

2006

Second Quarter

ASAP

NASA AEROSPACE SAFETY ADVISORY PANEL
National Aeronautics and Space Administration
Washington, DC 20546

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

May 15, 2006

The Honorable Michael D. Griffin
Administrator
National Aeronautics and Space Administration
Washington, DC 20546

Dear Dr. Griffin:

This report includes the results of our second formal meeting in 2006 which was held at NASA Headquarters. During the second Quarter, Panel members have and will continue to observe other key NASA activities such as the Space Shuttle External Tank DVR process and Space Shuttle Program Requirements Control Board meetings.

After our meetings at Headquarters, we carried away concern regarding the Space Shuttle Program having a clear list and tracked status of test and analytical results for modifications to the External Tank as they proceed toward the launch of STS-121. More specifically, we recommend that the Space Shuttle Program approach the STS-121 go/no-go flight decision with pre-established criteria in the following manner:

1. Define a list of test and analytical results which have firm pass/fail criteria which are or can be established at this time.
2. Define a list of test and analytical results which will have firm pass/fail criteria based on planned work to be completed prior to the Flight Readiness Review.
3. Define a list of decision points and/or test and analytical results for which there will not be firm pass/fail criteria at the time the decision will be required, e.g., go/no-go for launch at the FRR. For these, also articulate what assumptions NASA managers would have to make to be able to interpret the test data and reach a decision.

Based on the July launch date, we indicated to Mr. Hale that this information would be beneficial by the beginning of May to enhance ASAP insight as the Program proceeds toward the launch decision.

With great respect, I submit our Second Quarterly Report for 2006.

Sincerely,

// Signed //

Joseph W. Dyer, VADM, USN (Ret)
Chairman
Aerospace Safety Advisory Panel

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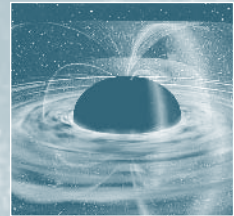
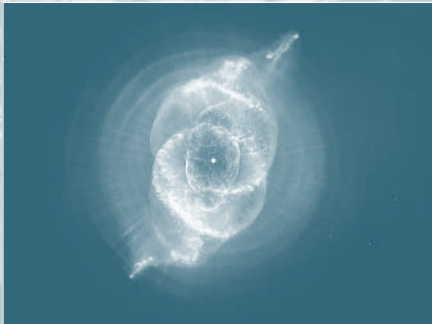
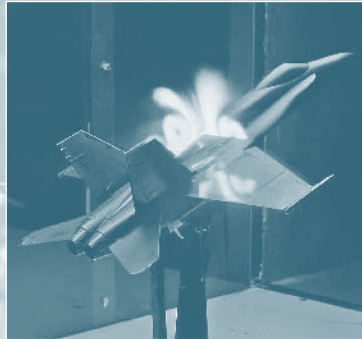
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SECOND QUARTER

I. Introduction

ASAP



I. INTRODUCTION

This is the Second Quarterly Report for the Aerospace Safety Advisory Panel (ASAP) in 2006.

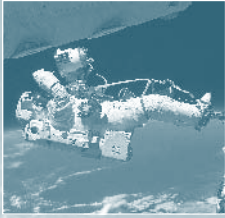
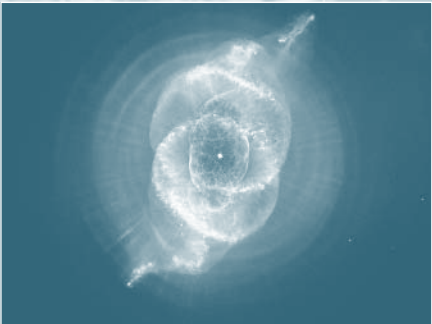
NASA chartered the Panel to review, evaluate, and advise on elements of NASA's safety and quality systems, including industrial and systems safety, risk management and trend analysis, and the management of these activities.



SECOND QUARTER

II. Second Quarterly Meeting Minutes

ASAP



AEROSPACE SAFETY ADVISORY PANEL PUBLIC MEETING

April 7, 2006

NASA Headquarters
Washington, DC

MEETING MINUTES

// Signature //

John D. Marinaro
Executive Director

// Signature //

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

AEROSPACE SAFETY ADVISORY PANEL (ASAP)

PUBLIC MEETING

April 7, 2006

**NASA Headquarters
Washington, DC**

Panel Attendees

Vice Admiral Joseph W. Dyer, USN (Ret.), Chairman
Dr. Dan L. Crippen
Dr. Amy K. Donahue
Mr. John C. Frost
Ms. Deborah L. Grubbe, P.E.
Mr. John C. Marshall
Ms. Joyce A. McDevitt, P.E.
Mr. John D. Marinaro, Executive Director

Observers

Mr. Chris Blackerby, NASA
Mr. Robert Cobb, NASA
Ms. Kelly Farrell, NASA
Ms. Lynn Cywanowitz, NASA
Ms. Jeanie Hall, NASA
Mr. Ben Jimenez, NASA
Mr. James Lloyd, NASA
Mr. Todd McIntyre, NASA
Mr. David Mitchell, NASA (detailed to Sen. Bill Nelson's office)
Ms. Katherine Trinidad, NASA
Ms. Susan Burch, NASA

Mr. Ken Monroe, House Science Committee
Mr. Jeff Morris, Aerospace Daily
Mr. Mont Smith, Air Transport Association
Dr. Steve Krahn, Perot Systems
Mr. John Whitely, Perot Systems

INTRODUCTION

Mr. Marinaro, Executive Director of the Aerospace Safety Advisory Panel (ASAP), called to order the 2006 ASAP Second Quarterly Meeting. The Chairman, Admiral Dyer, welcomed the group. He asked the Panel members to introduce themselves in succession around the table, followed by members of the staff and observers. Everyone in the room identified himself or herself, giving name and affiliation.

OPENING COMMENTS

ASAP tries to maintain a long-term perspective, Admiral Dyer explained. The goal is to fly at an optimal altitude, one that provides a broad enough view of the earth below to give context. However, the Panel is often drawn into urgent practical concerns, such as those raised by the external tank of the Shuttle. NASA is carefully navigating a path to launch with potentially catastrophic but infrequent risk. The important key is the effectiveness of the limitations and controls that are to be established. How shall NASA gain, demonstrate and communicate the risk mitigation to launch with good conscience? Concurrent with gaining this knowledge, NASA is shouldering the stress of conducting an acknowledged “flight test” and operational missions in support of the International Space Station. The ASAP observes this in discussions about crew size. Should the next launch be made with minimum crew or with a crew size driven by the work that needs to be done once in orbit? Is NASA approaching this next launch cogently and carefully? We believe the answer is yes. Other issues are contractor safety, Shuttle risk assessment, the NASA response to the Columbia Accident Investigation Board (CAIB) recommendations, the NASA safety culture and independent technical authority.

CONTRACTOR SAFETY

Admiral Dyer gave the floor to Ms. Grubbe, to review recent NASA activities in pursuit of improving contractor safety.

I will start with history since this issue needs context. I believe that all incidents like this are preventable and work needs to be done. This group visited Kennedy Space Center (KSC) in January 2005 and made recommendations on contractor safety. I'm happy that the Office of Safety and Mission Assurance has been following up on this issue. In March 2005, NASA Headquarters and Center representatives looked at this topic. Meetings are a necessary step. In July 2005, a contractor safety forum was held at KSC where NASA Centers marked their contractor safety procedures. Some things are in common. In August 2005, at Dryden, they developed best practices for contractor safety and came up with an agreement. There are 2,000 NASA employees and 13,000 contractors at KSC. Their safety is germane to NASA processing. NASA is considering putting forth a written policy on contractor safety. There's intent, but no full Center agreement. We want to ensure that the policy includes best practices so that the Centers can merge their practices with what's recommended. NASA should think about pre-qualifying vendors and understanding private sector approaches.

Discussion

Mr. Marshall: We want to push on contractors to strongly endorse those who embrace best practices and make it part of their normal operations. I give the Agency credit for steps taken recently to embrace best practices in the private sector and other government agencies.

Ms. Grubbe: Hopefully this will spur the Agency on to make sure these things don't happen again. NASA is dealing with change on numerous levels. There needs to be some management of change here at Headquarters and at the Centers.

Mr. Marshall: They now have four investigations simultaneously at KSC. Some distractions are hurricane damage and preps for the next launch. But the leadership needs to be aggressive in stopping distractions. It's a challenge that has to be institutionalized.

Admiral Dyer: This is complicated by the range of contractors—from roofing to Shuttle processing.

Ms. Grubbe: It's difficult to write a policy when there are such differences.

Mr. Marshall: We don't want to interfere with the roofer death investigation, but Mr. John Casper has told us that the focus is on safety culture. Is there something happening at KSC? What is the training?

Dr. Crippen: How do you get contractors' attention and hold them accountable?

Mr. Frost: We saw methods that NASA had available to properly incentivize contractors for safe performance. One of the more powerful was withholding some or all of a contractor's award fee in case of a major breach of safety requirements. However there seems to be no official process for investigating potential breaches and determining if they rise to the level of major. I think there's room for improvement here with a policy requiring a legal investigation much like the Department of Defense (DOD) collateral investigation process.

Ms. Grubbe: One of my concerns is that if the repercussions are too serious, then you risk non-reporting of incidents.

Admiral Dyer: We had discussions on contractual language. Do we need a defensive or offensive approach? I come down on carrot side of this . . . giving awards instead of giving penalties. Award fees work if they're large enough to motivate.

Ms. Grubbe: Who gets the reward? The worker? But sometimes these award fees go to the pockets of the owners of the firms and don't get distributed to the workers.

SHUTTLE RISK ASSESSMENT

Admiral Dyer introduced Mr. Frost to discuss the assessment of risks associated with the upcoming flight of the Space Shuttle.

NASA has been working the foam shedding issue hard on many fronts. During our first quarter review at Marshall, we looked at the External Tank modifications being considered. During this session we looked at the decision making process at the macro level. The foam shedding phenomenon is extremely complex. Tank designers have told us that the current design can't prevent all foam loss. The question is how much foam can be shed, when might it happen, and where will it go? Do you totally redesign the tank or try to improve the existing design? Redesigning is a lengthy process and could introduce new hazards of its own. NASA is taking the Continuous Improvement approach instead. Fixing the worst sources of potential foam loss first, then moving to next worst. Probabilistic Risk Assessments are being used to guide this process. With this approach, there is obviously a potential schedule risk since they could have to return the tank for modifications after it has been shipped. Tank designers have noted that the two predominant failure modes are void-divots and thermal cracking. Those two failure modes account for the majority of foam loss. In Safety Engineering, risk is generally characterized with two criteria: the probability of an event and its severity if it occurs. In the last flight, the foam hazard was characterized as having an infrequent level of likelihood with potentially catastrophic results. On the next flight, it is expected to be on the same order of magnitude even with possible improvements completed. Extensive Probabilistic Risk Assessment of this hazard is lacking because of the uncertainties surrounding the failure mechanisms. NASA's final decision will be based on engineering assessment of the effectiveness of the controls at the conclusion of testing. We were briefed that this risk acceptance decision would be made by the Shuttle Program Manager when all data are in. Several independent reviews are ongoing to aid in this decision. There are tests to verify that changes will do what they want them to do. The next two flights are considered critical to get data that ensure things are working as they should. In making their risk decision, the Panel strongly cautions NASA to carefully consider the fact that more than a minimum flight test crew is involved in the planned flights.

Discussion

Dr. Crippen: There've been some important changes. There's an understanding that the models won't give them the requirements that they need. Let's fix what we know is broken. To me, as one of the critics of modeling in the past, this is a much more realistic approach. The new foam hasn't been put into models yet. We would encourage that and do more simulations, so we can see if reality fits simulations. The Return to Flight Task Group (RTF-TG) encouraged

model testing and evaluation. There are other tools to be developed. Due to understanding of thermal cracking, then NASA should consider doing a tanking test. How do we determine what makes a test flight? The Contingency Shuttle Crew Support (CSCS) needs to be more thought out.

Dr. Donahue: It's reasonable to think of CSCS as an option. I think we found on RTF-TG that there's an understanding of a reasonable duration. It is a risk mitigator, but only for mitigating residual risk. NASA debated if you had damaged Shuttle, would you send up CSCS or just bring back the damaged Shuttle.

Dr. Crippen: There are fewer assertive tests. Our choice is to fly with the tank as best as we can make it. There's still risk.

Admiral Dyer: Wayne Hale's leadership is something that you can't help but respect. He's a straight shooter, frank with what he knows and doesn't know. He's a good listener. The Program needs to put the following into three buckets: a list of decision points/tests which have firm pass/fail criteria and analytical data, a list of decision points/tests which will have firm pass/fail criteria and analytical data prior to the Flight Readiness Review (FRR), and the third which will not have firm pass/fail criteria or analytical data and will require folks to use good engineering judgment. The goal is always that the third bucket will be empty, but that is never the case. What we can establish today about go/no-go decision will be useful. The next FRR is going to require judgment calls on things that aren't finalized.

Dr. Crippen: Last flight, there were parts of the decision making process that were less than transparent and rushed. That might be inherent in the process of getting back to flight.

FUTURE OPERATIONS

Dr. Crippen: We've tried to sample the attitude of exploration development. What role does safety play? We got some fairly positive responses about how inherent safety was going to be in the design. We've had some changes in the design. We've lost a little of the focus on safety being the primary criteria on this. We try to get a sense of how important safety is in general. I think safety hasn't fallen off the table, but is not as prominent in the design criteria as it once was.

Discussion

Admiral Dyer: I agree. Organizations need a "significant undertaking" to facilitate dramatic change. At DOD, the BRAC was difficult to deal with, but it afforded an opportunity to rethink how to do business. Similarly, the start of a new, big program such as Exploration affords an opportunity to shape NASA's culture. In our recommendations of last year, we strongly purported that NASA should take advantage of making safety a centerpiece on new programs.

Mr. Marshall: Safety Culture has been a focus of CAIB, all recent administrators and, of course, the ASAP. I think there is no question that having a positive safety culture is critically important—not only for next Shuttle mission, but for all operations. It really needs to permeate throughout the Agency. Unfortunately, at times I get the sense that the daily challenges of everyday work sometimes undermine their fundamental values. I think Safety and Mission Assurance (SMA) is trying to provide measurements of the Agency’s safety cultures, but a standardized approach is not yet approved Agency-wide. This issue requires more work. I think they need to step it up a little.

Ms. Grubbe: If there’s no openness in the culture, then those questions aren’t going to get asked and everyone loses.

Mr. Frost: We have noted that in the rush to get Crew Exploration Vehicle (CEV) and Crew Launch Vehicle (CLV) development underway, there were some issues of not having top level requirements established before proceeding with development of subsystems. I think there’s much merit in the systems engineering process of working out top level requirements before subsystem design begins. NASA should use that approach to ensure that an orderly process is followed.

Dr. Donahue: I agree with John Marshall’s idea that uniform assessment tools should be adopted across Centers. Some of SMA’s tools are not really targeted at understanding culture. Some of their current tools may be able to be updated and adapted to better serve their purposes with respect to assessing culture.

Mr. Marshall: SMA will do a safety cultural focus in the fall. This is an area that requires more focus.

Dr. Donahue: Culture is a substantive question. An organization’s culture is made up of the values people share. People often think about culture as being the employees’ general satisfaction with the environment (i.e., culture is often characterized as “positive” or “negative”). Culture is actually a system of shared values.

Ms. McDevitt: One of the things complicating the Exploration program is the management of change. NASA acknowledges that it has a handle on safety requirements relating to the safety process. Now we have this new independent technical authority (ITA) that becomes the owner of the safety requirements having to do with technical requirements. At MSFC, they’re just now staffing that Level 3 program organization with Safety people. At JSC, the Level 2 program organization is just getting established. There are many changes being addressed at one time. This is a much more complex problem as organizational roles and responsibilities are being sorted out in support of NASA’s governance model.

Admiral Dyer: In the last meeting, we discussed how NASA is going to approach ITA. They haven’t reached the deckplates (i.e., the lower levels of the organization) with implementation. We shall continue to watch that with great interest.

RESPONSE TO THE COLUMBIA ACCIDENT INVESTIGATION BOARD RECOMMENDATIONS

Admiral Dyer introduced Ms. McDevitt to discuss the update of NASA's response to the Columbia Accident Investigation Board Recommendations.

Ms. McDevitt: NASA responds to the CAIB recommendations periodically. They just published the 11th Implementation Plan. Actions still remain based on the Return to Flight Task Group (RTF-TG). They indicated that 12 recommendations had been completely met. We note three open recommendations. There's still analysis and wind tunnel testing ongoing before we can make a determination that there's an acceptable level of risk for the next flight.

On orbiter hardening, there are additional actions NASA would like to take, however there haven't been any actions since the last ASAP report in January at MSFC.

NASA has been aggressively looking at inspection criteria and repairs that can be made on orbit. NASA will continue with these periodic status reports that go to Congress. There will be another implementation plan before the July launch. They expect an update in the fall before the next flight.

The ASAP is also mandated by Congress to monitor on NASA's progress on the CAIB recommendations. As a new ASAP member and having read the RTF-TG report, there was a section in the RTF-TG report that had a transition plan that turned over responsibility for the monitoring of the CAIB recommendations to the ASAP. There were general recommendations for the ASAP.

It bears repeating that the ASAP does not have the breadth and depth in technical expertise to perform the same type of oversight as the RTF-TG. We do intend to develop a plan so that we can probe and get a measure on the progress being made. We want to be involved in the critical design review of External Tank (ET) modifications, as an example, and looking at long term initiatives.

Discussion

Dr. Crippen: There were lots of suggestions in the RTF-TG report. We frankly didn't vet those the way we did with everything else. There was a repository of ideas. They're not bad ideas, but RTF-TG never said these are things that ASAP ought to look at. We have to ask NASA about non-RTF recommendations. We need NASA to tell us what it is doing with some things that are related to Return to Flight.

MEETING ADJOURNED

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

Mr. Jeff Morris, of *Aerospace Daily*, asked about an item in the Flight Readiness report about the number of things that are left to answer. One is removing the Protuberance Air Load (PAL) Ramps. In terms of your three “uncertainty bins,” what is your sense of where this one lies?

Admiral Dyer answered it’s in the second bin [items that have clear pass-fail criteria with the needed information expected in the future].

Dr. Crippen said he thinks some of the issues involved things are in the third bin [things that don’t have decision points with firm pass-fail criteria].

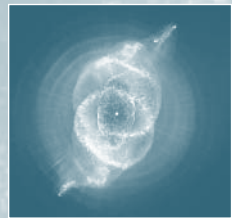
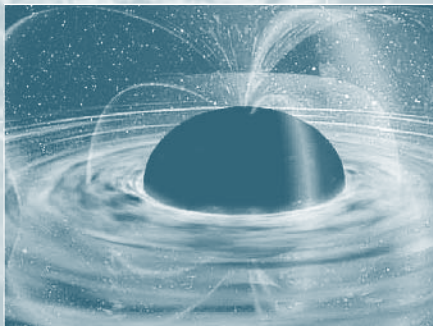
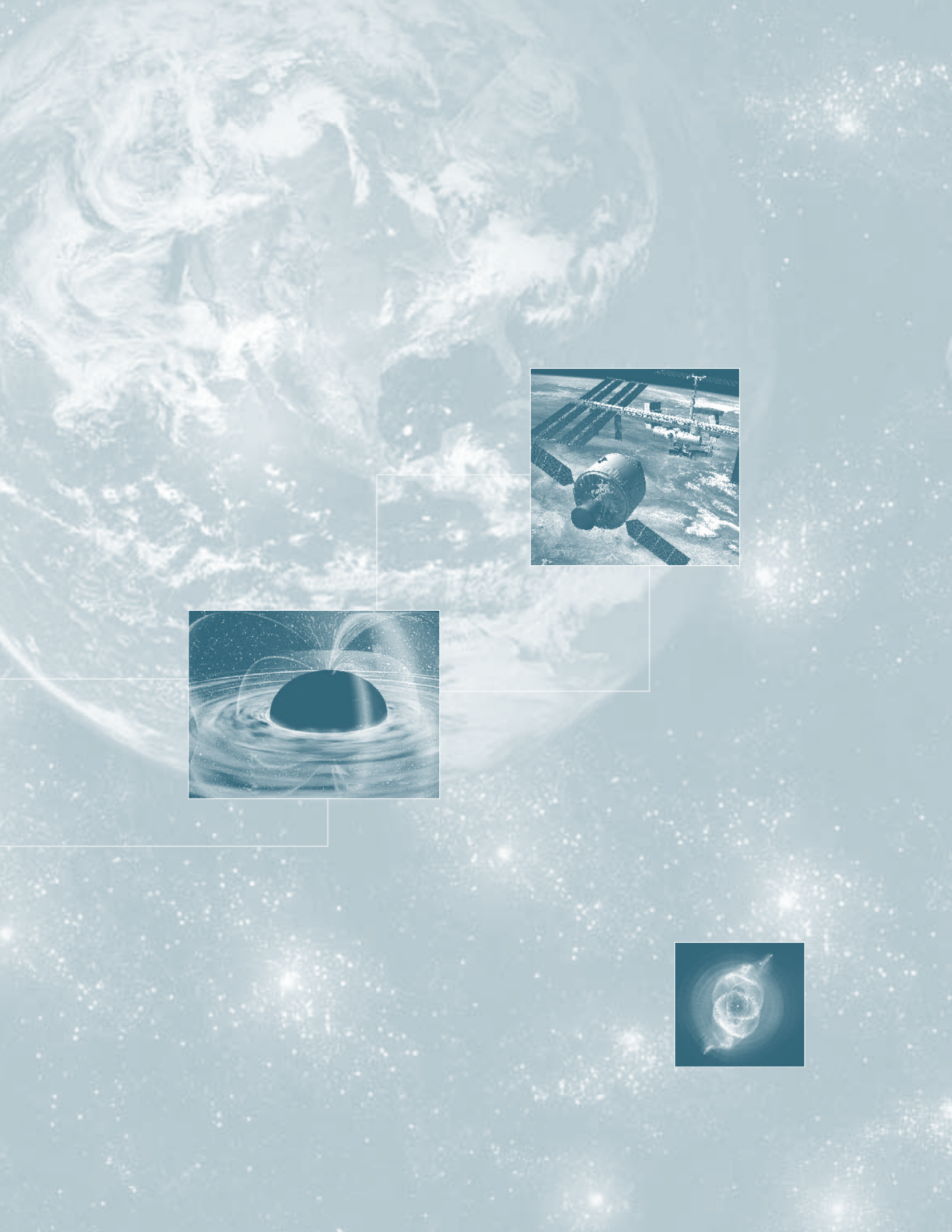
Hearing no further questions, the Chair thanked everyone present, and said goodbye.



SECOND QUARTER

III. Recommendations

ASAP



III. RECOMMENDATIONS

1. After our meetings at Headquarters, we carried away concern regarding the Space Shuttle Program having a clear list and tracked status of test and analytical results for modifications to the External Tank as they proceed toward the launch of STS-121. More specifically, we recommend that the Space Shuttle Program approach the STS-121 go/no-go flight decision with pre-established criteria in the following manner:

- a. Define a list of test and analytical results which have firm pass/fail criteria which are or can be established at this time.
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