russian ground sites.

**Extravehicular Activity (EVA) Before Ingress**

EVA activities will be performed prior to the transfer and stowage of the logistics items. While the logistics transfer is a higher priority than the EVA activities, the Program Office determined that performing the EVA before ingress is more operationally advantageous for the following reasons:

- For nitrogen washout, a 24 hour pre-breathe at 10.2 psi is required prior to EVA.
- This depress (of the Orbiter) to 10.2 psi can be performed prior to and during rendezvous and docking with the Node, with the EVA commencing after docking and prior to opening the hatches into the Node/FGB. The Orbiter crew compartment is then the only volume requiring repress to 14.7 psi.
- If ingress into the Node/FGB is performed first, either the entire Orbiter-Node/FGB volume

must be de-pressurized (undesirable for FGB avionics cooling considerations) and then re-pressurized, or after ingress and hatch closure the Orbiter crew compartment must be de-pressurized to 10.2 psi with the 24 hour pre-breathe wait.

- An additional consideration is the Node warm-up requirement. Prior to docking, the Node/FGB must be in an attitude optimized for Z-axis docking by the Orbiter. After docking, the mated stack attitude can then be optimized for Node heating (needed prior to ingress) while the EVA is in progress.

Mr. Joe Cuzzupoli asked if this is the first time that the Shuttle has executed a reboost; what the altitude delta would be; and if the forward or aft Reaction Control System (RCS) jets would be used. General Engle explained that it is the first time for the shuttle to perform a reboost of the ISS elements. The altitude of reboost will depend on the actual Shuttle launch date, taking into consideration the decay of the stacked elements and RCS propellant margins. Regarding the RCS, forward and aft jets will be fired to place the thrust vector through the combined Orbiter/ISS center of gravity. Mr. Cuzzupoli questioned whether the stack would be in optimum attitude for reboost. General Engle said that the stack will be in optimum attitude for thermal control of the stack and that it will be maneuvered to proper attitude for reboost. Colonel Jim Adamson U.S. Army, (Ret.) added that the reboost is an optional maneuver and may not be necessary on this mission depending on the ISS's orbital parameters.

### **EVA/Intravehicular Activity (IVA) Cargo Transfer**

#### EVA

TF Technical Advisor Mark Thiessen reviewed the planned EVA that is scheduled to take place on the fourth day of the mission. EVA activities include:

- Installation of the Functional Cargo Block (FGB) Target Mask
- Transfer of the Orbital Replacement Unit (ORU) Transfer Devise (OTD)
- Transfer of the Strela parts to the PMA-2 location
- Transfer of U.S. EVA tools

#### IVA Cargo Transfer

Four IVA days are planned, beginning on the fifth flight day, in order to transfer 5000 pounds of logistics (3000 pounds of U.S hardware and 2000 pounds of Russian hardware). Mr. Thiessen noted that he and General Engle have been in the mock-up of the FGB at JSC to examine the placement of logistics and ensure that there are adequate paths for the crew to maneuver and traverse in the FGB while the logistics are being transferred and stowed. They determined that the translation path (36" by 54") provides sufficient room for crew maneuverability after the logistics are stowed.

Other IVA activities include:

- Replacement of the MIRT (a Russian charge/discharge integrated circuit that has previously caused problems with the battery charge/discharge on the FGB)
- Testing of the Volatile Removal Assembly (VRA) which is an experiment designed to demonstrate the capability of hardware to support the ISS Node 3 water recovery system

- Installation of the FGB mufflers in order to mitigate the acoustic levels in that element

Mr. Thiessen stated that the TF originally had some concerns with the amount of logistics being transferred on this mission. However, in October of 1998, the manifest was revised and some task requirements from flight 2A.1 were moved to flight 2A.2, thus alleviating most of the concerns regarding logistic transfer and stowage.

Mr. Miles Whitnah, NASA Headquarters, Office of Safety and Mission Assurance, stated that the five Contingency Water Containers scheduled for transfer have been certified and are ready for flight. Mr. Whitnah questioned the shelf life of the water being transferred to the ISS. Post meeting investigation revealed that the shelf life is greater than 2 years based on analysis of water taken from Shuttle-Mir missions.

### **External Tank (ET) Damage**

Colonel Adamson briefed the participants on the hail damage that the ET sustained during a storm on the weekend of May 8-9, 1999. While Discovery did not have any hail damage, there were 8-10 impact points reported on the ET's outer foam insulation. The largest was 2 ½ inches deep by 2 inches wide. There is some uncertainty about the total amount of damage because access above 195 feet on the pad is limited, precluding inspection of the entire tank.

The Program Office voiced the concern that ice may form in the areas of impact after tanking, possibly flying off during ascent and impacting the Orbiter. Aerodynamic modeling has indicated that while this is a possibility, analyses are still being conducted to determine the potential for ice to form in the impact points. Colonel Adamson stated that United Space Alliance has recommended to the Program Office that the Shuttle be rolled back into the Vehicle Assembly Building (VAB) in order to inspect and repair the damage. This would cause the launch to potentially be delayed for seven to ten days. The Program Office will have a meeting today (May 13, 1999) to determine if the launch will continue on schedule or be moved to a later date.

Mr. Benjamin Cosgrove asked if the concern stems from the potential for ice balls to hit the Shuttle windshield. Colonel Adamson stated that impact to the Shuttle windows is their worst case scenario. He explained that the modeling indicates that the windows are not certified to sustain the estimated energy level of the ice balls traveling at 800 to 1000 feet per second which could be compared to a 45-caliber bullet hitting the windshield.

General Stafford asked if Mr. Goldin has given any indication of a safety concern. Mr. Whitnah stated that Mr. Goldin addressed this issue earlier in the day and said that safety is the first

concern and if there is any doubt at all about the safety of the launch, then the Shuttle should be rolled back.

### **TF Readiness Assessment**

General Engle said that he believes the STS-96 readiness assessment letter to Mr. Goldin should

indicate that the flight and ground crews are fully trained and there are no mission safety or operational concerns with the exception of the external tank damage. General Stafford concurred with this recommendation and noted that his flight assessment letter to Mr. Goldin will state that there are no issues that would lead to recommending against launch at this time. General Stafford posed this recommendation to the Task Force and there were no objections. Furthermore, General Stafford directed General Engle and Mr. Thiessen to closely follow the External Tank damage analysis and launch decision process, and to keep him informed of the progress and status.

Mr. Cleary said that Mr. Goldin has requested that he receive the assessment letter by tomorrow (May 14). If a decision is reached to roll back and repair before May 14, then the letter will indicate concurrence. Should the decision be made later in the week, the TF will consider proposing an addendum to the original letter regarding the Program Office's decision.

There were no objections from the TF members. General Stafford thanked everyone for their participation and the meeting adjourned.

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Task Force on International Space Station Operational Readiness**

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**Task Force Membership**

Chairman

Lt. Gen. Thomas Stafford, USAF (Ret.)

Members

Col. James Adamson, U.S. Army (Ret.)  
Mr. Benjamin Cosgrove  
Mr. Joseph Cuzzupoli  
Dr. Charles Daniel  
Dr. John Fabian  
Dr. Craig Fischer  
Dr. Michael Greenfield  
Mr. J. Milt Heflin  
Dr. Daniel Heimerdinger  
Maj. Gen. Ralph Jacobson, USAF (Ret.)  
Dr. Andrew Thomas  
Dr. Ronald Merrell  
Captain John Young, USN (Ret.)

Technical Advisors

Maj. Gen. Joe Engle, USAF (Ret.)  
Mr. Mark Thiessen

Executive Secretary

Mr. Philip Cleary

Asst. Executive Secretary

Ms. Holly Stevens

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**Meeting Attendees**

Stafford Task Force Representatives

Lt. Gen. Thomas Stafford, USAF (Ret.) - via teleconference  
Col. James Adamson, U.S. Army (Ret.) - via teleconference  
Mr. Benjamin Cosgrove - via teleconference  
Mr. Joseph Cuzzupoli - via teleconference  
Dr. Charles Daniel - via teleconference  
Dr. John Fabian - via teleconference  
Dr. Craig Fischer - via teleconference  
Mr. J. Milt Heflin - via teleconference  
Dr. Daniel Heimerdinger - via teleconference  
Dr. Ronald Merrell - via teleconference  
Dr. Andrew Thomas, Astronaut Office – via teleconference

Stafford Task Force Technical Advisors

Maj. Gen. Joe Engle, USAF (Ret.) - via teleconference  
Mr. Mark Thiessen - via teleconference

Task Force Executive Secretary

Mr. Philip Cleary

Task Force Asst. Executive Secretary

Ms. Holly Stevens - via teleconference

NASA HQ

Mr. Miles Whitnah, Code Q  
Ms. Susan Minor, Office of the Inspector General