National Aeronautics and Space Administration

NASA Advisory Council Task Force
on the
Shuttle-Mir Rendezvous and Docking Missions

May 20, 1998
Johnson Space Center
Houston, Texas

MEETING REPORT

Original Signed by

Dennis McSweeney
Executive Secretary

Original Signed by

Thomas P. Stafford
Chairman

NASA ADVISORY COUNCIL TASK FORCE ON SHUTTLE-MIR RENDEZVOUS AND DOCKING MISSIONS

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Welcome and Opening Remarks

Lt. General Thomas P. Stafford, USAF (Ret.), Chairman of the Task Force, thanked the members for their participation in the meeting and throughout the assessment process of the Shuttle-Mir Rendezvous and Docking Missions. He pointed out that this would be the final Shuttle-Mir readiness assessment in which the Task Force would participate, as the launch of STS-91 constitutes the last flight of the joint program.

General Stafford stated that there do not appear to be any major safety or operational issues with either the Space Shuttle or the Mir at this time, but several minor issues related to the Shuttle will be reviewed:

- The status of the gas leak in the galley water line
- The status of the leak in the relief valve for fuel cell three, NASA's options, and how the leak may affect the transfer of water to Mir.
- The new docking mechanism on Shuttle, which will be used for the ISS

Mir Status

Jim Van Laak stated that the overall condition of Mir is good and that there are no significant issues regarding Mir crew safety. He reviewed several minor issues:

Mir Consumable Status

Because of the leak in the relief valve in the orbiter (which will be discussed in detail later in this report), there was concern about the amount of water that could be transferred to Mir. Some of the water contained in the Progress currently docked with Mir may not be recoverable due to a leak in one of the bladders. The next Progress vehicle is scheduled to rendezvous with Mir in August. It will carry with it more water and, depending on the amount of water transferred to Mir from STS-91, there should be ample water for the remaining two crewmembers onboard. All the other consumable margins will continue to be assessed, but appear to be adequate.

Propulsion Module

This past Spring, the propulsion module used for roll control on the end of the Mir boom was depleted of propellant. After a series of three EVAs, the new propulsion module was installed, fully integrated, and has been operating perfectly.

Mir Inspection

The STS-91 crew will include Russian Cosmonaut Valery Ryumin, Director of the Russian portion of the Shuttle-Mir Program since 1992. After the Orbiter docks with Mir, Ryumin will conduct an inspection to assess Mir's systems and observe any corrective actions which have been implemented. He is also going to take samples of corrosion to determine the extent that biological elements may be contributing to some of the corrosion on Mir.

Mir Motion Control System

There has been a recent failure of the 'left side' control panel for the Mir motion control system. This panel is used to switch to the control mode used for docking. The 'right side' control panel is a redundant panel, and is operating nominally. The laptop control panel for the TORU system can be reconfigured and used, if required. In addition, switching control modes can be accomplished by MCC-M.

New Docking System

David Hamilton reviewed the modifications for the Orbiter Docking System that will be used on the International Space Station and is being tested on STS-91. This is a new mechanism that will:

- Soften the loads generated during docking to limit ISS loading.
- Increase the roll and shear damping capability following capture.
- Increase the mated load capability.
- Expand the temperature limits.
- Add longer life and more dockings.
- Add resource transfer capability between the Orbiter and ISS.

Other design improvements include:

- Additional hook sensors to monitor each active hook's position.
- Fault tolerance enhancements.
- Improved avionics layout for ground maintenance.
- Certified longer vacuum exposure time to support more EVAs.

Additional enhancements and changes are listed in Attachment D, Presentation Materials.
The Program has certified that the new docking system is ready for flight.

Shuttle Status

Bill Gerstenmaier reviewed the Space Shuttle Discovery's status, focusing on the gas in the galley water line and the leak in the relief valve of fuel cell three.

Gas in the Galley Water Line

Mr. Gerstenmaier stated that during the initial functional testing, erratic "hot" dispense behavior and gas were found in the galley water line. The ambient inlet flow regulator was replaced and the behavior improved, but gas was still visible in both the hot and cold dispenses (less than 1 milliliter per 8 ounces). The galley was replaced, but the gas was still evident in similar quantities. It was determined that a new water testing method detected gas levels that had always been present in GSE-provided water. Therefore, no further action is required.

Fuel Cell #3 Relief Valve

During the Super Lightweight Tank (SLWT) tanking test, the fuel cell number three water relief valve leaked in small quantities (less than 1.2 pounds per hour). There is a possibility of changing the panel where the valve is located or perhaps going around the fuel cell and capping off the line. Capt. John Young, USN (Ret.) asked if there was a possibility of crimping the line, but Mr. Gerstenmaier stated that the tubing being used is likely to crack rather than seal.

There is a meeting scheduled later in the day (May 20, 1998) to study the ramifications of flying with the leak, i.e. effects of ice formations on trajectory, etc. Capt. Young suggested that if ice formation is a concern then perhaps the starboard door could be closed and the robotic arm could be used to knock and ice formation off of the orbiter. Mr. Gerstenmaier said that he would look into the feasibility of using the arm. The Task Force agreed to postpone sending Mr. Goldin and Dr. Parkinson the Task Force's readiness assessment of STS-91 until the Shuttle Program made its decision on whether to fly with the valve open or closed and until the Task Force had an opportunity to evaluate that decision.

Task Force Final Report

Mr. Dennis McSweeney, Executive Secretary to the Task Force, stated that the Shuttle-Mir Rendezvous and Docking Missions Task Force would work with Academician Utkin's Advisory Expert Council (AEC) to prepare a final report on Phase 1.

Conclusion

General Stafford concluded the meeting by expressing his gratitude for the outstanding work the Task Force has done throughout Phase 1 and looks forward to continuing the efforts through Phase 2.

Attachment A

Open Meeting Agenda
Task Force on Shuttle-Mir Rendezvous and Docking Missions
Johnson Space Center
20 May 1998, 13:00
Bldg. 1 Rm. 920L

1. Introduction	Gen. Stafford
2. Mir Status from Phase 1 Program	Jim Van Laak
• Mir Repair Status	
• Mir ECLSS	
• Mir Consumable Status	
• COMM	
3. Shuttle Status	Bill Gerstenmaier
• Galley	
• Docking System	
• Fuel Cell Relief Valve	
4. Mission Readiness	Task Force
5. Task Force Schedules	Dennis McSweeney

Attachment B

NASA ADVISORY COUNCIL TASK FORCE ON SHUTTLE-MIR RENDEZVOUS AND DOCKING MISSIONS

MEMBERSHIP

Chairman

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

Members

Col. James C. Adamson, USA (Ret.)
Mr. Joseph Cuzzupoli
Dr. Charles C. Daniel
Dr. John Fabian
Dr. Craig L. Fischer, MD
Dr. Michael A. Greenfield
Mr. James Heflin
Dr. Daniel J. Heimerdinger
Maj. Gen. Ralph Jacobson, USAF (Ret.)
Cdr. Michael Lopez-Alegria, USN
Dr. Ronald C. Merrell, MD
Capt. John Young, USN (Ret.)

Technical Advisors

Maj. Gen. Joe H. Engle, USAF (Ret.)
Mr. James C. Snowden

Executive Secretary

Mr. Dennis McSweeney

Asst. Executive Secretary

Ms. Holly Stevens

Attachment C

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Meeting Attendees

Task Force Members
Lt. General Thomas P. Stafford, USAF (Ret.), Task Force Chairman
Mr. James C. Adamson
Dr. Charles Daniel
Maj. General Joe Engle, USAF (Ret.), Technical Advisor
Dr. John Fabian
Dr. Michael Greenfield
Mr. Milt Heflin
Dr. Daniel Heimerdinger
Maj. General Ralph Jacobson, USAF (Ret.)
Cdr. Michael Lopez-Alegria, USN
Mr. Dennis McSweeney, Executive Secretary
Mr. Jim Snowden, Technical Advisor
Ms. Holly Stevens, Asst. Executive Secretary
Capt. John Young

NASA JSC
Mr. Jim Van Laak
Mr. Dave Hamilton
Mr. Stan Donahoe
Mr. James Medford
Mr. Bill Gerstenmaier