

NASA ADVISORY COUNCIL  
TASK FORCE ON THE SHUTTLE-MIR RENDEZVOUS AND DOCKING MISSIONS  
May 5, 1997  
NASA Headquarters  
Washington, DC

SUMMARY

The NASA Advisory Council Task Force on the Shuttle-Mir Rendezvous and Docking Missions met on May 5, 1997, from 2:00 p.m. to 4:15 p.m. in 7W31 at NASA Headquarters in Washington, D.C. Attachment A contains the agenda. Attachment B lists the Task Force members, NASA employees and members of the public in attendance. Attachment C lists the presentation materials on file.

Introductory Remarks

Lt. General Thomas P. Stafford, USAF (Ret.), Chairman of the Task Force, opened the meeting by welcoming the Task Force members meeting at NASA Headquarters and those participating via teleconference. He expressed his gratitude for the great strides the Task Force has made in the past month and thanked the team members who traveled to Russia for the great work they did there.

Status of STS-84 Preparations

The first presentation was by Bob Hinson, Deputy Chief Avionics Systems Division, and assigned temporarily to Headquarters from NASA's Johnson Space Center in Houston, Texas. STS-84 is currently set to launch on May 15th for a ten-day mission. He elaborated on several recent Shuttle anomalies that are being studied. The cause of the abnormal performance of fuel cell 2 which caused STS-83 to return early is still being evaluated. The suspected N<sub>2</sub> leak in the nose landing gear was determined to be the result of human error. The strut, depressurized and repressurized after each mission, was not repressurized. General Stafford asked why the strut is depressurized and repressurized after each mission, citing the fact that airplanes do not do that. Mr. Hinson stated that depress/repress is the normal procedure to check for leakage. Mr. Hinson also explained that elongated holes were detected on the orbiter where the debris canister attaches to the External Tank (ET) fittings. A one-flight repair has been designed and implemented to reduce this stress and the orbiter is deemed ready for flight.

Status of Mir 23 Mission

Marcie Swilley, Engineering Manager for the Space Station Headquarters Office, continued the presentations with the status of the Mir 23 mission. She reiterated that the Phase 1 Program objectives are to 1) learn to work with the Russians, merging engineering and operational approaches while developing a mutual understanding of design philosophies 2) reduce risk on ISS by building on Russian experience and

facilities and 3) experience long term space operations and early science research due to the availability of Mir for experimentation. Ms. Swilley continued by pointing out some of the Phase 1 lessons learned. These included the fact that operational flight rules for long duration spacecraft are different from sortie spacecraft and that Russian timeliners use a more flexible timeline for the crew. Also, the Soyuz return vehicle is a fully qualified and crew-rated vehicle for nominal transportation, not just for emergency evacuation. She stated that the decision to use the Soyuz is not determined by any certain procedures, but rather by the commander. Ms. Swilley added that maintenance is part of normal operation on the Mir and spare parts are kept onboard. Like Mir, ISS plans to bring and return parts by Shuttle. And finally, Mir experience has demonstrated that minimal continuous telemetry on a space station is not an inhibitor for performing science and routine operations. She ended her remarks by giving a brief history of the system anomalies and the current status of those systems.

#### Assessment of STS-84/Mir 23 Operational Readiness

Maj. General Joe Engle, USAF (Ret.) and Colonel Jim Adamson, USA (Ret.) gave assessments of the STS-84/Mir 23 operational readiness. General Engle began by pointing out that the Mir has a long history of anomalies and the anomalies have increased since 1994, as he would expect when equipment becomes older. He stated that the Russian's philosophy is to wait until system fails, then to repair it if possible and continue. He went on to explain some of the recent failures. General Engle expressed concern about the continuing coolant loop leaks due to corrosion in the aluminum alloy. He stated that the Russians are reluctant to say too much about the solid propellant generator of oxygen (SOG) fire until the unit is brought back on STS-84 and inspected. He pointed out that the canisters had been used over 2500 times without an incident. The Elektron units failed due to corrosion and the Elektron 2 will also be returning on STS-84. He mentioned the condensate problem and the shut down of the Vosdukh.

After elaborating on these anomalies, he went on to say that a month ago he was worried that the Mir was not going to last and had serious reservations about transferring STS-84 Mission Specialist Mike Foale to the Mir. However, in the past month, the Russians have repaired the systems and gotten them back on line. General Engle acknowledged that the Russians do not compromise on crew safety, and General Stafford expressed his agreement.

Colonel Adamson presentation followed General Engle's remarks, echoing his feeling that as of late March and early April he was very concerned about continuing the program. Now, he explained, the team has come back from briefings at JSC, Moscow and Star City and has decided to press ahead. He pointed out two important findings that brought the team to this conclusion. 1) While the reliability of the Mir was questionable, the Mir has actually grown in its robustness. As the Russians have added modules, they have also added redundancy. 2) Americans are learning a great deal from the Russians about what it takes to keep a continuous presence in space. He concluded by saying that

he feels comfortable that any problems can be worked out and that the benefits of continuing the mission far out weigh any concerns.

#### Assessment of Shuttle-Mir Crew Safety

Dr. Michael Greenfield, Deputy Associate Administrator, Office of Safety and Mission Assurance, concurred with Colonel Adamson's assessment of the situation on Mir and stated that he and Dr. Fred Gregory, Associate Administrator, Office of Safety and Mission Assurance feel perfectly comfortable sending Mr. Foale up on the next mission.

Maj. General Ralph Jacobson, USAF (Ret.), questioned how much ethylene glycol exposure the crew could withstand. Dr. Craig Fischer explained that the liquid ethylene glycol is being collected with sponges and the crew members do not seem to have suffered any ill effects from the exposure. He continued to say that there is limited data on the long term effects of ethylene glycol exposure, but currently the levels in the Mir are down.

Mr. Joe Cuzzupoli expressed concern about the long period between ground communication. General Jacobson suggested that it would probably not be difficult to put in a SGLS system. General Stafford indicated that he had talked to Academician Vladimir Utkin and General Director of the Russian Space Agency Yuri Koptev about additional coverage with their ALTIR (satellite system), but it would cost them too much to hook up to this Russian Department of Defense network. General Jacobson suggested that AFSCN be given a serious look and General Engle and Mr. Gilbert R. Kirkham, Executive Secretary to the Task Force, were tasked with investigating that option.

#### Assessment of Shuttle-Mir Crew Safety

Dr. Fischer gave his assessment of the Shuttle-Mir crew health. He explained that after the fire, the scrubbers did a good job and there were no combustion products detected in the air. Despite the thermal problems, there was no threat to the crew due to the high temperature. The water and food are good as long as they remain free of contamination from the ethylene glycol. Dr. Fischer fully supported transferring Mr. Foale to the Mir.

#### Findings

General Engle listed the Task Force findings.

Finding 1 - There are no significant safety concerns at present which would prevent the continuation of the Shuttle-Mir program and NASA's participation in the Mir 23/24 mission.

Finding 2 - The recent anomalies on Mir 22/23 have been adequately addressed by the Russian and United States program managers.

Finding 3 - Flight rules adequately address crew health and safety, but the capability for performing a real time assessment on board the Shuttle and Mir should be reviewed. As next steps, an appropriate capability to assess crew health and safety should be added to the Shuttle, Mir and ISS inventory and procedures for the use of that capability should be defined. The procedures should include the timing for the safe removal of gas masks.

Finding 4 - There are no significant medical concerns at this time due to the fire or subsequent failures in the environmental control systems.

Closing Remarks

General Stafford concluded the meeting by wishing STS-84 Mission Commander Charles Precourt and the rest of the STS-84 crew a successful mission and expressed his appreciation for Colonel Precourt's contributions to the committee. He continued to thank all of the Task Force members for their assistance, explaining that one month ago it looked like we were going to call it quits, now it looks great and everyone did a great job. General Stafford adjourned the meeting at 4:00 p.m.

ORIGINAL SIGNED BY

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Mr. Gilbert R. Kirkham  
Executive Secretary  
Task Force on the Shuttle-Mir  
Rendezvous and Docking Missions

ORIGINAL SIGNED BY

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Lt. General Thomas P. Stafford, USAF (Ret.)  
Chairman  
Task Force on the Shuttle-Mir  
Rendezvous and Docking Missions

ATTACHMENT A

NASA ADVISORY COUNCIL  
TASK FORCE ON THE SHUTTLE-MIR RENDEZVOUS AND DOCKING MISSIONS  
May 5, 1997  
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Washington, DC

2:00 - 2:05	Introductions and Welcome	General Stafford
2:05 - 2:15	Status of STS-84 Preparations	Bob Hinson
2:15 - 2:45	Status of Mir 23 Mission	Marcie Swilley
2:45 - 3:15	Assessment of STS-84/Mir 23 Operational Readiness	Jim Adamson/Joe Engle
3:15 - 3:30	Assessment of Shuttle-Mir Crew Safety	Michael Greenfield
3:30 - 3:45	Assessment of Shuttle-Mir Crew Safety	Craig Fischer
3:45 - 3:50	Findings	Joe Engle
3:50 - 4:00	Closing Remarks	General Stafford

**ATTACHMENT B**

NASA ADVISORY COUNCIL  
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ATTENDANCE

Task Force Members

Thomas P. Stafford, Chairman (via teleconference)  
Jim Adamson  
Joe Cuzzupoli (via teleconference)  
John Fabian (via teleconference)  
Craig Fischer  
Michael Greenfield  
Dan Heimerdinger  
Ralph Jacobson  
Arnauld Nicogossian  
Charlie Precourt (via teleconference)

Executive Secretary

Gilbert Kirkham  
Holly Stevens, Assistant

Technical Advisors

Joe H. Engle

Ex Officio Member

Jim Snowden

NASA Personnel

Marcie Swilley (NASA HQ/Code M)  
Mile Whitnah (NASA HQ/Code Q)  
Mike Hawes (NASA HQ/Code M)  
Bob Hinson (NASA HQ/Code M)

Visitors

Jane Mellors, ESA