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Statement of

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Before the

Subcommittee on Space & Aeronautics
Committee on Science
United States House of Representatives

Mr. Chairman and Members of the Subcommittee:

Thank you for this opportunity to appear before you today to discuss the status and future of NASA's Space Shuttle Program (SSP).

As the new Associate Administrator for the Office of Space Flight (OSF) and the Human Exploration and Development of Space (HEDS) Enterprise, I am excited about sharing with you my vision and plans for the Space Shuttle program. As a former Shuttle pilot and mission commander, and also NASA's former Associate Administrator for Safety and Mission Assurance, I have spent a great deal of my career focusing on the safety of NASA's precious resources – our workforce of on-orbit and ground crews, and our Shuttle fleet. There is nothing more important to me than the safety of the men and women who dare to risk their lives in service to our country. They deserve nothing less.

I am committed to continuing to meet the Space Shuttle goals of: 1) flying safely; 2) meeting the manifest; 3) improving supportability; and, 4) improving the system. It is my personal goal to ensure that we take advantage of the Space Shuttle's tremendous capabilities for meeting NASA's mission to understand and protect our home planet, to explore the Universe and search for life, and to inspire the next generation of explorers, as only NASA can.

It has been twenty-one years since the Space Shuttle Orbiter Columbia made its maiden voyage. This first flight was evidence that the U.S. space program was continuing its leadership in human space exploration. NASA knew then that it had developed the most reliable, capable, and versatile space transportation system in the world. It remains the world's only human-rated reusable launch vehicle. No other country's space programs have come close to matching the accomplishments of the Space Shuttle. The Shuttle enables humans to live and work in space, provides the opportunity for commercial development of space, and allows us to enjoy the benefits of discovery. The Space Shuttle maintains the capability to deliver crew and cargo to the International Space Station (ISS). It can act as a research platform for microbiology, pharmaceuticals, material science, mapping, service our spaceborne telescopes, retrieve disabled satellites, and serve as a testbed for the reusable vehicles of the future.

In FY 2001, NASA flew seven Shuttle missions, five of those launched during a six-month period in support of the ISS. The Space Shuttle delivered to the ISS solar arrays for power (STS-97); the U.S. Laboratory Destiny module (STS-98); the ISS Robotic Arm, Canadarm2 (STS-100); the ISS Joint Airlock Quest (STS-104); and three ISS crew transfers (STS-102, 105, 108). Additionally, the Space Shuttle accomplished its 60^{th} space walk, the 100^{th} by an American, and it flew its first improved Block II flight engine (STS-104). Last month the Space Shuttle successfully serviced the Hubble Space Telescope (HST).

This first decade of the new millennium will see new challenges to the SSP. We will be implementing a prioritized list of Shuttle safety and supportability upgrades, revitalizing the Shuttle infrastructure, successfully assembling the ISS, and retaining a skilled workforce of both civil servants and contractors. At a minimum, the new challenges include investigating options of competitive sourcing for Space Shuttle operations, and using the Space Shuttle as a possible pathfinder to developing new technologies that could be used in a next generation reusable launch vehicle (RLV).

The current SSP budget supports flying four flights in FY 2003, five flights in FY 2004 (four ISS and one HST servicing mission), then four flights per year. The transition to an adjusted flight rate of four flights per year does not require that this rate will remain constant for the coming years. NASA is working to ensure that limiting the Shuttle flight rate will not have undesirable cost and technical impacts to Agency programs. The SSP can support additional flights assuming the requesting organization (NASA Enterprise, DOD, other) provides the necessary funding. Attachment 1 shows the launch schedule for FY 2002 through FY 2003.

Each Space Shuttle orbiter's structural airframe was designed to fly approximately one hundred missions, and as of today, the entire orbiter fleet still has almost three-fourths of its usable life remaining. This means that we can fly the Space Shuttle through 2012 or beyond if necessary. Currently, airline companies and the military are flying 737 and F-18 aircraft whose airframes are 25 – 30 years old. These aircraft began flying before the Space Shuttle and they are still flying today because as new technologies were developed these aircraft were updated to enhance their capabilities. Shouldn't we be doing the same and provide the Nation with the best, most capable human access to space until our next RLV is available? While others are working to overcome the limitations of current space travel, we in the Space Shuttle program must continue to provide a safe and reliable vehicle for human access to space.

Space Shuttle Upgrades: Safety and Supportability

For the Space Shuttle to successfully continue accomplishing its goals, it must implement Shuttle upgrades that will increase flight safety and improve systems reliability. NASA has established a goal of developing and certifying the current suite of safety upgrades by 2005 with implementation into the fleet by 2007. Additionally, I have tasked the Space Shuttle Program to assess upgrade investments required to safely fly the Space Shuttle through FY 2020. This does not in any way indicate an agency decision to fly Shuttle until 2020; however, we believe it is prudent to understand this information as a contingency.

Space Shuttle Upgrades fall into two categories: high-priority safety upgrades (to improve system safety) and supportability upgrades (to mitigate obsolescence issues). The Space Shuttle Upgrades Program is a strategic and proactive program designed to keep the Space Shuttle flying safely and efficiently in order to meet Agency commitments and goals for reusable human access to space.

The selection process for establishing the Space Shuttle upgrades content is based on prioritization of candidate upgrades that undergo a rigorous systems analysis. The goal of this process is to develop and maintain an integrated suite of baselined upgrade projects that have been selected for optimal compliance with the Space Shuttle Upgrades Program objectives.

Space Shuttle safety upgrades provide significant reductions in operational risks in the orbiter flight systems -- the main engine, external tank and solid rocket boosters. These risk reductions are achieved by implementing design or manufacturing changes that eliminate, reduce, or mitigate significant hazards and critical failure modes, and therefore, significantly increase the overall reliability of the Space Shuttle system. Attachment 2 depicts the "Loss of Vehicle-on Ascent" probability curve for the various safety improvements made to the Space Shuttle over the life of the program.

Supportability upgrades provide replacement equipment for those existing flight element systems which are becoming obsolete and which will not reliably support Space Shuttle operations in the coming years. These upgrades are generally in response to an increasing failure rate or decreasing efficiency due to age and wear, increasing repair time due to component or technology obsolescence, a reduction of serviceable spares through attrition, or a lack of vendor support for repairs or replacement parts.

The current suite of upgrades candidates is in various stages of formulation and implementation. Authority to proceed for each upgrades project is not given until a thorough definition phase has been completed, an independent assessment of project cost, schedule and technical feasibility has been performed, and the NASA Headquarters HEDS Program Management Council has given its approval for implementation.

A list of safety and supportability projects is provided (Attachment 3). This list outlines projects that will be implemented, the potential improvement to the particular flight element, and the project status.

Space Shuttle Upgrades and the Space Launch Initiative (SLI)

NASA's strategic goals for a next generation space transportation vehicle are to significantly reduce the risk of crew loss, reduce ground processing times in addition to other lifecycle cost drivers, and thus reduce the overall costs of access to space. The plan for achieving these goals is the Integrated Space Transportation Plan (ISTP). NASA currently spends nearly one-third of its budget on space transportation; the ISTP is NASA's strategy for reducing these costs and thereby making these funds available for NASA's core science research, technology development, and exploration activities. Note, plans are currently underway for an Agency update to the ISTP where NASA will revisit our current and future technology investment decisions.

ISTP is the governing framework that coordinates and guides NASA's various space transportation investments, including Space Shuttle improvements, SLI, and far-term technology. ISTP is the decision path by which NASA ensures continued access to the International Space

Station, invests to reduce its human space flight transportation costs, and avoids duplicative or unnecessary human space flight transportation investments. ISTP consists of three major components:

1. Space Shuttle Improvements – Improvements to the safety of the Space Shuttle through ground and flight system upgrades, and facilities revitalization;

2. Space Launch Initiative – Risk reduction and development of a lower cost, safer, privately operated space transportation capability to replace the Space Shuttle early next decade; and

3. Far-Term Technology – Investments in far-term space transportation technology to maintain a technology base for future vehicles.

ISTP calls for a decision at mid-decade (2006), depending on progress in SLI risk reduction, on whether to undertake full-scale development of a new human space flight transportation available by early next decade.

As the only reusable human-rated launch vehicle, the Space Shuttle is being used as the "lessons learned" reference point for the SLI program. The Shuttle integrated operations models are the starting point for developing SLI architectures and assessing proposed and maturing technologies. In addition, the Space Shuttle offers a potential platform for evaluating and demonstrating the performance of SLI prototype equipment.

Space Shuttle Competitive Sourcing

Since the early 1990s, the annual operations cost of the Space Shuttle has remained flat, absorbing the costs of inflation by implementing operations efficiencies and completing a series of contract consolidations. In FY 1997, United Space Alliance (USA) was awarded the Space Flight Operations Contract (SFOC) to transfer day-to-day operational responsibility for the Space Shuttle from NASA to industry.

The President's Management Agenda provided the guidance for NASA to evaluate competitive sourcing initiatives for the Space Shuttle. In October 2001, NASA chartered a Shuttle Privatization Task Team to perform a top-level definition and assessment of potential business options for competitive sourcing. This team identified potential options that are being further researched during follow-on activities. The key challenges to competitive sourcing of the Space Shuttle are centered on ensuring that safety is not compromised while at the same time achieving further cost benefit to the Government.

NASA is continuing the Space Shuttle competitive sourcing effort, having chartered an independent external Space Shuttle Business Review Team in January 2002. This team consists of predominantly industry expertise in financial, banking, investment, insurance and technical disciplines. The Business Review Team will investigate the business case models, market, and challenges for competitive sourcing of the Space Shuttle. NASA intends to use the Business Review Team's evaluation to prepare for interaction with industry in mid to late summer 2002.

Space Shuttle Infrastructure

In addition to investing in Space Shuttle upgrades and consolidating Space Shuttle operations, investment in infrastructure revitalization is a priority for NASA, given that much of its infrastructure is over forty years old and in need of repair or replacement. Infrastructure includes facility structures, ground support systems, and test support equipment. The SSP infrastructure extends across all aspects of the SSP from manufacturing, assembly, testing, transportation, processing, launch and landing. Over the past ten years, the investment in Space Shuttle infrastructure was severely limited, due mainly to annual budgets that were unadjusted for inflation, and other Agency priorities.

SSP maintains a prioritized list of Space Shuttle infrastructure investments required at the Kennedy Space Center (KSC), Marshall Space Flight Center (MSFC), Johnson Space Center (JSC), Stennis Space Center (SSC), White Sands Test Facility, and the Michoud Assembly Facility. The highest priority projects are at the Launch Complex 39 (LC-39) area at KSC for both Launch Pads A and B, and the Vehicle Assembly Building (VAB). The Program's prioritized list of projects is reevaluated yearly during the Program Operating Plan cycle.

Space Shuttle Workforce Status

NASA is making key investments in recruiting, training, and retaining a dedicated and skilled workforce. At the end of FY 1999, OSF undertook an assessment of its staffing requirements at the field centers. Our internal assessment of core civil service workforce requirements at the four Space Flight Centers revealed that full-time equivalent (FTE) targets would have to be adjusted upwards. In late December 1999, each Center was directed to address critical SSP workforce shortfalls. The objective was to hire employees to support flight safety and the Space Shuttle Upgrades program, including addressing critical skill shortages. Since January 2000, we have seen our Space Shuttle FTE levels grow from a FY 1999 base of 1819 to a planned FY 2002 level of 1986 FTEs.

The SSP has made significant progress in addressing the skills imbalance identified in 1999; however, like other programs its has been impacted by normal attrition. Having completed two consecutive years of hiring, our FY 2003 hiring efforts will target critical skills.

Space Shuttle External and Internal Reviews

NASA continues to maintain a strong interaction with the Aerospace Safety Advisory Panel (ASAP), the Space Flight Advisory Committee (SFAC), a subcommittee of the NASA Advisory Council, and other external groups that will provide valuable assessments on improving the Space Shuttle system. We are currently reviewing the March 2001 ASAP report and we will provide input to ASAP in the coming months. Also, the SFAC is scheduled to provide the Office of Space Flight an assessment on the SSP this coming May.

Aside from managing Agency programs and projects using formal NASA procedures and guidelines, OSF is establishing three new internal review groups. First, an OSF Management Council will be formed to integrate and streamline the management processes between the field Centers and OSF. The membership of this council will include the Associate Administrator (chairperson) for OSF, the directors for the Code M Centers (JSC, KSC, SSC, and MSFC), and the OSF Program Executive Officer (PEO). The program managers for both the Space Shuttle and the ISS will be under the authority of the PEO.

Second, the Institutional Advisory Council will provide recommendations on improving the management of institutional resources (facilities modification, facility and ground support equipment utilization, workforce planning, etc.) that support OSF Programs. And third, the establishment of a Scientific and Technical Advisory Council will be responsible for providing recommendations on integrating the scientific and technical goals of OSF Programs.

Finally, Leadership of human space flight must start at the top – at NASA Headquarters, and specifically in the Office of Space Flight. To that end, I have resumed chairing the Flight Readiness Review for each mission, which had been delegated down to the center.

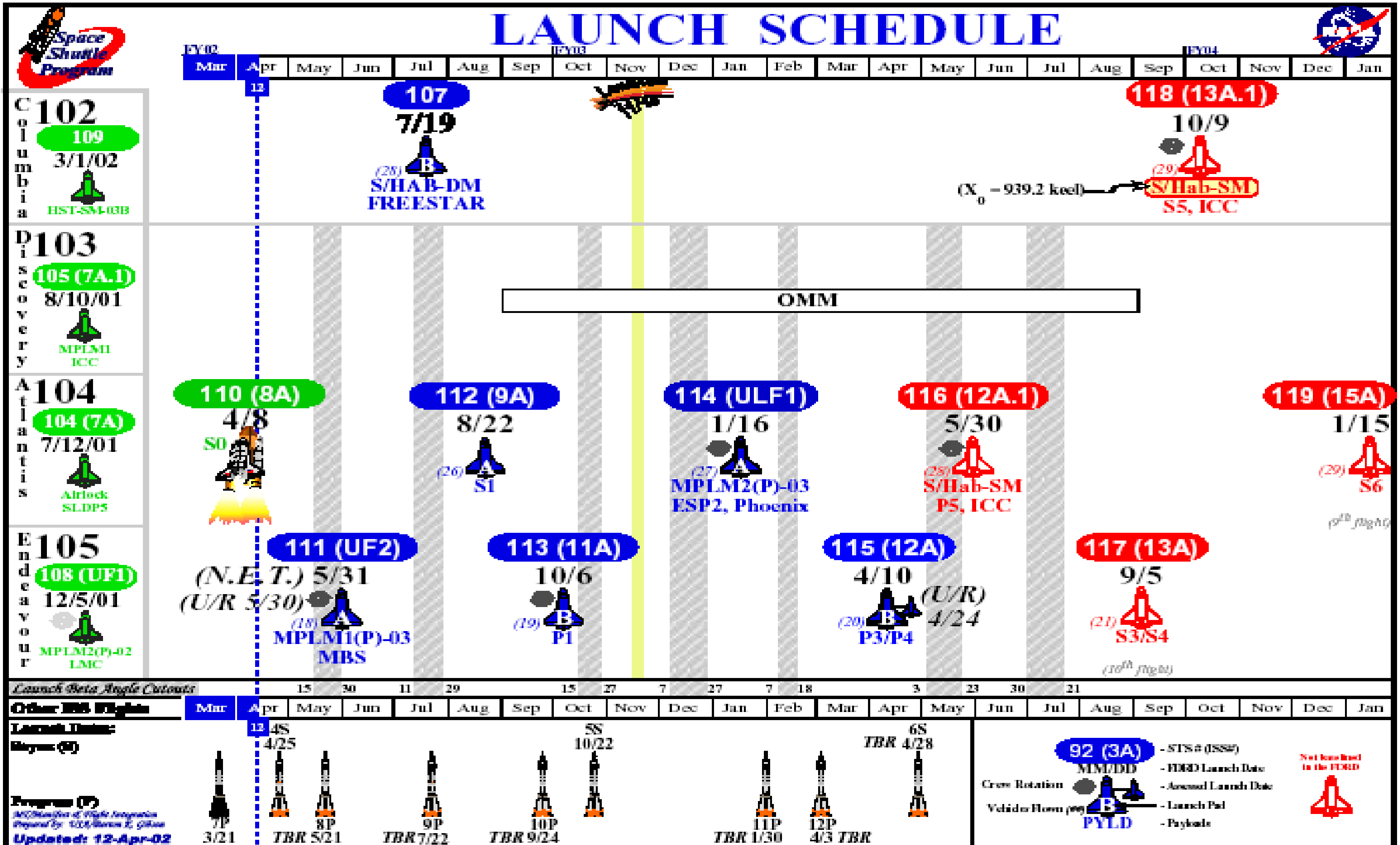
Conclusion

Mr. Chairman, safety continues to be our top priority at NASA. The National leadership and every American taxpayer have every right to expect the Space Shuttle Program to safely and effectively implement program plans, operate efficiently, and provide the Nation the benefits of space exploration and discovery. The men and women of NASA are committed to maintaining the Space Shuttle Program as a safe world-class human-rated space transportation system. This will be accomplished with timely investments in safety and supportability upgrades that will be required for as along as we are asked to fly. Additionally, investments will be needed in maintaining a strong corporate knowledge workforce of civil servants and contractors who will operate and improve the present system, and thus train the next generation RLV workforce.

I look forward to working with members of this Committee and the Congress, in structuring the Space Shuttle Program in a manner that will provide the greatest scientific and social benefits to the Nation.

Mr. Chairman, this concludes my remarks. I would be happy to answer any questions you may have.

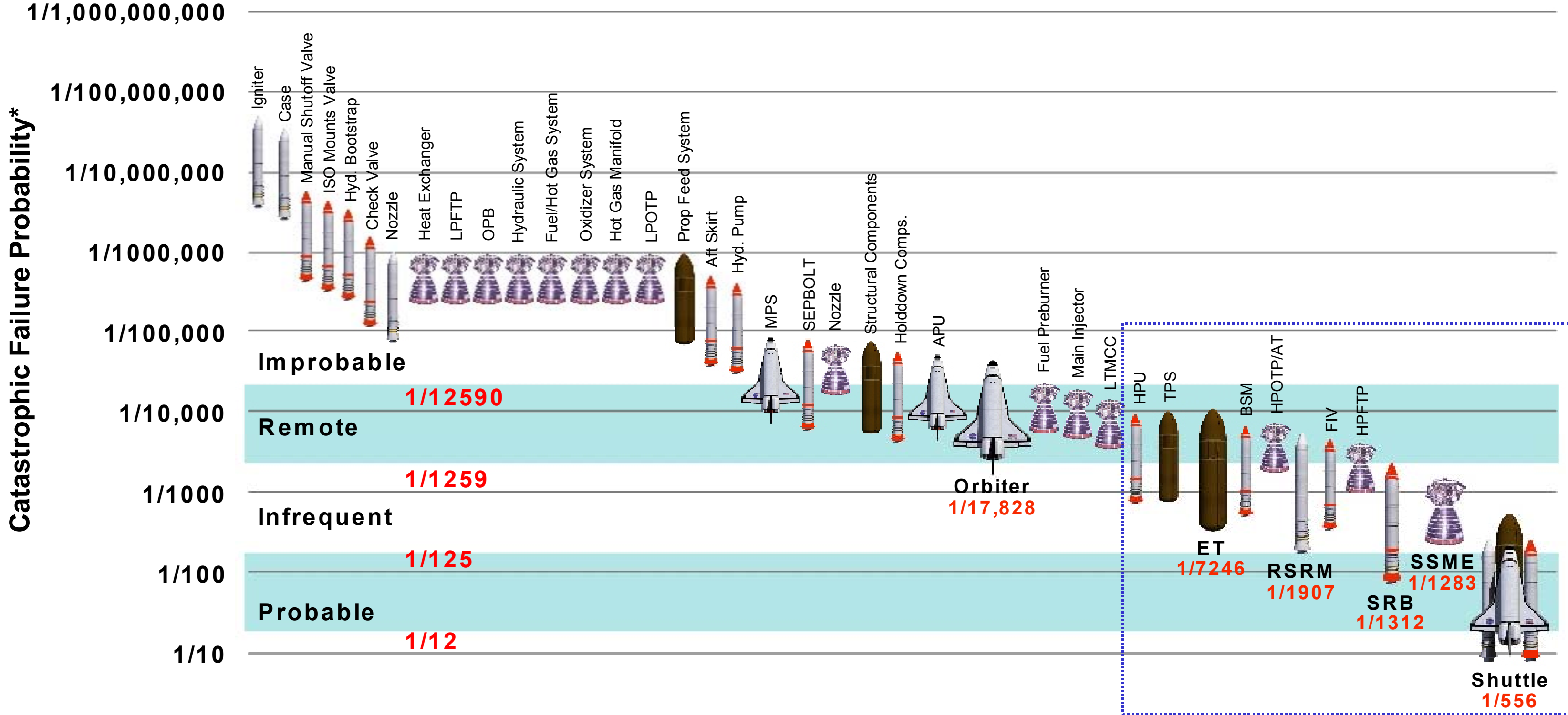
Attachment 1.0



*This schedule represents the only official Space Shuttle Program Launch Schedule as baselined in the FDRD, Table 4.1. It can be viewed on the Internet at: http://ssp web.jsc.nasa.gov/mldata/ssp/webdata/mchome/ssplndex.htm

Attachment 2

LOSS OF VEHICLE - Ascent



* Based on 2000 QRAS

Attachment 3

April 2002 Status Of Safety Upgrade Candidates

Project	Potential Safety Improvement Metrics	Status
Cockpit Avionics Upgrade	**Aircrew errors are responsible for 50-60% aviation accidents. High crew workload and loss of situational awareness are significant sources of error. CAU implementation will greatly improve situational awareness while reducing workload.**	**Increment 1 Approved** Increment 2 Deferred (No FY-03 Funding)
Space Shuttle Main Engine (SSME) Advanced Health Management System (AHMS)	**~19% ascent risk reduction** **~9% mission risk reduction**	**Phase I Approved** Phase II Under Review* (No FY-03 Funding)
Solid Rocket Booster (SRB)/ Thrust Vector Control (TVC)	**~9% ascent risk reduction** **~4% mission risk reduction**	Deferred (No FY-03 Funding)
External Tank (ET) Friction Stir Weld	**Manufacturing reliability**	**Approved**
Orbiter Main Landing Gear (MLG) Tire/Wheel	**Increase landing speed and load margin**	**Approved**

ATTACHMENT 3 (continued)
April 2002 Status Of Supportability Upgrade Candidates

Supportability Project	Potential Supportability Improvement Metric	Status
Checkout and Launch Control System (CLCS)	Wider access to test data; advanced processing applications	Approved
Device Driver Unit (DDU)	Increased reliability; simplifies crew procedures	Approved, *1st flight on STS-109*
Modular Memory Unit (MMU)	Solid state technology; power savings; weight savings mitigates obsolescence issues	Approved, *1st flight on STS-110*
Long Life Alkaline Fuel Cell (LLAFC)	Extended cell life; reduced cycle voltage losses; reduced operating temperatures	Approved
SRB Range Safety Command Receiver-Decoder (CRD)	Eliminates a criticality 1 failure mode; mitigates obsolescence issues	Approved
SRB Altitude Switch Assembly (ASA)	Improves Built-in-Test equipment and power protection	Approved
RSRM Nozzle/Case Joint J-Leg Insulation Design	Eliminates potential of hot-gas intrusion in the nozzle-to-case joint; improves reliability	Approved