

NASA AEROSPACE SAFETY ADVISORY PANEL
National Aeronautics and Space Administration
Washington, DC 20546
VADM Joseph W. Dyer USN (Ret.), Chair

August 8, 2012

Mr. Charles F. Bolden, Jr.
Administrator
National Aeronautics and Space Administration
Washington, DC 20546

Dear Mr. Bolden:

The Aerospace Safety Advisory Panel (ASAP) held its Third 2012 Quarterly Meeting at Kennedy Space Center on July 19-20, 2012. We greatly appreciate the participation and support that was received from the subject matter experts and support staff.

The Panel submits the enclosed Minutes and Recommendations resulting from this meeting for your consideration. As part of its response to our recommendations, we request that NASA provide an Agency Point of Contact (POC) and the expected completion or implementation date for the action(s).

Sincerely,

A handwritten signature in black ink, appearing to read "J W Dyer". The signature is fluid and cursive, with a large initial "J" and "W" and a smaller "Dyer".

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

Enclosures

ASAP RECOMMENDATIONS, THIRD QUARTER 2012

2012-03-01 Software Assurance and CMMI Requirements [ASAP point of contact: Don McErlean]

Finding: The ASAP learned that NASA is working toward a Capability Maturity Model Integration (CMMI) Level 3 development standard across the Agency. The documentation seems to indicate that is in place now, but the ASAP would like that to be confirmed.

Recommendation: All NASA internal safety-critical software development groups should achieve CMMI Level 3 (or an equivalent as established by external validation agent) by the end of FY 14.

Rationale: Compliance and accreditation at CMMI Level 3 is a requirement for bidding on most U.S. government contracts; NASA should require the same level of performance regarding its internal software related activities. It should also be noted that reduced life cycle cost is one of the expected results of adoption of the CMMI process, which may provide added benefit to NASA if this course of action is adopted.

2012-03-02 Software Assurance Metrics [ASAP point of contact: Patricia Sanders]

Finding: ASAP believes that NASA has a comprehensive software assurance process, but would like to see some evidence that the process is working.

Recommendation: NASA should provide metrics and trends that demonstrate whether the software assurance provisions are working and provide return on investment.

Rationale: While the processes seem to place emphasis on providing software assurance, progress toward that goal should be measurable. NASA should be measuring the effectiveness of their software assurance processes in order to have confidence that they are providing the expected value.

2012-03-03 Software Independent Verification and Validation (IV&V) Requirements. [ASAP point of contact: Patricia Sanders]

Finding: NASA has clarified the processes and criteria used to prioritize safety-critical software for IV&V and has put IV&V in the overall context of software assurance. The process and criteria seem to be reasonable, but the Panel is concerned that there is not a standard for identifying what level of criticality should require IV&V.

Recommendation: NASA should establish a standard identifying the level of criticality that requires software IV&V, i.e., at what risk level must IV&V be required and therefore either be resourced, or if that is not possible, a formal waiver process be in place for an accountable individual to accept the associated risk and document it.

Rationale: Software constitutes a known risk area in any system design and development. After the software is identified as having exceeded a known and defined level of criticality (as measured above) then IV&V is needed to assure that the risk is mitigated. If this is not done then the reason for risk acceptance needs to be formally documented as it would be for any other known accepted risk.

2012-03-04 Revised Estimate of Loss of Crew (LOC) and Loss of Mission (LOM) for the International Space Station (ISS) [ASAP point of contact: Jim Bagian]

Finding: On the upcoming increment, some additional Micro-Meteoroid and Orbital Debris (MMOD) shielding will be installed on ISS. Also, additional MMOD shielding for Soyuz is now underway and is expected to be complete by 2014. This MMOD protection will change the LOC and LOM numbers regarding ISS.

Recommendation: Revised estimates for both LOM and LOC for ISS due to both MMOD and other causes through 2020 (based on the current configuration) should be determined and compared to the data previously supplied in this regard which predated any of the recent MMOD hardening that has been implemented on ISS.

Rationale: Previous data supplied to the ASAP indicated that over a 10-year period, there is a greater-than-30-percent chance of LOM, which in some cases could result in an off-nominal de-orbit of the ISS. The actions being taken now are intended to mitigate that risk somewhat, but it needs to be quantified.

2012-03-05 Five Year Roadmap for Continuous Improvement of the Agency's Mishap Investigation Process [ASAP point of contact: Bob Conway]

Finding: The Five Year Roadmap is on track to deliver a product that will improve mishap investigation efficiency and quality with the exceptions of 1) addressing the details of the training and training process of Mishap Investigation Team (MIT) members and investigation board chairs, and 2) being tied to the lagging drug and alcohol testing policy development. The plan does a good job of addressing the time limits of the public release of the investigation report and the investigation endorsements, and accounts for entities that will eventually be involved in commercial space missions.

Recommendation: Link status reports of the five year mishap investigations process plan with progress reports on the NASA drug and alcohol policy development. Also, continue to report on the training of the MIT and the investigation Board Chairs in greater detail to include the method, consistency, and quality of training for MIT members and Board Chairs.

Rationale: It is necessary to have formal, high-quality, and consistent training. It can make the difference between a program that investigates mishaps and a program that makes a difference to the institution and carries lessons learned forward.

Updates to existing recommendations:

2010-02-02 NASA Headquarters Mishap Investigations and Process/Plan and **2008-01-06 NASA Headquarters Mishap Investigation**

Briefings received. Recommendations closed.

2010-02-03 Taurus XL Mishap Documentation

Discussed post-meeting; Recommendation closed.

2011-02-04 Safety and Mission Assurance (SMA) Software Assurance

Briefing received. Recommendation closed.

2011-01-01 Alcohol Testing Policy [ASAP point of contact: Jim Bagian]

A small amount of progress has been made; in particular, a determination was made that a breathalyzer test would be acceptable, rather than a more expensive type of test. However, no definitive action has been taken that put in place policy and procedures that require testing for alcohol involvement following a mishap for civil service and contractor personnel. One of the first steps that the ASAP had been informed would take place was to talk with the labor partners and as of the time of the briefing it was reported that this had still not been accomplished along with the lack of any other concrete implementation of the required actions to satisfy the alcohol testing requirement. Currently, there is a meeting scheduled with the NASA Deputy Administrator to brief her on the plans, and a briefing with the labor partners is planned for later this fall. The alcohol testing policy has been an open action in one way or another since 2006 with virtually no meaningful progress over this period of time. There appears to be very little sense of urgency based on the failure to bring this issue to closure over a period of six years.

The SMA Office agreed to report back to the ASAP at the next quarterly meeting in October as to the status of activities in regard to the alcohol testing policy. The ASAP emphasizes that it would like to have an understanding of when all of the outstanding actions will be completed and when the associated plans and policies will be fully implemented fully.

2012-01-02 ISS De-Orbit Capability [ASAP point of contact: Jim Bagian]

The Program is developing plans for a single Progress, which would be used for off-nominal end-of-life (EOL); for the planned EOL, there would be two Progress vehicles that would provide more impulse and better targeting on the impact point. More work needs to be done on the modifications to Progress, and that work is going ahead. The ASAP is satisfied that work is progressing at a rate that makes sense. The Program still needs to report back on how it would deal with the off-nominal occasion. The ASAP would like to see finalization on the end-of-life (EOL) plan.

**AEROSPACE SAFETY ADVISORY PANEL
Public Meeting
July 20, 2012
Kennedy Space Center
Cape Canaveral, FL**

**2012 Third Quarterly Meeting
Report**

Aerospace Safety Advisory Panel (ASAP) Attendees

VADM (Ret.) Joseph Dyer (Chair)
Dr. James Bagian
The Hon. Mr. Claude Bolton
Capt. Robert Conway
Mr. John Frost
Dr. Donald McErlean
Dr. George Nield
Dr. Patricia Sanders

ASAP Staff and Support Personnel Attendees

Ms. Harmony Myers, ASAP Executive Director
Ms. Susan Burch, ASAP Administrative Officer
Ms. Paula Burnett Frankel, Technical Writer/Editor

NASA Attendees

Gerry Schumann, NASA HQ, OSMA
Linda Euell, NASA KSC
Russell Romanella, NASA KSC
Lori Thurow, NASA KSC, SMA
Rob Ellison, NASA KSC, SMA
Brett Pearce, NASA KSC Co-op
Rick Boutin, NASA KSC, SMA
Laura McDaniel, NASA KSC, SMA
Lisa Malone, NASA KSC, PAO
Scott Chandler, NASA HQ, HEOMD
David Facemire, NASA KSC, SMA
Pepper Phillips, NASA KSC, GSDO
Josie Burnett, NASA KSC, ISS GP&R
Jose Nunez, NASA KSC, ISS GP&R
Tim Lewis, NASA KSC, SMA
Shakil Ferdousi, NASA KSC, SMA
Beau Peacock, NASA KSC

Other Attendees

Keith Jones, USA SQ&MA
Lisa Waters, USA SQ&MA
Pam Underwood, FAA
Greg Koch [not affiliated]
Ellen Conway [not affiliated]

OPENING REMARKS

VADM Joseph Dyer called the ASAP's Third Quarterly Public Meeting of 2012 to order at 11:30 am. He noted that this was an historic day—43 years ago on this date, Neil Armstrong set foot on the Moon after having departed Kennedy Space Center (KSC). The ASAP's host at KSC was the Center Director, Mr. Robert Cabana, and VADM Dyer recognized and complimented his leadership. The staff at KSC have shepherded this organization through a very challenging time. There is much work left to be done, but KSC's transition from Shuttle to the future is better than the Panel could have hoped for, thanks to the institution's leadership. With respect to the workforce, the ASAP has been impressed with the energy and future focus of everyone with whom the Panel has dealt.

VADM Dyer noted that the ASAP, as part of its charter, holds a series of fact-finding meetings around the country. Two days prior to this quarterly meeting, the ASAP met with some of the Boeing Corporation's managers and staff and had an opportunity to hear their thoughts on commercial space and talk with them about their activities. Previously, the ASAP had visited with SpaceX and Orbital Sciences. In the next few weeks the ASAP will be making other visits to include Sierra Nevada and Blue Origin. VADM Dyer commented on the richness and diversity of approach among this distribution of American companies, large and small. Boeing enriches the competitive pool on the experience side, with a strong corporate history of aerospace disciplines and system engineering. VADM Dyer also made some observations on the larger pool of companies interested in providing

transportation to low Earth orbit (LEO): The diversity extends from companies that are young, quick, and innovative, to companies that are more experienced, competent, but probably slower and perhaps more expensive. This leads to questions about acquisition strategy that the Panel has discussed: Will the government make a source selection decision based on lowest cost but technically acceptable or on best value? How will safety play out in that distribution? These are important questions. The ASAP has noted a trait common to both commercial space and NASA's Space Launch System (SLS): pursuant to flexibility, design is preceding requirements. The Panel is very focused on closing the gap between the two. If the provider or builder is designing ahead of the requirement, there are questions: What is it I need to build to win? What does the customer want? The requirements are the buyer's tool and if design is out in front of requirements, there is the risk of "having the cart before the horse." The Panel understands the uncertainties—budget, requirements, and approach, and notes that progress being made on closing the gap. Everyone will be better off when that happens.

TECHNICAL AUTHORITY

VADM Dyer noted that "Technical Authority" was highlighted in the Columbia Accident Investigation Board (CAIB) report, and this topic has been of continuing interest to the Panel. Dr. Don McErlean reported on the briefing by Mr. Mike Ryschkewitsch, NASA's Chief Engineer, on NPR 7120.5, Revision E. In this briefing, Mr. Ryschkewitsch expressed that it was his view that very little had changed in the revision to the document, and that they were still maintaining a separation of authority between the programmatic chain and the institutional chain. The ASAP has some questions concerning that aspect. It was the Panel's original impression that the intent was to separate the programmatic chain from the technical competency chain which is a path that does not necessarily flow through institutional structure. The ASAP expects to have more questions, especially concerning the impact of re-introducing the requirement that the institutional chain of command be a required part of the flow process for technical concerns and non-concurrences. The ASAP is not yet satisfied that the new revision does not constitute a fundamental alteration of the technical authority process and this topic is continuing under review. The Panel requested some action items from Mr. Ryschkewitsch for the next meeting to help clarify the impact of this policy revision. Mr. Ryschkewitsch pointed out that a key difference in the new policy is that Technical Authority now flows through the Center Director. His view was that this strengthened the process because the issues could be worked by the Center Director before they needed to flow to NASA Headquarters. While this can be positive, the Panel was concerned that the new policy does not mandate that if there is a continuing non-concurrence, the issue must be elevated. The Panel thinks that this is an important part of the process that must be maintained.

The ASAP looked at three particular issues that had been generated through the CAIB report. First was the separation of Technical Authority between schedule and cost management and the technical expertise to solve the questions or concerns. The second issue was a separate Safety and Mission Assurance (SMA) organization, which is still maintained. The third issue was the concern that there were cultural impediments that would only be resolved with the input of top-level leadership. The ASAP's concern now revolves around the formal re-insertion of the institutional structure into this process. The ASAP has asked Mr. Ryschkewitsch to come back at the next quarterly meeting and provide the Panel with his view of three particular topics: (1) How is the integration and resolution of issues generated by disagreement between the program and Technical Authority resolved, especially across multi-center programs? (2) What is the formal acceptance process if, at a particular level, there remains a stated non-concurrence, and where is that risk acceptance or formal process codified? (3) Why is the process being changed? Because there are fewer multi-center programs than before? The general consensus was that the process was good before. Mr. Ryschkewitsch has agreed to bring back answers to those questions at the next quarterly meeting. On the positive side, the ASAP noted that he is auditing the process to make certain that in any resolution discussion, there is not a communications breakdown or any place where a disagreement on risk has not been elevated. The ASAP agreed that monitoring the process is important. Mr. Ryschkewitsch stated that they are also utilizing Equal Employment Opportunity (EEO) / Inspector General (IG) and safety survey data, mishap reports, close calls, and accident reports to keep track of metrics associated with this program to make certain that there are no indications that risks are not being identified.

VADM Dyer added that the criticality of Technical Authority springs from the CAIB. There was recognition that dissenting opinions and concerns could not be directly or easily elevated. There was a lot of work done during prior and current Administrators, and it was improved. If someone doesn't feel an action is right or safe, is there a requirement to elevate that concern, or does it become an "act of courage" rather than an "act of obligation?" If it is a requirement, in the form of an automatic, decision-level elevation in the event of Technical Authority non concurrence, and hence an act of obligation, an individual has a solid place to stand.

SPACE LAUNCH SYSTEM (SLS)

Mr. John Frost commented on the SLS briefings. The ASAP received a good overview on all the activities of the Exploration Systems Development (ESD) organization, the key elements of which are Orion and the SLS. These are critical—the ability to

develop best procedures ride on the back of these cornerstone programs. The ASAP saw a detailed master plan of what has been accomplished and is ahead in the near future. A scrub of the 21 top-level requirements has just been completed, and there were a number of modifications. One was an adjustment to the crew size and the addition of the number "0" to allow for the uncrewed first flight, EFT-1. For the near term, weights have been adjusted—the "tactical" mass has been adjusted from 30,257 kg to 33,350 kg to reflect the current capabilities and design. That is expected to improve in the long term. There were no changes to the human rating requirements or loss of crew (LOC) probabilities that were discussed at the last meeting. They are still under development for the out years. The ASAP encourages those to be solidified as soon as possible to drive design. One change of interest was the adjustment to the reentry velocity that needs to be withstood. Previously, it was set at 11,500 m/sec; it was reduced to 11,200 m/sec for a couple of reasons: one was that the program didn't need that velocity for the test flights; but the more important reason is that the current technology will not support the higher number, and NASA has to advance the state of the art to achieve it. It sounds like a small change, but energy absorbed is proportional to the square of the velocity, so it is actually a significant change (about 700 mile/hr difference).

On Orion, there have been several successes: the flight software has been delivered for verification; the crew module closeout friction stir welds have been completed; the heat shield carrier layup is ongoing; and parachute test five has been completed. This is significant because parachutes have always been a high risk item in returning capsules. SLS also completed a number of milestones. Flights of Orion are coming up in 2014 and 2017, and the focus is on those first two flights. The biggest risk is the funding profile for this program—a flat profile. Normally, major developments require a funding curve with more resources needed as development progresses. In this program, that "bump" is not there, and it will be challenging beyond 2015.

ALCOHOL TESTING POLICY

Dr. James Bagian reviewed the status report that the ASAP received recommendations that go back six years. In 2006, the ASAP recommended that NASA develop a policy that would provide for post-mishap incident testing for drugs and alcohol. Not much progress was made through 2010. The ASAP again made a recommendation in 2011, and yesterday the ASAP received a report on the status to date. Some progress has been made—a determination was made that a breathalyzer test would be acceptable, versus a more expensive type of test. However, no further action has been taken with regard to informing unions and labor partners. NASA is proposing changes to the Federal Acquisition Regulation (FAR) supplement, which would enable inclusion under NASA's contracts. However, this may take at least two years to institute. The ASAP believes that there are more immediate things that could be done. Progress has been disappointing; it has been over six years since this problem was identified, and there is still no solution. Dr. Bagian noted that the Panel continues to hear many reasons about why things cannot be done, but not much about how it will get done. Currently, there is a meeting scheduled with the Deputy Administrator, Ms. Lori Garver, to brief her on the plans, and a briefing with the labor partners is expected later this fall. The SMA Office will report back to the ASAP at the next quarterly meeting in October. The ASAP emphasized that it would like to have an understanding of when all the action will be completed and the new policies implemented. There appears to be very little sense of urgency. VADM Dyer noted that the Panel feels strongly that when there is a fatal accident, any responsible organization should be able to answer the question: Were drugs or alcohol involved?

SOFTWARE ASSURANCE

Dr. Pat Sanders reported on the very thorough and informative presentation that the Panel received from Ms. Martha Wetherholt, Software Assurance Manager in NASA's Office of Safety and Mission Assurance (OSMA), on NASA's software assurance processes with all its components—quality, safety, reliability, verification and validation (V&V), and independent verification and validation (IV&V). Clearly, a great deal of emphasis and effort is placed on software assurance. The Panel would like to see metrics, trends, and return on investments to indicate the extent to which the software assurance processes are working. The presentation responded to an earlier ASAP recommendation (2011-02-04) to analyze the impact to NASA's critical programs by not doing 100 percent IV&V for software assurance. Ms. Wetherholt clarified the processes and criteria used to prioritize safety-critical software for IV&V as well as put IV&V in the overall context of software assurance. The process and criteria seem to be reasonable, but the Panel is concerned that there is not a standard for identifying what level of criticality should require IV&V, i.e. at what risk level must IV&V be required and therefore either be resourced, or if that is not possible, a formal waiver process be in place for an accountable individual to accept the associated risk and document it. The ASAP recommended that such a policy or standard be established.

Additionally, a question arose during the briefing with regard to cyber-threats and ensuring software security, which seemed to the Panel to be a key element of software assurance or at the very least closely aligned with it. The ASAP understands that NASA policy is for the Chief Information Officer (CIO) to hold responsibility for software security, and therefore requests a briefing from the CIO on this topic and how it interacts with software development and software assurance processes.

On another positive note, the ASAP learned that NASA is working toward a Capability Maturity Model Integration (CMMI) Level 3 development standard across the Agency. The Panel would like to see a firm deadline on that. The documentation seems to indicate that is in place now, but the ASAP would like that to be confirmed.

Mr. Frost added that when it comes to IV&V and software safety in general, there are a couple of parts to it. One is analyzing the software; the other is which software should be analyzed. There are many ways of deciding that. One of the key players in helping to decide that is the safety engineer, who understands the hardware in which malfunctions could cause hazards. It appears that NASA is utilizing some of the outputs of the system safety program to decide which software needs analysis, and the ASAP would like to get a briefing from the systems safety community on how they directly and formally feed into that process and how they are tied together.

MISHAP INVESTIGATION PROCESSES AND PLANS

VADM Dyer introduced one of the new ASAP members, Capt. Robert Conway, USN, whose background includes leadership and direction at the Navy School of Aviation Safety. Capt. Conway noted that the ASAP received a good briefing from Mr. Gerald Schumann on mishap investigation processes and plans. In response to the ASAP recommendations (2008-01-06 and 2010-02-02), OSMA has written a 5-year strategic plan/roadmap for continuous improvement. The NPR is being rewritten to increase the efficiency and improve the quality of the Mishap Investigation Program (MIP). The ASAP believes that the action has several positive aspects: it is designed to improve the efficiency and quality of the process; it defines a public release/endorsement timeline; it involves a mechanism to resolve endorsements and disputes; the FAA and commercial entities are accounted for, and this will continue to evolve as time goes on; and it includes post-mishap drug and alcohol testing. Capt. Conway recommended that when the ASAP receives updates on the alcohol testing policy it should be wrapped into the mishap investigation process as well. On the down side, the plan did not appear to be very robust in the training area. The ASAP would like to see more about how training would be accomplished. It is necessary to have formal, high-quality, and consistent training. It can make the difference between a program that investigates mishaps and a program that makes a difference to the institution and carries lessons learned forward.

NASA FACILITIES AND INFRASTRUCTURE

VADM Dyer introduced the other new member, the Honorable Mr. Claude Bolton, a retired Air Force Major General and former Assistant Secretary of the Army for Acquisition, Logistics and Technology. The Hon. Mr. Bolton again noted the importance of the day and the tremendous accomplishment Neil Armstrong's event was for NASA and the country, and the unfortunate overshadowing of this accomplishment by the tragic events that occurred in Aurora, Colorado earlier in the day. He discussed the briefing given by Ms. Olga Dominguez, Assistant Administrator in NASA's Office of Strategic Infrastructure, on the status of NASA facilities and infrastructure. It was very positive. The organization has a strategy, a plan, and metrics. NASA will renew and modernize its facilities to sustain its capabilities and to accommodate those capabilities in the most efficient facilities set practical. Another way of saying this is: "divesting without diminishing." There are facilities from which NASA needs to divest itself, but at the same time keep the capability to serve the mission it has today and the mission it will have in the future. On the planning side, there is a Center Master Plan that includes stakeholders that are both NASA and non-NASA. The plan includes assessments and a risk cube applied to facilities that includes safety. The program has three parts: reliability-centered (predictive) maintenance, planned maintenance, and repairs. On the construction side, there are several elements: major repairs, repair by replacement, program funded, and demolition. There is a backlog, and that backlog is being used to help in the decision process. On the metrics side, there is the risk cube and assessments and charts on facilities and the condition of those facilities. The objective is to manage all this and make sure all the players who need to make the decisions (particularly for the major facility investments)—the Executive Council, the Mission Support Council, and the Program Management Council—have what is needed. This process is merged with the funding process. Overall, it was a good package. Because of changes on the budgetary side, NASA may want to take a look at focusing more attention on mission and safety and consider developing a metric that tells the Agency how well it is doing in those areas. Overall, it was a good, well-balanced briefing that told the ASAP what it wanted to know. VADM Dyer added that the quality of the presentation was a real step forward and reflective of the good work that is going on.

Mr. Frost noted that there is still a huge shortage of dollars to repair facilities. Funds needed for predictive maintenance have been used to ease budget pressures elsewhere. The Centers have been maintaining their prioritization based on mission and safety. For some time, the ASAP has been asking about how NASA rolls that up at the Agency level and ensures a valid distribution of funds. At this meeting, the Panel received a good presentation on how prioritization is done at the top level. To close out the action, the ASAP would like to get copy of the printout. The Hon. Mr. Bolton commented that the presentation pointed out how the Centers are working together to address the priority items and drive the average year downward.

INTERNATIONAL SPACE STATION (ISS)

Dr. Bagian commented on the briefing that the ASAP received from Mr. Mike Suffredini, ISS Program Manager. It was a positive briefing. New work that provides improved ranging information has been done on the Progress vehicles. On the upcoming increment, there will be some extravehicular activities (EVAs) performed that will accomplish some additional Micro-Meteoroid and Orbital Debris (MMOD) shielding and changes in cable routing. As far as research work on ISS, the average of the last several months for payload operations has been 37.1 hours per week on the US side. The mission requirement is 35 hours per week. While they are meeting the requirements overall based on the average, there is some variation week to week. In the crew health area, they are tracking radiation exposure, and it has been below 24 millirad/day, which is the requirement. There is concern going forward for the 2013/2014 period because that is the solar maximum, and there could be additional radiation exposure issues. Another thing that has come up in the past and is still a concern is the issue of ocular change (papilledema) that may be due to increased intracranial pressure, which has been showing up in some crew members. Some of the changes on orbit have not gone away when the affected crew return to a 1g environment. This does not affect all crew, and it is actively being investigated. Mr. Suffredini recommended that the ASAP get a briefing about this sometime in the future. Various maintenance upgrades were discussed. ISS has had upgrades in the communication system that provides a dramatic, five-fold increase in uplink and downlink data rates as well as two additional audio communication channels.

Mr. Suffredini discussed the additional MMOD shielding for Soyuz. That is now beginning to be implemented, and is expected to be complete by 2014. The MMOD protection will change the LOC numbers in a positive direction. There are preliminary numbers for LOC, but not LOM. The ASAP was supplied previous data that indicated that over a 10 year period, there could be up to a 32 percent chance of LOM. The actions being taken now will mitigate that risk somewhat, but it has not been quantified. Mr. Suffredini agreed to report back to Panel on how the new changes will affect the LOC and LOM numbers and compare them to the past projections. On the commercial space topic, the SpaceX launch in May was a highly successful mission, with good coordination between NASA and SpaceX to accomplish docking to the ISS. Orbital Sciences has milestones in the fall and is proceeding according to plan. With regard to the end-of-life (EOL) issues that have been discussed before—i.e. what would happen in either an off-nominal issue that would require ISS de-orbit or the nominal EOL de-orbit—additional work has been accomplished on these topics. In the past, proposals for using Progress to provide impulse to de-orbit had been discussed. The Program is developing plans for a single Progress, which would be used for off-nominal EOL; for the planned EOL, there would be two Progress vehicles that would provide more impulse and better targeting to hit the impact point. More work needs to be done on the modifications to Progress, and that work is going ahead. The ASAP notes that work is progressing in a positive direction. The Program still needs to report back on how it would deal with the off-nominal scenarios. The only formal recommendation is to obtain a revised estimate on the LOC and LOM numbers in light of the modifications that have already taken place and the ones that are forecast. Mr. Frost added that the ASAP would like to get finalization on the EOL plan.

The Hon. Mr. Bolton commented that he was impressed with the amount of activity on ISS. Dr. McErlean added that several meetings ago, there was a discussion about the potential extension of the life of the ISS from 2020 to 2028. At that time, the ISS team said there were some systems on board that would need recertification to extend their lifetime into that period. The ASAP requests an update on this situation so that it can be tracked. While it is a future requirement, it would seem that early planning will prevent a “snowball” situation on certification requirements as the end of design life point approaches. Since it now appears that the leadership of the country is likely to extend the ISS lifetime beyond 2020, the ASAP would like to track this recertification activity so that should any re-design of a system be necessary there is adequate time to accomplish the work needed.

SPACE X CHECK VALVE

With respect to this topic, VADM Dyer noted that there were some constraints on what information could be disseminated at a public meeting, based on International Traffic in Arms Regulation (ITAR) restrictions as well as SpaceX proprietary data. The Hon. Mr. Bolton stated that everyone is aware that at about T minus 0.07 seconds, there was an automatic shutdown on the SpaceX launch in May. The problem was found to be due to a check valve. The process used to return to a launch position was described during the briefing, which was made by Mr. Scott Henderson, Director of Mission Assurance for SpaceX. The ASAP understood from NASA's report that the process was effective and efficient, turning around for a second successful launch attempt in three days; it was thorough, robust, fast, and transparent to NASA. The ASAP saw no objections. VADM Dyer observed that the turnaround was so fast that there was initially some concern on the Panel's part that sufficient work may not have been done to identify root cause. However, after further review, the ASAP was satisfied with how this class D-equivalent mission was treated.

COMMERCIAL CREW UPDATE

Dr. George Nield discussed the briefings the ASAP received from Mr. Phil McAlister, Director of Commercial Space Flight Development, and Mr. Ed Mango, Commercial Crew Program Manager. They discussed several different aspects of the overall commercial spaceflight program and reviewed commercial cargo efforts, including the SpaceX successful demonstration flight in May. Orbital Sciences is coming up on their test activities, including a hot fire test at Wallops later this summer, a test flight later in the fall, and a demonstration flight to the ISS about three months later. Following those demonstrations, both companies expect to get into the Commercial Resupply Services (CRS) program, where each company will be delivering cargo to the ISS. The ASAP was told that each company already has five flights in the flow.

Commercial Crew Development 2 (CCDev 2) is ongoing. Under that program, seven different companies are involved. Four are receiving NASA funds: Blue Origin, Boeing, Sierra Nevada, and SpaceX. Three are working under unfunded Space Act Agreements: ULA, ATK, and Excalibur Almaz. All of the agreed-to milestones are being rapidly worked off, and all should be completed by the end of the year. It has been a very successful effort so far.

Commercial Crew Integrated Capability (CCiCap) is planned to be a 21-month program from roughly August 2012 to May 2014, with optional milestone periods after that. The selection effort is currently underway. NASA expects to announce the award later this month or in August. This is all aimed at having a commercial crew services capability by mid-2017 under FAR-based contracts, once NASA has certified the commercial companies to be able to carry NASA astronauts. In the past, the Panel has expressed some concerns on how best to transition from the Space Act Agreement environment, which allows rapid progress and a good “decision velocity”, to the more structured and rigorous effort that would be involved with a FAR-based contract. It is very important to the ASAP to be assured that there is transparency and understanding by the companies on what NASA needs and wants, and by NASA understanding what the companies plan to provide so that there won't be any surprises at the end. There was some discussion about how NASA is attempting to meet those concerns. The ASAP is pleased with the progress and looks forward to the final decisions on how that will be implemented.

SAFETY METRICS

Mr. Frost reported that there is good news on this topic. Several years ago, the ASAP found that the NASA centers seemed to have a good analysis of their safety metrics—accidents, causes, and trends—but didn't see a centralized program that did the analysis Agency-wide, looking for lessons-learned and transferring them across centers. NASA has made excellent progress on a number of fronts in this regard. In the metrics area, they have gone from no centralized analysis to robust and comprehensive centralized analysis. The ASAP was briefed on that analysis by Mr. Alan Phillips, Director of the NASA Safety Center. The NSC has taken the safety metrics action forward—analyzing it, briefing it, examining it, and using it at the highest levels in NASA. It is paying benefits—effort is being focused in the right places. Even better news is that the accident rate continues to come down, year after year. Core metrics are improving, e.g. there has been a 13 percent reduction in injuries since last year and a 23 percent reduction in damage mishaps. The mishap rate has gone down 30 percent since 2008. The NSC is focusing on specific areas that need work. Mr. Frost congratulated the NSC and recommend that the ASAP move from a quarterly metrics briefing to an annual or semi-annual one in the future. Capt. Conway complimented NASA for pushing that information out to the general workforce in addition to the supervisory and management levels. Dr. McErlean commented that the area that continues to be a principal cause of accidents across all centers is vehicular and traffic accidents. NASA Headquarters is preparing a special report and guidance that is quite good. The ASAP hopes that will be distributed to all employees to emphasize everyone's need to be careful while driving.

VADM Dyer noted that the next three topics are good news.

SPACEPORT STATUS

Ms. Joyce Riqueime is heading up the KSC Planning and Development Office for the Spaceport. She laid out the history of this effort, starting with the 50-year plan that was done in 2002. The ASAP was impressed with the fact that she is running a business office; she has the right people and can probably get more expertise. The Hon. Mr. Bolton noted that there are some challenges—some are regulatory, some are statutory. This will be a long-enduring venture. He recommended that NASA consolidate those challenges and develop some type of mitigation strategy. VADM Dyer added that this is a way to preserve important national infrastructure that both the government and industry can use.

GROUND SYSTEMS DEVELOPMENT AND OPERATIONS (GSDO)

Dr. Bagian summarized the briefing by Mr. Pepper Phillips, the KSC GSDO Program Manager. The overall goal is to provide sustainable, affordable, and safe ground operations and integration capabilities required to extend the human presence across the solar system. There are two basic initiatives: the Exploration Ground System (EGS) and the 21st Century Space Launch

Complex. Efforts are in place to facilitate both SLS and Orion activities. The developments and steps needed for SLS and Orion can also be available for Spaceport activities and can be utilized by the commercial space sector, e.g., for horizontal launch and landing, the clean pad concept, and horizontal and vertical processing. The challenges are recognized. The Program is looking at a lot of the resources and expertise that KSC has developed over the years and how to adapt those to more efficiently support SLS and Orion as well as be available to the private sector through various partnering activities.

KSC SMA STATUS

The ASAP heard from the new KSC SMA Director, Mr. Russell Romanella. He spoke openly and proudly about the SMA transitions at KSC from an operations-centered activity to a design and development-centered activity. It is a significantly smaller-sized organization. The Center SMA is down 22 percent as of 2012 and will probably be down about one third in 2013. There is good coverage of safety activities and safety tracking. At KSC, there is obviously a strong safety culture and an appreciation of the people that work here and the people who are served.

There were no public comments, and VADM Dyer adjourned the meeting at 12:32.