

**National Aeronautics and Space Administration**

**AEROSPACE SAFETY ADVISORY PANEL  
PUBLIC MEETING**

February 3, 2006

**Marshall Space Flight Center  
Huntsville, Alabama**

**MEETING MINUTES**

// Signature //

---

**John D. Marinaro  
Executive Director**

// Signature //

---

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

# **AEROSPACE SAFETY ADVISORY PANEL (ASAP) PUBLIC MEETING**

February 3, 2006

**Marshall Space Flight Center  
Huntsville, AL**

## **Panel Attendees**

Dr. Dan Crippen (serving as Meeting Chairman)  
Mr. John C. Marshall  
Ms. Deborah L. Grubbe  
Dr. Amy K. Donahue  
Mr. John Frost  
Ms. Joyce McDevitt  
Mr. John D. Marinaro, Executive Director

## **Panel Members Not In Attendance**

Vice Admiral Joseph W. Dyer, USN (Ret), Chairman

## **Observers**

Mr. David King, NASA MSFC  
Mr. Charles Chitwood, NASA MSFC  
Mr. Chris Scolese, NASA HQ  
Mr. Roy Malone, NASA MSFC  
Mr. Michael Ralsky, NASA HQ  
Mr. Dan Dumbacher, NASA MSFC  
Ms. Susan Burch, NASA HQ  
Ms. Pat Doty, NASA MSFC  
Ms. Gena Cox, NASA MSFC

Mr. Edward Ingraham, NASA HQ  
Mr. Walter Hussey, NASA HQ  
Ms. Robin Witter, NASA HQ

Mr. Bill Kilpatrick- Sigmatech  
Mr. Dave Hall- IBM  
Mr. Dave Schulz- South

## **Telecon Observers**

Kimm Groshong, New Scientist  
Irene Klotz, Reuters  
Don Nelson, NASA Retired Engineer  
John Casper, NASA  
Bill Douglas, NASA  
Lindy Forten-Berry, NASA  
Craig Young, NASA

## **INTRODUCTION**

Mr. John Marinaro, Executive Director, opened the first quarterly meeting of the Aerospace Safety Advisory Panel (ASAP), and asked for names of those who attended via telecon and live audience (names provided above). Mr. Marinaro explained that members of the public were permitted to submit questions during this session. Dr. Dan Crippen represented ASAP Chairman Joseph Dyer; members of the ASAP introduced themselves.

## **OPENING COMMENTS**

Dr. Crippen thanked Marshall Space Flight Center (MSFC) for graciously hosting the meeting. He noted a very impressive array of capabilities and personnel at MSFC, and recognized that the center is known for setting standards in safety and training. MSFC has also been critical for the Return to Flight (RTF) effort, especially in addressing foam engineering issues, and is a major player in the Exploration effort (launch vehicles for CLV/CEV). The center is certainly capable of fulfilling its new role.

## **PUBLIC STATEMENTS/COMMENTS**

The first 30 minutes of the meeting were reserved for public comment on safety in NASA. Mr. Don Nelson provided a written statement to the Panel and was afforded the opportunity to make a statement at this time.

Mr. Don Nelson, a member of the public audience, introduced himself via teleconference as having a background in launch vehicles and design, and having formerly been a member of the Shuttle design team. He submitted a written statement regarding the current Exploration designs to the Panel prior to the meeting. His verbal statement paralleled his written statement and he expressed his concerns and opinion regarding the following: flight control capability; the introduction of a fifth segment creating a very top-heavy vehicle; concern about the stack related to the growing Crew Exploration Vehicle (CEV) weight; and, perceived failure rates regarding this type of design and application.

Mr. John Frost asked if Mr. Nelson was concerned that the failure rate goal was too high or poorly assessed. Mr. Nelson replied that his point was that a 1-in-2000 failure rate was not a historically viable figure. With the current CEV configuration, he felt that the rate was more like 1-in-25 or 50.

Mr. Marshall read a portion of Mr. Nelson's written statement where he concluded that the only solution for the next-generation crew vehicle was a reusable vehicle that was developed and operated by a non-government enterprise. Marshall then queried Mr. Nelson if his assessment was based on a cost/operations perspective, safety concerns, or both. Mr. Nelson stated that his opinion was based on a 1999 study that included both factors.

Dr. Crippen took Mr. Nelson's submission under consideration for a NASA response; the ASAP is not a technical body, but it will certainly consider safety allegations. Dr. Crippen could not confirm or deny Mr. Nelson's assertions on technical grounds. Mr. Nelson added that he did not think the National Research Council (NRC) had done a proper evaluation of the CEV/CLV

(Crew Launch Vehicle). Dr. Crippen assured Mr. Nelson that the panel would consider this assertion in a NASA response.

No other members of the public requested time to make a public comment nor submitted any written comments.

### **CONTINUED OPENING REMARKS**

Dr. Crippen went on to briefly review the previous two days spent at MSFC. The ASAP had arrived at the center with the intent to review the establishment of the independent Technical Authority (iTA) prescribed by the CAIB, center Safety and Mission Assurance functions, the STS-121 and the External Tank (ET) with respect to Return to Flight (RTF) activities, briefings on the CLV, and the MSFC physical plant. This fact-finding endeavor will be reported to the public. There is also a new legislative mandate to consider, as recently outlined by Congress to the ASAP in the NASA Authorization Act of 2005.

### **MSFC OVERVIEW**

Dr. Amy Donahue reported first on a general overview of MSFC. She noted that MSFC has a long history in spacecraft, robotics, ISS operations, and rockets, with quite a bit of effort being spent on the Shuttle's high-energy propulsion components such as the ET, Space Shuttle Main Engine, and Solid Rocket Booster systems. ASAP has found the center's expertise to be very impressive, with tremendous implications for the next generation of vehicles. Recent accomplishments include the shipment of a new oxygen system for ISS to the Kennedy Space Center. She noted that MSFC also conducts science experiments aboard the ISS, and was an integral player in the Gravity Probe B science mission. The big endeavor of course is the development of the Cargo and Crew Launch Vehicles under the Constellation Program. MSFC is called to operate on the edge of "what we know and what we knew," with a significant amount of risk inherent in the process.

### **FACA ETHICS BRIEFING**

Mr. Frost reviewed a Federal Advisory Committee Act (FACA) briefing on how federal advisory committees operate, commenting that advisory committees date back to the era of George Washington. By FACA rules, the ASAP (founded in 1967) is required to maintain a balanced representation, engage in open public meetings accompanied by published minutes, provide full access to written material, maintain documents for public access, and retain a designated federal official on committee. Members of the panel are appointed by the Administrator, and all members are required to provide financial disclosure statements. ASAP members are subject to all federal rules governing civil servants.

### **TECHNICAL AUTHORITY**

Dr. Crippen reported on the ongoing development of Technical Authority, a NASA entity developed in response to CAIB recommendations regarding culture and organization. The CAIB had determined that culture and organization played a large role in the loss of Columbia. A major

component of the independent nature of the iTA is the recommendation for funding and organizational reporting separate from the program. The CAIB recommended the iTA be established for a clearer demarcation from the Program for accountability. NASA had originally established a system of warrants and warrant holders to address this issue; some changes have been made to this approach by the new Administrator. The responsibility for iTA was originally placed in the Office of the Chief Engineer (OCE). The new design has Technical Authority administered through the centers, such that center directors are in the line of authority, along with the engineering directors, discipline engineers and chief engineers for each project. The principal change is more center authority. Management of center hires is significantly influenced by the OCE for lead engineers. NESC will be preserved in order to help with technical questions. The technical authority function will be financed by Headquarters and the programs will remain responsible for schedule and cost. The concept of technical conscience/excellence will also include personal accountability. NASA is also promoting organizational responsibility for adequate training and the provision of tools and environment necessary to do the work. Openness to criticism will be encouraged. The full Technical Authority process is scheduled to be implemented this year and its primary components have been put in place. The ASAP also received a briefing from the NASA Chief Engineer during the fact-finding sessions. The panel agrees that this conception of iTA seems to be consistent with what CAIB had in mind.

Mr. Marshall commented that independence of technical authority has been an issue within NASA for some time and that the Administration had in the past addressed the matter with varying success using different approaches. However, he noted that he was pleased to see that the current plan was moving forward in the right direction. He also noted that he was pleased to see the release of a NASA Interim Directive (NIT) dealing with iTA, which over time would provide a document that will codify and standardize NASA's approach. Finally, Marshall commented that while the NIT was an important step, understanding how each Center and program will implement the NIT's approach to iTA will be the true measure that will determine its success.

Dr. Crippen applauded the fact that while the CAIB had recommended iTA for the Shuttle program only; NASA was nonetheless adopting the concept across all programs, in effect doing better than the CAIB had required.

### **SMA**

Mr. Frost reported on MSFC Safety and Mission Assurance (SMA) activities, mentioning his background in systems safety. Safety is a critical element of mission success and is recognized as an identified core value of NASA. Mr. Frost was pleased to find a direct line of authority of the SMA Director to the Center Director, Mr. David King. SMA's technical expertise and independence positively support the roles of Project Management and the Technical Authority in mission accomplishment. He noted SMA's awareness of their technical demographics and their goal of adjusting expertise to fit the needs of changing programs, and their plans to grow individuals into areas where expertise is needed. MSFC is diligently educating its workforce. He noted, with approval, documentation of desired minimum characteristics of key specialties. He also noted that BRAC related DOD reassignments of major DOD activities to Redstone Arsenal could have a negative impact on available systems engineering and systems safety engineering

personnel if the situation is not managed properly. Mr. Frost commended the SMA relationship to iTA and project management, approving the fact that individuals, and not committees, sign off on decisions.

## **SAFETY WITHIN CENTERS**

Ms. Deborah Grubbe reviewed center institutional safety issues. In reviewing institutional safety, she found center strengths to be the following: excellent vision, improvements in lost time rates, and recognition that safety is a continuous improvement journey. Leadership is involved through a team structure, and while the management role is good, it can be improved. She cited an extensive use of lagging indicators and suggested that MSFC consider and develop leading indicators to better predict likelihood of losses. Improvements can be made in contractor safety management from a systems standpoint. Ms. Grubbe observed good work in culture, but noted that this work must be built upon, identified, captured and addressed. She noted that MSFC had identified a training deficiency regarding chemical-handling and took on the job to improve it; it is good that MSFC recognized this issue.

Contractor safety management needs to be more integrated and transparent, at the leadership, strategic and operational levels. The experience modification rate (EMR) must be less than 1.0; this may not be the case across the board for all contractors. MSFC should benchmark more with the private sector. The process of hiring contractors should be modified so that it is not the weakest link in the safety chain. The ASAP had made this recommendation at KSC. Ms. Grubbe expressed the hope that there would be more uptake of this learning at other centers.

In terms of culture change, improvements have been under way both at MSFC and NASA-wide, laying a foundation for good next steps. There are several areas of focus: training and development of concepts of leadership; teamwork and communications between supervisor and subordinate; more transparency; and addressing safety with a balance of carrot and stick (i.e. there will be ramifications to the leaders when failures occur).

## **ASAP FEEDBACK**

Ms. Joyce McDevitt reported on a lunch seminar, which provided a valuable exchange between MSFC and ASAP participants, highlighting ways in which the ASAP can further provide value to NASA. The dialogue began by one of Marshall's participants noting that NASA historically had regarded the ASAP as a committee with a solid reputation for making a positive difference to NASA's operations. Another individual remarked that the ASAP helps the centers define what they know and don't know and supplements Agency audit activities, which NASA has gratefully acknowledged in the past. Ms. McDevitt followed by saying she was pleased to learn that oftentimes there are natural follow-up actions to ASAP meetings that go beyond the recommendations since NASA also takes informal recommendations quite seriously. All agreed that routine center visits by the ASAP were helpful and productive.

Feedback also indicated that there is some opportunity for improvement. For instance, a Marshall representative conveyed that for centers that have not been visited by ASAP in recent times, it may be useful if a clearer understanding of ASAP's interest areas were identified prior

to the visit. In this regard, Mr. Bryan O'Connor, NASA's Chief for Safety and Mission Assurance, stated that he would be interested in working more closely with the ASAP Chairman to help develop ASAP focus areas. Admiral Dyer replied that he sincerely appreciated this suggestion and looked forward to continued recommendations; but, he also noted that the ASAP currently is targeting four specific areas that the Administrator had asked the ASAP to address and provide recommendations to, as well as recent Congressional taskings that will require further involvement. Another participant added that perhaps the ASAP could gain more insight and confidence in NASA's new management team by selecting some key decision-making events to observe. Again, the Chairman agreed to consider the suggestion. Finally, the ASAP was encouraged to participate in center activities as they began if time and schedules allowed, so as to provide direct and better feedback.

### **SHUTTLE FLIGHT PREPARATIONS**

Dr. Crippen reviewed preparations for the next Shuttle launch, noting that the last flight was operationally successful in several ways: a new imaging system was tested and the mission resupplied ISS, however foam continues to be a problem. The final stages of root cause analysis of the foam loss, redesign and testing of a new tank configuration are underway. The PAL ramp will be removed and some changes in bi-pod heater wiring will be made. MSFC is still analyzing the effects of PAL ramp removal. There is no firm schedule in place, however there are launch windows in May and August of this year, pending more certain outcomes of testing. Testing of repair materials will continue on the next flight, along with a new camera to gather more engineering data.

Mr. Frost commented that it is clear that it is not possible to eliminate all foam shedding with the present design, and urged that the critical risk assessments of the remaining potential shedding be performed as soon as possible.

### **RISK ANALYSIS AND ASSESSMENT ON CEV/CLV**

Dr. Crippen stated that ASAP had seen impressive array of tools and considerations, and incorporation of lessons learned. The CLV is clearly in the initial stages of design, and the ASAP recognizes that as processes go forward, redesign may take place. NASA has taken a traditional approach – risk analysis is embedded in the design process. ASAP has harped on the subject to design with safety in mind wherever possible. The program has identified eleven top macro risks, which are mostly programmatic mission success risks. Other risks include uplift mass capability, workforce requirements, and obsolescence of human-rated flight systems.

### **CREW LAUNCH VEHICLE (CLV) ISSUES**

Mr. Marshall began his comments by first noting that the ASAP had specifically asked MSFC's senior staff if funding was sufficient to address outstanding issues necessary for STS-121 and beyond shuttle mission success. He then commented that the ASAP emphatically was assured that having proper resources was not a limiting factor.

Turning his attention to CLV issues, Mr. Marshall reflected that there have been dramatic changes regarding CLV's development and employment since the ASAP last was briefed. In this regard, he noted that in the last 6 months the project office has been staffed fully and is operational, a concept of operations has been developed, key contractors have been identified, a baseline CLV design has been released for trade studies, and design analysis has begun. This said, Marshall noted that considering the early stage of the CLV's development, the ASAP naturally would expect continuous changes, improvement, and reviews in the future. Marshall also reported that the ASAP had asked if the Administration had undertaken a dedicated lessons-learned analysis from the Shuttle program for applicability to CLV's development to ensure that every opportunity for initial success is achieved? He then noted that the ASAP had likewise asked if a similar assessment of the CAIB recommendations, again as applicable to CLV, had been made. In response to both questions the reply was yes.

Marshall further reported that while the CLV program was new, the CLV management team is rich with experience. In this regard, Marshall commended the CLV management team for incorporating up-front risk analysis early on in their assessments. He added however that he had not heard the word "safety" used during all the discussions regarding the CLV and recommended that "safety" become the lexicon of success for the future space vehicles. Marshall concluded by noting that NASA's move to reduce complexity was on the mark and the beginning to a wonderful new chapter in manned space flight.

#### **NEW LEGISLATION AFFECTING ASAP**

Dr. Crippen addressed the impact of the NASA Authorization Act of 2005, which requires the ASAP to present an annual report to the Administrator and to Congress that includes an assessment of NASA's safety culture and actions to address remaining CAIB recommendations not cleared by the Stafford-Covey task force.

Mr. Marshall commented that he had great confidence in Dr. Crippen and Dr. Donahue's technical expertise in assessing the outstanding CAIB recommendations. However, he expressed concern that the bigger challenge for the ASAP would be to assess NASA's safety culture because of the lack of standardized metrics and standards dealing with safety culture within the agency and the lack of a uniform safety assessment database at each center. In this regard, he noted that if the ASAP was to be successful in meeting its tasking, a standardized, agency-wide, database on safety would be needed and that the agency should immediately undertake to development such a resource. In this regard, Marshall recommends that NASA Headquarters, using a standard safety assessment tool (i.e., a PEP or PEP-like process), assess currently available information agency wide and format the information into a uniform database.

Ms. Grubbe suggested that NASA develop a robust and continuous focus on culture with a vision, goals, processes, measurement, and a continuous improvement process. What gets measured gets done. NASA's work is so important that the culture needs to support this effort. ASAP should offer guideposts, but NASA must do the work.

Mr. Marshall noted that the timing of the annual report will be a challenge for the ASAP. In this regard, he assessed that the ASAP was going to need some technical support and a budget to



fulfill this requirement. Dr. Crippen and Mr. Marshall took an action on wording this recommendation.

Ms. Grubbe added that there is certainly work and correlative data extant on cultural alignments in organizations, regarding safety.

Dr. Crippen asked the panel if it wanted to make a recommendation on standardization of training issues.

Dr. Donahue replied that there was tension between standardization and unique center needs—one can have a core database, but the system can be tailored to each center. She recommended tying this observation in with a broader recommendation about workforce.

### **OTHER RECOMMENDATIONS AND DELIBERATION**

- A closer integration of SMA with contracting with respect to safety should be pursued. Ms. Grubbe reiterated the recommendation to make contractor safety management issues transparent, continuous and uniform end to end. The goal should be to have one contractor safety management policy at MSFC. There should be continuous benchmarking with the private sector to achieve a world-class center. Extend the “EMR less than 1.0” hurdle to all MSFC contractors.
- Processes leading up to risk analysis relative to Return to Flight and External Tank should be transparent. The STS-121 risk analysis process and results should be reviewed by an independent entity, perhaps by NESC, for validation.
- ASAP should improve communications with centers, coordinate activities outside of quarterly meetings and determine how it will respond to its new reporting requirements.
- Mr. Frost commented that it was not clear that risk assessment procedures and criteria are directly relatable between the large and distributed programs the Agency manages, and recommended increasing consistency of these procedures, especially with regard to the components of integrated flight vehicles.

### **MEETING ADJOURNED**

Dr. Crippen adjourned the meeting and opened the floor to questions and comments from the public observing the meeting.

Mr. Don Nelson recommended that NASA consider reducing the number of flight crew on the next STS mission to promote ISS safe haven rescue if required.