

National Aeronautics and Space Administration

**AEROSPACE SAFETY ADVISORY PANEL
PUBLIC MEETING**

October 21, 2004

Johnson Space Center (JSC)

Houston, Texas

MEETING MINUTES



Mark D. Erminger
Executive Director



VADM Joseph W. Dyer, USN (Ret)
Panel Chair

AEROSPACE SAFETY ADVISORY PANEL (ASAP) PUBLIC MEETING

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Panel Attendees

VADM Joseph W. Dyer, USN (Ret), Chair

Dr. Dan L. Crippen

Dr. Augustine O. Esobue

Maj Gen Francis C. Gideon, Jr., USAF (Ret)

Mr. John C. Marshall

BG Joseph A. Smith, U.S. Army, Ex-Officio member

Mr. Rick E. Williams

Mr. Mark D. Erminger, Executive Director

Panel Members not in Attendance

Ms. Deborah L. Grubbe

Dr. Rosemary O'Leary

Mr. Steven B. Wallace

Members of the public were given the opportunity to submit comments in writing to the Panel prior to the start of the meeting. No members of the public submitted any written comments.

INTRODUCTION

Vice Admiral Joseph Dyer introduced himself and welcomed the participants.

OPENING COMMENTS

Vice Admiral Dyer explained that the purpose of the meeting was to share a report of the Panel's last three days in Houston. He noted that this was the Panel's fourth meeting and the best that they have had. The Panel has seen substantive progress in areas that are important to NASA. Major topics include Independent Technical Authority (ITA), Shuttle return to flight (RTF), International Space Station (ISS), and Exploration.

The Panel believes NASA has made a breakthrough in terms of addressing and planning for ITA. The Panel spent a large amount of time looking at the Space Shuttle Program (SSP). The SSP is tracking toward RTF in the May/June timeframe. On the ISS, the safety status has improved and the direction is very positive. In addition, the Panel is beginning to focus on Exploration and is happy to report that safety is becoming a central focus and a central pillar of that program and it offers a wonderful opportunity to positively shape the culture. Safety and Mission Assurance (SMA) is progressing and is achieving alignment across the board.

The Panel can be proud of its influence and positive force in both the ITA and Exploration areas.

The Panel has several areas of special interest and future focus. The first area is the planned shutdown of the Space Shuttle Program (SSP) in 2010; the Panel will be looking at this in depth in future meetings. With the planned shutdown, there is a need for contingency planning as well as planning that integrates into Exploration. The Panel has been assured that resources, both dollars and people, are in place to support NASA's undertakings and to support safety. Panel members will take a quantitative look at the budget in subsequent meetings. Another key topic that the Panel has singled out for a future review is alignment or the shifting from a federation to more of a united or aligned approach across NASA Centers. Alignment should support best practices, should be given to positive change management, and harmonize safety best practices across the Agency.

The Panel has heard 16 reports and investigations and will be very brief and as we address the most salient points of each report.

ITA

After providing opening remarks, Vice Admiral Dyer addressed the first topic, ITA.

The Panel believes that the new approach to ITA is very positive. NASA has a new and more aggressive approach reflecting very positive attributes. They include -- accountability resident in an individual as opposed to just an organization, authority independent of geography and not Center specific, and embracing technical conscience that is independent of the Program Manager. Vice Admiral Dyer expressed the Panel's appreciation to Rear Admiral Walter Cantrell who has been a special force in shaping NASA's approach to ITA.

SPACE OPERATIONS

Major General Rusty Gideon summarized the Panel's review of Space Operations.

Mr. Readdy, Associate Administrator for the Space Operations Missions Directorate, updated the Panel on Space Operations. Mr. Readdy reminded the Panel that his

workforce was about 90 percent contractor. Therefore, any discussion about safety needs to include a discussion about how to monitor the safety culture in a contractor while they are doing work for NASA and also doing work under other contracts. The Panel also discussed the transition from the SSP to Exploration and the need to focus on the SSP all the way to the end of the program. Another topic the Panel discussed was the importance of International cooperation on the ISS Program.

EXPLORATION

Dr. Dan Crippen discussed the Panel's review of the Exploration Program.

During the discussion of the Exploration Program with Rear Admiral Steidle, the Associate Administrator of the Exploration Systems Mission Directorate, the ASAP wanted to determine to what extent safety was being designed into the Exploration Program. Rear Admiral Steidle addressed this topic and also told the Panel what the Exploration Program is doing to incorporate systems safety into their design. The Exploration Program is implementing a number of new approaches to the design in addition to incorporating safety. They have technologists and operators working together on the design team using spiral-engineering development and have a peer review process in place. There has been a robust response to solicitations from private industry. The Exploration Program has formed 11 teams to design the Crew Exploration Vehicle and plan for lunar missions. Also, the Exploration Program will apply the new concept of the ITA. The Exploration requirements that are being formulated will establish criteria for designing in safe and reliable system of systems operation. There are three key points: the Human Rating and NASA standards will be used to establish Exploration requirements for redundancy and reliability, Probabilistic Risk Assessment (PRA) will be used to compare design choices, and there will be architectural requirements for the ability to abort and return home at any time during the mission.

The Exploration Systems Mission Directorate is also responsible for the Hubble Space Telescope servicing mission and the development of alternative propulsion systems.

NASA SAFETY CULTURE

Mr. Rick Williams discussed the Panel's review of the NASA Safety Culture.

The Panel is extremely interested in the quantitative results from the NASA Culture Survey performed by Behavioral Science Technology (BST). The Chief Executive Officer of BST briefed the Panel. BST performed a follow-up survey after 6 months at three of the NASA Centers to measure progress. They saw positive results at all three locations. BST is using leadership coaching with 360-degree feedback, leadership observations and feedback, and leadership skills training. BST is also seeing strong leadership and sponsorship from NASA Headquarters and the Centers. The results are encouraging. It is important to note that 6 months is not enough time to declare victory. The changes need time to become ingrained as the way NASA does business. The next step is for BST to expand their efforts to the remaining Centers and that is underway.

Short-term climate changes need to turn into long-term culture changes. In general, ASAP is pleased with the progress we have seen. This whole area of culture change is what the Columbia Accident Investigation Board (CAIB) spoke about often and is an area that ASAP will continue to monitor to make sure the positive results are sustained.

ISS

Dr. Augustine Esogbue discussed the Panel's review of the ISS habitable environment.

The Panel reviewed the status of crew health care on the ISS. Topics ranged from crew selection and training, adaptability, human factors, and performance of the environmental health monitoring system. The Panel also reviewed countermeasures as well as health maintenance systems and operations issues. The Panel was particularly impressed that most areas were functioning well. Re-supply has been facilitated by good cooperation from the Russian systems.

The Panel noted some areas of particular interest and attention. The medical and environmental systems were designed for optimal crew productivity. On-board stowage issues impede optimum performance and productivity. It is encouraging to note that supporting program activities are in place to address these issues.

The Panel also reviewed environmental health systems which include monitoring of air and water quality, radiation, and acoustic levels. The ISS atmosphere and water samples have shown that they are acceptable for continued operations. The Medical Operations Panel endorsed this view. Although current acoustic levels are above thresholds in several modules, the ISS has risk mitigation approaches and the on-orbit assessment does not show any permanent threshold shifts in hearing. Various countermeasure systems and the health maintenance system are in place to support crew readiness. The crew is in good shape and the medical operations team is on call 24 hours per day to support the crew on-orbit. This is backed by a well-staffed mission control center. NASA is aware of and addressing on-going operational-issues. NASA is also working to solve problems with storage system accumulation issues by planning storage ahead of time and constantly re-prioritizing. The team is working on planning storage ahead of time and is constantly re-prioritizing.

NASA FACILITIES

Dr. Crippen discussed the Panel's review of NASA facilities and infrastructure.

ASAP is interested in this topic because of the quality of the facilities and the safety of the workers. For NASA to attract world-class talent, NASA needs world-class facilities. It is important that ASAP continue to monitor the development of facility plans. NASA facilities have a \$21 billion replacement value and many of the facilities are 40-years old and in need of upgrading or replacement. There was a lack of spending in the late 1980s to 1990s which resulted in a maintenance backlog. ASAP discussed the need for NASA to prioritize some of that backlog based on safety requirements. NASA is in the process

of benchmarking their facility processes with other agencies and the private sector. ASAP encourages NASA to continue that process. NASA noted that they need further analysis of what future property needs will be and there are probably some facilities that are not being utilized to their full capacity. The future Space Exploration Program may be able to make good use of some of these facilities but the question of when that would be and what to do with them in the meantime is still pending. ASAP concluded that NASA needs to develop a detailed facilities plan for the SSP as well as the future Space Exploration Program.

TRAINING FACILITIES

Brigadier General Joe Smith discussed the Panel's review of Space Shuttle and ISS Training facilities at JSC.

The Panel received an orientation of the Space Shuttle and ISS trainers as well as the mock-up facilities to help them better get an appreciation for the day-to-day living on the Space Shuttle and the ISS. The Panel was impressed with the integration of simulation both on the Space Shuttle and ISS. NASA exercises a wide range of malfunctions for both the crew and ground controllers. The Panel was also impressed with the training and procedural validation and very impressed with the focus on safety for the people that are on the crew.

CAIB RECOMMENDATIONS

Dr. Crippen discussed the Panel's review of CAIB Recommendations that NASA will implement after the Space Shuttle RTF.

The CAIB made 29 recommendations that fall into two main groups. The RTF Task Group is assessing NASA's response to the first 15 recommendations. The ASAP will be assessing NASA's response to the remaining 14 recommendations. Culture needs to be part of the RTF recommendations.

NASA has accomplished many of the remaining 14 recommendations already because of the longer delay which was not anticipated when the CAIB made the recommendations. Also, the CAIB thought the Space Shuttle would fly for more than 20 more years so some of their recommendations were based on a longer life. Some of the recommendations have become either less important or had to be altered because of the change in outlook. One of the recommendations that received a lot of public attention at the time of Columbia was the data collection system. To address the recommendation, NASA has devised a way to send much of the data to the ground in real-time, and they have some very sophisticated software developed to pick the data streams during different phases of flight so that they will get the maximum amount of data relative to each of the phases of the flight. That is the kind of recommendation that is not RTF but that NASA has largely accomplished already.

SSP RISK MANAGEMENT

Mr. John Marshall discussed the Panel's review of the SSP Risk Management Program.

The CAIB identified areas where the SSP risk management was deficient and identified areas including risk identification, risk analysis, risk characterization, and operations decision as needing improvement. ASAP has been and will continue to be very interested in the steps NASA is taking to improve their risk management programs. For this reason, the Panel asked for and received a comprehensive briefing on the SSP Risk Management Program. NASA has taken great steps to implement new top-tier risk reporting to improve risk identification throughout all their programs including a better integration of risk coming from the different sources into a prioritized integrated risk posture. The SSP has done this through the expansion of a program called Shuttle Probabilistic Risk Assessment (PRA). PRA is being used to support prioritization of program resources, increase the rigor of program technical risk assessment, and provide the technical rationale for major program decisions. The Panel asked for examples of decisions that were successful that previously they couldn't have made. Examples where the SSP was able to use PRA to provide new insight included ascent debris risk, the electronic auxiliary power unit, the Space Shuttle main engines, and the wire-to-wire short risk. One of the greatest contributions of PRA is to identify areas where additional study was needed to reduce uncertainty. This area requires further study and more maturity before the SSP can really prioritize correctly. All in all, the Panel was very impressed with the changes that have been made. It is still a process that is evolving and will require further refinement.

ASTRONAUT OFFICE

Vice Admiral Dyer discussed the Panel's review of the Astronaut Office.

The Panel reviewed the Astronaut Office and their linkage to safety across the Agency. The Panel was interested in whether the Astronauts were engaged and whether they were influential in the Agency where system safety and safety in general was concerned. Without question, ASAP believes the answer is "Yes." The leadership of the Astronaut Office is strong, and they are supported by a cadre of exceptional talent.

JSC S&MA

Dr. Esogbue discussed the Panel's review of the SMA organization at JSC.

The Panel reviewed recent changes in SMA at JSC. Ms. Marshall, the JSC SMA Director, gave a very thorough overview of their core competencies and a review of what has changed in their organization structure over the last year. They have made major changes since STS-107 including their reporting system, organizational funding, and organizational structure. There is a new requirement for approval of selection of the SMA Director and a concurrent functional management assessment by the NASA Chief Safety and Mission Assurance Officer. The SSP and ISS Program Offices have dedicated

SMA staff with matrix support from the JSC SMA organization. Additionally, safety and reliability panels transitioned to the JSC SMA organization. There is now functional oversight from the NASA Headquarters Office of Safety and Mission Assurance. JSC is showing good conformance with the recommendations from the CAIB.

The Panel also reviewed the JSC Close-Call Reporting System. JSC's performance between 1994 and 2003 has shown a dramatic drop in lost workday cases and Occupational Safety and Health Administration reportable accidents. This is quite remarkable and good evidence of an improving safety culture. The Panel noted that JSC statistics have shown an impressive steady decline in rates and is evidence of a good safety culture at JSC. This program could pay useful dividends at other NASA Centers.

Some high performing organizations in private industry select their on-site contractors based on their Experience Modification Rate. This would also be beneficial to be incorporated into NASA's safety practices.

The Panel is quite impressed with the forthrightness of the presenters. They were very open and discussed many of the issues that deal with SMA. By and large JSC employees were quite pleased with the opportunity to introduce these changes. They felt that bringing the much-needed focus on the Program is very important and the organizational changes that they have made helped get most of the people on the Center on board.

ISS S&MA

Mr. Williams discussed the Panel's review of the ISS SMA program.

The Panel reviewed several areas within the ISS SMA program: risk management, critical item lists, stowage, policy, and procedures.

ISS SMA uses PRA as a tool to assist with decision-making. They gave the Panel positive examples of how they use PRA to make decisions.

Despite all of the challenges from the SSP, the Panel is convinced that the ISS Program has their arms around the ISS risks and the issues facing them.

ISS SYSTEMS STATUS

Brigadier General Smith discussed the Panel's review of the systems on-board the ISS including Elektron, Russian Cargo Block smoke detector, disturbance torque during the Russian segment extra-vehicular activity, extra-vehicular mobility unit lighting, and exercise equipment. The Panel received a good overview and there was certainly a lot of open dialogue. The Panel was very pleased with the special attention given to each of these areas.

SSP PROGRAM MANAGEMENT

Vice Admiral Dyer discussed the Panel's review of SSP Program Management.

The Panel was impressed with the Space Shuttle Program Manager, Mr. Parson's, approach. The Panel had a good discussion on the status of the planning, which was solid in terms of approach and execution. The Panel was especially interested in how robust the systems engineering approach was for the program at large. The Panel came away with the confidence that good planning was supporting good systems engineering. The Program Manager indicated that he had sufficient resources, both in dollars and in people. There will be a need to take a mid and longer-term look at the resources in support of Shuttle. In the 2010 timeframe, NASA's clear goal is for the last flight of the Space Shuttle to be as safe as the upcoming flight. The Panel believes that NASA needs to be conservative in long-term planning and invest in the supply chain, engineering support, and knowledge retention to make that happen. The Panel is putting special focus on mid and long-term planning in the SSP in addition to the high tempo work leading up to the next flight.

ISS PROGRAM MANAGEMENT

Mr. Marshall discussed the Panel's review of ISS Program Management

The Panel's discussions with the Deputy Space Station Program Manager, Mr. Suffredini, were helpful and encouraging.

The Panel had three take-aways and they were all positive:

1. The ISS Program took all of the CAIB recommendations and reviewed them to see if any of them were applicable to the ISS.
2. The ISS Program understands how their relationship works with the Russians and they were very positive and professional.
3. The ISS Program has learned to deal with challenges without support from the SSP, like water, food, and oxygen.

The Panel has seen significant improvements. The bottom-line is that the ISS program is being comprehensively managed.

CONCLUSION

Vice Admiral Dyer concluded by noting that the Panel also met with the NASA Administrator, Sean O'Keefe, and the NASA Deputy Administrator, Fred Gregory, and appreciates the support that NASA leadership is extending to the Panel.

Vice Admiral Dyer asked each of the Panel members if they had any closing comments.

Brigadier General Smith said that this was his third meeting. From his first meeting, there has been great progress made by the Panel and he is very proud to be serving on it.

Mr. Williams agreed with Brigadier General Smith. The Panel continues to grow in capacity to better understand its role and optimize its time. As a group, he felt good about the progress and the responsiveness from the NASA organization.

Mr. Marshall said that this meeting had many great takeaways. In the last meeting, the Panel was briefed about ITA and was troubled by the slow rate of progress in developing and implementing the ITA concept. It wasn't that progress hadn't been achieved, but progress was not at the rate that we had hoped for. During this meeting, the Panel was most encouraged by the excellent progress that Rear Admiral Walter Cantrell made on the ITA concept. It will take a lot of mentoring within the Agency to get all of the components lined up. The process is well defined and is nearly ready to be implemented across the Agency.

Major General Gideon said that his thoughts were repetitive. NASA is off to a good start on ITA but it needs to be monitored for completion. He was very pleased with the planning in the Exploration Systems Mission Directorate and that safety is right in the middle of it in a big way. ASAP will continue to watch. NASA is making good initial progress on changing the culture as shown in the BST surveys. Culture change takes a long time, and ASAP will continue to track progress in the future.

Dr. Esogbue said that he was impressed with the forthrightness of the people that talked to the Panel at JSC. They were not shy when talking about issues and answered a lot of questions. Considerable progress has been made in moving to a culture where they report all the data and analyze. JSC gave him the impression that they welcome the institutionalization of safety culture. He hoped that this will be characteristic all across the Agency.

Dr. Crippen said that the support NASA gave to this meeting was extraordinary and was indicative of how NASA takes ASAP seriously. He was honored to be a part of this Panel and appreciated the opportunity to serve.

Vice Admiral Dyer said that Dr. Crippen and Dr. Rosemary O'Leary served on the RTF Task Group as well as ASAP and will greatly facilitate the transfer of knowledge. The Panel's next meeting will be at Kennedy Space Center.

MEETING ADJOURNED

Vice Admiral Dyer adjourned the meeting and opened the floor to questions from the public participating in the meeting.