National Aeronautics and Space Administration
Washington, DC

NASA ADVISORY COUNCIL

February 7, 2008

NASA Headquarters
Washington, DC

MEETING MINUTES

Paul A. Iademarco
Executive Director

Harrison H. Schmitt
Chair

NASA ADVISORY COUNCIL
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David J. Frankel & Paula Burnett Frankel

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The Council meeting was convened by Sen. Schmitt at 9:20 a.m.

Opening Remarks

Sen. Schmitt, the Council Chair, thanked the staff for their hard work in making the past several days a success. He stated that the meeting was open to the public in accordance with the Federal Advisory Committee Act. Mr. Paul Iademarco, NASA Advisory Council Executive Director, advised the attendees that members of the public will need to be escorted when they leave the meeting room because the meeting was being held at NASA Headquarters. Sen. Schmitt introduced four new members: Dr. Jack Burns, who will serve on the Science Committee; Dr. Ilan Kroo, who will serve on the Aeronautics Committee; Dr. Ioannis Miaoulis, who will serve on the Human Capital Committee; and Dr. Lucy Fortson, who will also serve on the Human Capital Committee.

Space Operations Committee Report and Discussion

Sen. Schmitt introduced Dr. Stephen (Pat) Condon who was standing in for Chairman Paul Robinson. Gen. Condon described the briefings that had been given to the Space Operations Committee: Space Operations Management Directorate (SOMD) FY 2009 Budget Summary for Space and Flight Support, International Space Station (ISS), and Space Shuttle; the Lunar Architecture Team – 2 Next Steps (with Exploration and Science Committees); Constellation Mass Margin (with Exploration Committee); and Ares I Thrust Oscillation (with Exploration Committee). He observed that NASA is doing what they said they would do in the budget through 2010; however, there is virtually no reserve or margin, which is particularly critical on Shuttle and ISS. There is no room for delays, and any significant budget cuts or technical issues may mean content reductions. Gen. Condon expressed other concerns. After shuttle retirement, NASA will be looking to the Russians to provide transportation to ISS. There are provisions in the Iran-North Korea-Syria Nonproliferation Act that prohibits NASA from purchasing that service after 2011. Legislation will be needed to provide a waiver. He questioned how medium launch capability will be provided once Delta II is flown out (beyond 2009). He noted that NASA management is working on this through the COTS initiative. There is uncertainty over the costs associated with the Shuttle transition and retirement beyond 2010. It is not clear what those costs will be. Sen. Schmitt commented that NASA will not know what the situation will be regarding costs for access to the Space Station until next year. Gen. Condon noted that NASA management up to the Administrator is aware of this situation. Relative to the eventual transition of lunar outpost operation from ESMD to SOMD, Gen. Condon also noted that follow-up information has been requested by the Committee on suit-lock and sealing, as well as on the power budget for the rover system.

In response to a question from Sen. Schmitt, Gen. Condon stated that a Council "Observation" on Shuttle-Constellation transition issues would not be helpful. Col. Eileen Collins noted that the budget beginning in FY08 seems to be fairly stable. Sen. Schmitt explained that as the transition is approached, the Council should make recommendations on funding for access to the Space Station. Capt. Rick Hauck stated that it would be useful to encourage NASA to look at personnel issues relating to the transition. Sen. Schmitt asked all the Committees to begin thinking about the critical things that they would like to say to the next Administration on these matters.

Rear Adm. Benjamin Montoya described his recent site visits to Space Exploration Technologies Corporation ("SpaceX"). He is amazed at their apparent progress. They have indicated with some confidence that they will be conducting three launches within the year. They are about six months behind schedule. They will use a "Falcon" booster to launch a capsule named "Dragon." The second launch will be virtual docking with the Space Station. The third launch will be a "proof of the pudding" launch where they will dock with the Space Station, deliver some nominal cargo, and bring back some trash. Adm. Montoya will visit them every month and expects them to be mission-ready by November 2010. The founder of SpaceX, Elon Musk (also the founder of PayPal), said there are no issues regarding funding.

Sen. Schmitt noted that there is an ongoing competition for another Commercial Orbital Transportation Services (COTS) contractor, with an announcement expected momentarily. Once that contractor has been selected, the Committee should visit that contractor. There was discussion among Council members over whether Falcon was in the Delta II class and, if successful in development, might solve the Delta II problem. Gen. Condon indicated that he would get back to the Council with an answer.

Gen. Condon described Dr. Tom Jones' Altair Industry Day visit for the Altair Lunar Lander. In response to a question from Sen. Schmitt, Gen. Condon stated that there had been no discussion about reusing an already qualified lunar lander vehicle by refueling it and using it again for sorties from an outpost. Sen. Schmitt requested Gen. Condon to raise questions to assure that initial design would not preclude this option.

Col. Collins described the upcoming Hubble repair mission, scheduled for August of this year. It will be the fourth mission to the Hubble. She and Dr. Thomas Jones are satisfied that this mission is going very well. There is an independent review board that has been following this mission since its inception. The board has twelve aerospace experts, some with prior Hubble experience. Col. Collins noted that a rescue mission would be available for launch, if necessary. There will be no need for a call-up; instead, Endeavor will be processed on pad B and will be ready along with Atlantis on pad A. Endeavor will stand down if not needed. Sen. Schmitt asked whether parallel processing of two Shuttles could increase the probability of a delay. Col. Collins replied that there has been much discussion on that question, and that NASA is under no immediate schedule pressure to launch. Sen. Schmitt observed that a delay on this mission would affect future missions. He explained that NASA is preparing to be ready to launch two spacecraft on the same day, and he noted that these are the kind of issues that led NASA to not have two Saturn

Vs ready to go on the same day. There are double risks. Col. Collins reported that the launch is scheduled to take place during hurricane season. Capt. Hauck stated that NASA had been previously prepared to have two Shuttles in orbit at the same time. Col. Collins noted that Atlantis would have seven crew members and the rescue vessel would have only four crew members. The way the crew would transfer would be by Extravehicular Activity (EVA), using a rope between the two orbiters and shimmy across the rope.

Gen. Condon described other events that Dr. Jones had attended. Dr. Jones attended both an STS-120 and an Expedition 16 Mission Management Team meeting. Both are being planned and handled well according to Dr. Jones. The Council discussed the problem with repairing the solar array. Col. Collins noted that the array had been repaired. Dr. Logsdon stated that if it had extended another foot it could not have been reached. Sen. Schmitt explained that a "crawl-over" EVA could reach anywhere on the Station.

Gen. Condon stated that the Space Operations Committee had no recommendations at this time. He expects to have recommendations at the next meeting, including training the workforce on lessons learned, particularly due to the gap between missions. They want to make sure that the workforce does not lose the benefit of Shuttle-ISS experience. Sen. Schmitt asked the Committee to include how they bring new people into the workforce, how they apprentice people, and how they get people ready to take over from retirees. He noted that how they are integrated into the workforce is an operational issue.

At the request of a Council member, Gen. Condon agreed to inquire about whether it would be possible to be briefed on the COTS source selection criteria in order to get an understanding about how one entity is chosen over the other. He also agreed to find out whether an analysis of alternatives had been performed with respect to the demise of the Delta II.

Audit and Finance Committee Report and Discussion

Sen. Schmitt introduced Mr. Robert M. Hanisee, Chair of the Audit and Finance Committee. Mr. Hanisee briefed the Council on the results of the Committee's fact-findings, which included presentations on NASA's FY08 Audit Plan, the FY07 Financial Statement Audit Results, the Comprehensive Compliance Strategy, Earned Value Management (which Mr. Hanisee suggested could be an appropriate topic for a future Council meeting), an Update on the NASA Shared Service Center (NSSC) Transition, and a working lunch with NASA's Chief Financial Officer, Mr. Ronald Spoehel. Mr. Hanisee noted that the outside auditors, Ernst & Young, had declined to express an opinion on financial statements for FY 2007, or on the effectiveness of NASA's internal control over financial reporting. This was due, in part, to problems that continue regarding the retention of documentation related to property accounting. The basis for the disclaimer was two weaknesses: (i) financial systems, analysis, and oversight; and (ii) controls over property, plant and equipment. The audit report acknowledged, however, significantly greater granularity on control deficiencies and provides a useable road map for remediation. Ernst & Young noted some improvement in management; however, the auditor continued "to identify weaknesses in entity-wide internal control which impaired NASA's ability to report accurate financial information on a timely basis." Mr. Hanisee

reviewed recommendations for improvements that had been made by NASA's Office of Inspector General and by Ernst & Young. These recommendations include the following: (i) ensure that the Office of the Chief Financial Officer is staffed with properly trained personnel; (ii) ensure that accounting practices are consistent with applicable standards and are consistently applied; and (iii) establish internal controls that provide reasonable assurance that the financial statements are supported, complete and accurate.

Mr. Hanisee introduced Mr. Ted McPherson. Mr. McPherson reported that NASA's new Chief Financial Officer, Mr. Spoehel, has changed the focus from fixing individual problems on an *ad hoc* basis to putting a comprehensive process in place to bring NASA into full compliance with legal and regulatory requirements for financial management.

Grant accounting persists as a problem. NASA has 4,400 outstanding active grants totaling $850 million and will be going to grant-by-grant accounting. Improvements are being addressed to enhance the value of this portfolio through more effective definition of requirements, improved monitoring, interim assessments, and final reporting. NASA is moving forward cautiously with the NSSC. The transaction processing of accounts payable, accounts receivable, and fund balance with Treasury cash reconcilements has been moved from three Centers (Stennis, Dryden, and Marshall) to the NSSC. Additional work from other Centers is scheduled to be moved later in 2008. Mr. Hanisee described Earned Value Management (EVM) at NASA as a methodology for integrating scope, schedule, and resources, and for objectively measuring project performance and progress by quantifying progress and accomplishment. Implementation of EVM began at NASA one year ago under the Office of the Chief Engineer. There has been uneven application of EVM at contract and project levels. The Agency is committed to increased EVM use, however, to mitigate GAO "High Risk" areas. Mr. Hanisee stated that NASA's Executive Leadership, NASA's Inspector General, and Ernst & Young have independently expressed to the Committee improved confidence in NASA's Office of the Chief Financial Officer. This is a result of Mr. Spoehel's leadership in advancing progress already begun by Mr. Terry Bowie (Deputy Chief Financial Officer) and many other NASA associates, as well as the filling of several key vacancies in staff. Sen. Schmitt asked Mr. McPherson whether he had discussed relocating functions with the CFO. Mr. McPherson responded that the mandate should be deferred because it is not an immediate, pressing issue.

Mr. Hanisee described the Committee's concerns about managing the NSSC properly. He stated he was relieved over how intelligently the transition has been handled and noted that the individual Centers could not afford to make these changes. He is personally much less concerned today. There is now, for example, a sophisticated call center for contractors.

Mr. Hanisee observed that risks have declined significantly. Dr. Fisk remarked that within each Directorate, they will probe about the adequacy of the number of people in those offices, about too few people to keep track of the money, and how at the lower levels they need the same qualifications as the higher levels. Mr. McPherson stated that all Center CFOs now report to the Headquarters CFO and that has been constructive. Mr.

Hanisee observed that one problem has been getting each Center to work in a "One NASA" organization. The Committee has not delved into whether the Centers are adequately staffed. He reported that the new CFO at Goddard is demonstrating that One NASA is being implemented. Mr. Hanisee added that in terms of the NSSC and the $10 million in savings expected, those saving come from reduced FTEs at the Centers. This will be an incremental thing based on confidence in the NSSC. Mr. McPherson noted that the Centers now have additional detailed information and that the ability to have more accurate numbers at that level is very positive. Dr. Fisk observed that when he worked at NASA, he had four times the personnel available to assist him than is currently available. Mr. Hanisee agreed to take this under advisement. In response to a question from Col. Collins, Mr. Hanisee stated that the NSSC has about 400 employees at present, and that will increase to about 500 in the future. Mr. McPherson opined that more volume is needed.

Sen. Schmitt thanked Mr. Hanisee and Mr. McPherson for their Committee report.

Exploration Committee Report and Discussion

Sen. Schmitt introduced Lt. Gen. James A. Abrahamson, Chair of the Exploration Committee, who described the Committee's recent activities. They have maintained an ongoing review of Aries and Orion requirements development, contractual activity, and technical progress. They have continued to have discussions with NASA's Exploration Systems Mission Directorate (ESMD) related to the Council's Cyber Security Recommendation and have an increasing level of confidence in NASA's progress. With the Science and Space Operations Committees, they reviewed the Lunar Architecture Team (2nd Gen, referred to as "LAT-2"). There are multiple objectives for the LAT-2 trade off activities. One key objective is to validate the requirements for payload sizing, makeup, and scheduling for launch vehicles and support equipment. Similarly, power infrastructure must meet both vehicle and mission requirements. Gen. Abrahamson noted that LAT-2 is now moving very quickly, and they are doing a terrific job. They are working with interested international teams to assist their planning for Lunar Operations. Sen. Schmitt suggested that the LAT-2 briefing was disjointed at the conceptual level and that it was not clear to him how inputs from others were being integrated. He asked for a more specific tracking of the Council's recommendations. Dr. Owen Garriott stated that he is impressed by intensity of LAT-2 in going forward, but that they need to ensure that the concepts are aligned with the science requirements.

Gen. Abrahamson described the Exploration budget review. He stated that it was an outstanding example of process maturation.

Dr. David Longnecker reviewed the *ad hoc* Biomedical Committee's findings on health and medical initiatives. The Committee was briefed on the Lunar Science Institute (LSI) by Dr. James Green from the Science Mission Directorate (SMD). The LSI is newly formed, and is modeled after the NASA Astrobiology Institute. Sen. Schmitt asked whether the Committee had a feeling for what the LSI was going to add in terms of value. Dr. Longnecker responded that this question had not been addressed. Dr. Bradley Jolliff explained that lunar science research is very distributed and that basic research would be

integrated. Dr. Mark Robinson explained that the LSI is bringing people together for projects that require either lots of people or that will extend over long time periods. Dr. Longnecker stated that the Committee does not have a recommendation and needs to get a better understanding about the LSI and basic research for both the Moon and Mars. Sen. Schmitt asked whether the LSI will address the things that are going to be useful. Dr. Longnecker responded that it depends on the linkage with the biomedical aspect in the charter for the LSI. In response to Sen. Schmitt's question regarding whether there was a need for a recommendation, Dr. Longnecker indicated that it may be premature for a recommendation now since it would cause a recommendation for allocation of funds that may not be warranted. In order to understand the LSI more fully, the Committee wants to review it further between now and the next meeting at Stennis.

Dr. Longnecker reviewed NASA's response to the Committee's August 2008 lunar biomedical recommendations. The response has just been received and has not yet been fully digested. In most areas, NASA has been responsive to issues under its control. For example, the Council had proposed that a biomedical laboratory be established on the Moon and that it be designated a National Laboratory. NASA pointed out that NASA does not have the authority to make that designation; it is a role that belongs to Congress.

Dr. Longnecker reviewed the Skylab Medical Summit. He stated it was a very helpful meeting to prepare for Constellation because Skylab had a similar architecture. He noted that six of the nine crewmembers from Skylab were present. He discussed the key findings from the summit. EVAs, including suits and umbilicals, were not a problem, but gloves were restrictive and tiring. A water landing is not their favorite approach; terrestial landings are preferred. Long term muscle deconditioning impairs the ability to handle contingencies with water landings. Sensory-motor dysfunction, rough seas, and motion sickness can add to the effects of deconditioning. If water landing is required, they recommend lifting the whole vehicle, over entering a raft on the water. The crews strongly preferred reentry in flight suits, not pressure suits, in order to enhance mobility and performance, especially in contingency situations. Contrary to the later Apollo landings, the baseline now is pressure suits. Once undocking and vehicle integrity is demonstrated, the crews felt that flight suits were sufficient. Dr. Garriott opined that it is important, as a safety issue for handling contingencies, that pressure suits be used—for reasons other than pressure. Col. Collins noted that the baseline for Orion is water-landing. Dr. Garriott stated that the reason they switched to water landing on return from the Moon is because of weight problems. Capt. Hauck reminded the Council that these are comments from Skylab crewmembers. Sen. Schmitt suggested that NASA review the decision-making process from Apollo about water-landing versus terrestrial landing.

Sen. Schmitt thanked Gen. Abrahamson for his presentation.

The Council adjourned for lunch and reconvened.

Exploration Committee (continued)

Capt. Hauck described the Constellation performance briefing that was delivered to the Committee. He reviewed a chart on Lunar Design Reference Mission (DRM), predicted

margins, and management reserves. He reviewed a slide on the Total and Unencumbered Margin Status and a slide entitled "Required Total Project Margin by Phase." It shows that today, NASA is comfortable with a 25% reserve. Capt. Hauck noted that this gives the Committee a sense of comfort, but he added that this metric should be looked at continuously. Dr. Eugene E. Covert asked whether the data for the chart shown on the slide was consistent with past experience. Sen. Schmitt explained that for Apollo, the curves would be different due to the weight issues. Capt. Hauck responded that in his opinion, the chart was drawn based on experience. He reviewed a slide entitled "Constellation Program Summary Schedule" and a slide entitled "Preliminary Performance Margins Five Configurations." He recommended keeping close watch on a fail-safe system and Gen. Abrahamson concurred. Capt. Houck discussed the status of the Thrust Oscillation Focus Team. He noted that thrust oscillation is a recognized characteristic of solid rocket motors and that concern arises if pressure oscillations drive resonant modes in the vehicle structure. He noted that other launch vehicles with solid motors have dealt with thrust oscillation. A preliminary structural analyses conducted in support of the Ares Systems Development Review (SDR) indicates a potential resonant concern resulting in high dynamic g levels in Orion and the Ares Upper Stage. The Focus Team was formed to review analyses conducted to date and determine a path forward. Capt. Hauck reviewed the early conclusions. The frequency of the motor pressure oscillation is well understood to be a characteristic 1L standing (acoustic wave) and is a function of hot gas properties and length. The Ares I vehicle stack 1st and 2nd longitudinal modes are in the range of the primary acoustic frequencies of the 5-segment motor. Other launch vehicles may provide valuable information on thrust oscillation and mitigation. The magnitudes of the solid rocket motor (SRM) oscillation and the transmitted forces are not as well understood as the frequency. The immaturity of the Ares and Orion designs restrict any assessment of the impacts to sensitive subsystems to a qualitative assessment. The crew health limit is ~ .6 g reliability, maintainability, and supportability (RMS) at these frequencies and may be much lower ~ .25 g's for crew performance. Capt. Hauck then reviewed a slide entitled "Mitigation Approach & Schedule."

Capt. Hauck noted that the Committee had received a thorough briefing on the Exploration Systems budget request. Gen. Abrahamson observed that there are a lot of things that are maturing and that progress has been consistent. The Committee is not prepared to say they have a recommendation in any one area. Sen. Schmitt stated that he would like the Committee to consider a suggested recommendation concerning an increase over the last six to twelve months in the emphasis on a pressurized rover. A rigorous study needs to be made between current pressurized lunar rover concepts and the use of dual unpressurized rovers with on-board consumables access, taking full consideration of early exploration, flexibility and efficiency, launch and landed mass, and program costs. He noted that long term Lunar and Martian exploration and scientific instrument emplacement will require development of pressurized rovers. Mass, cost, and efficiency considerations, however, may favor unpressurized rovers with access to on-board consumables. Emergency solar particle event (SPE) protection during use of unpressurized rovers can be provided by floor shielding, trenching, and access to on-board consumables. Gen. Abrahamson agreed to take this suggestion in draft form and submit recommendations if appropriate. He noted that they have not asked the question

directly. Sen. Schmitt concurred with that approach, provided it is handled expeditiously. Gen. Abrahamson suggested reviewing it with NASA and getting back to Sen. Schmitt within a month. Sen. Schmitt emphasized that the question has been asked several times in several ways. Dr. Jolliff observed that what is driving the pressurized rover is the perceived requirement to get a long way from the outpost with astronauts. There is a need to look at the trade between human and robotic exploration activity. Dr. Garriott stated that an expanded mobility requirement affects design expenses. Sen. Schmitt expressed his expectation that the ESMD will be reading about these concerns. He has not yet seen a response, despite the fact that the questions were asked over a year ago. He explained that downstream, there will be a use for a pressurized rover, just as there will be a use for a re-usable lunar lander. These things need to be examined. He cautioned against making design decisions that preclude reusing the lunar lander. If it just landed, he explained, there is no obvious reason it cannot be refueled and reused. Gen. Abrahamson agreed to follow-up on the question.

Human Capital Committee Report and Discussion

Sen. Schmitt introduced Dr. Gerald L. Kulcinski, Chair of the Human Capital Committee. Dr. Kulcinski described the Committee's plans for 2008. They intend to look at four areas. The first priority will be to continue to work with the Exploration and Space Operations Committees in examining NASA's approach and progress in the transition from Space Shuttle Operations to those related to Constellation, including continued examination of issues related to workforce retention (especially contractor), facility maintenance and upgrades, and inclusion of all ten Centers in the Vision. They will continue to investigate NASA's educational strategy, aiming toward a recommended integrated approach that includes line, embedded and earmarked educational projects. They will examine communications and outreach capabilities and plans at NASA and recommend approaches for the Office of Communications Planning to better convey NASA's message about the Vision to the public and to the science and engineering communities. They will also investigate how to best focus management responsibility for human capital and other external affairs issues and document options for possible organizational structures to accomplish that focus.

Dr. Kulcinski presented the Committee's observations on the Office of Strategic Communications. Significant activities are planned for NASA's 50th anniversary. These activities, as well as the International Year of Astronomy, should have a positive effect on the public perception of NASA. There is concern that the 30% drop in the FY08 Public Affairs Office budget will not leave sufficient resources to get NASA's story out at a time that will be particularly vulnerable to congressional criticism. Finally, NASA TV needs to undergo a major overhaul to be more exciting and higher quality. A public/private partnership may be a solution. Col. Collins asked if the TV observation needs to be a recommendation. Dr. Kulcinski responded that it was a good comment, but due to rollover on the Committee membership, they are making no recommendations at this time. He added that there are also legal constraints to be considered. Sen. Schmitt explained that an overhaul does not necessarily mean a higher budget and suggested that the Committee should take it as an area for a recommendation to pass on to the

Administrator by the next meeting at Stennis. Dr. Kulcinski agreed with Sen. Schmitt's suggestion.

Dr. Kulcinski described the presentation that had been given to the Committee on NASA's Office of Diversity and Equal Opportunity (ODEO). The ODEO has 20 people and a $1.4 million budget. The Committee learned that about 20% of ODEO's time was being spent on conflict management. No major problems were identified. Dr. Kulcinski reviewed the briefing given by the Office of Small Business Programs on the status of small business programs in NASA. He noted that the overall government goal for the award of contracts to small businesses is 23%, but NASA has a special exception setting its goal level at 15%, but this does not include the contractor workforce. This year, NASA met its goal for the first time. Dr. Kulcinski explained that the shift in mission from Shuttle to the Vision for Space Exploration is having a major impact on the Small Business Program because NASA is consolidating work items that may make it more difficult to reach the goal in subsequent years. He also described a change made to the law in 2007 that will affect the way small business dollars are counted towards NASA's goals.

Dr. Kulcinski described the Shuttle-to-Constellation Workforce Mapping Activity that was performed by Ms. Jane Datta and Mr. Tim Sullivan. They noted that the Programs and Centers have made a good start by identifying gaps and surpluses, but need to go one step farther to get to specific disciplines. There were 1,746 FTE's working on Shuttle as of January 5, 2008, and over 95% of that workforce is located at Johnson, Kennedy, and Marshall. The average age is in the 45-49 range, which also happens to be the average age across the Agency. Dr. R. James Milgram opined that the age distribution is not a cause for concern, a conclusion Sen. Schmitt disagreed with. Dr. Kulcinski added that the Committee had looked for age abnormalities and found none. Dr. Kulcinski reviewed several graphs on the age of the Shuttle's workforce. He then described the NASA 2008 Workforce Plan. He reminded the members about the Congressional language governing the Shuttle to Constellation transition. It requires the Administrator to prepare a strategy for minimizing job losses. The strategy must maximize the utilization of existing civil service and contractor workforces at each of the affected Centers and make an effort to equitably distribute tasks and workload between the Centers to mitigate the brunt of job losses being borne by certain Centers. Dr. Kulcinski described methods under consideration for dealing with staff that cannot be carried over to the Constellation program.

Capt. Hauck observed that there is no indication how many years will be required for the transition. Dr. Kulcinski responded that that they are starting to get into this and will need two to three years of data to get accurate numbers. He explained that this is a unique situation, akin to going off a cliff; you need people up to a point, and then you don't need them. He described possible plans for an orderly reduction in force. One option is to pick up health care. He noted that buyouts have not been increased for a decade or so. Another option is to hire retirees on a temporary basis. These concepts need to be worked out with the Office of Personnel Management. Dr. Kulcinski described a new tool referred to as a "Data Cube" for the Human Capital Information Environment (HCIE). This will be rolled

out in September. Other federal agencies are looking forward to using the tool once it has been successfully implemented by NASA. It is 50-50 development effort by vendor and NASA. NASA has taken the lead for debugging it.

He reviewed the briefing given to the Committee by the NASA Office of Education. Sen. Schmitt noted that the Astronaut Office has been identified as an educational resource for the Education Coordinating Committee (ECC), and he suggested that other groups have at least as much appeal. He stated that NASA continues to miss the total resources that it has for educational outreach, and that there are entities other than the Astronaut Office that are equally effective. Capt. Hauck suggested that the Council should also be considered an educational resource because its members are well-known in their respective areas of expertise. Sen. Schmitt suggested getting NASA alumni onto the ECC. Dr. Kulcinski agreed to look into Sen. Schmitt's suggestion.

Dr. Kulcinski reported that NASA has begun to develop metrics to measure the performance of its education programs and still has a long way to go before they can be validated. A Student Ambassador Program has been initiated. It does not have a full track record yet. It takes advantage of the interns at the Centers. They are developing educational kits for the interns to help them make presentations to their peers. Dr. Covert stated that many market placement activities are implemented by selecting someone in the high school who is popular. Dr. Kulcinski described the Interagency Aerospace Revitalization Taskforce, which has adopted the NASA "inspire, engage, educate, and employ" approach. In response to a question from Sen. Schmitt, Dr. Kulcinski described the space grant consortium and stated that the number of people who interact with it include a large percentage of teachers.

Dr. Kulcinski referred to the National Research Council (NRC) recent report entitled "NASA's Elementary and Secondary Education Program: Review and Critique." The Committee needs to review the NRC report and will report on it at the Stennis meeting. Dr. Milgram stated that the NRC report criticizes NASA for not having a coherent evaluation plan. The NRC is impressed by the work but is concerned that there is no way to check for results. The NRC feels that NASA's goals are too broad and would like to see the NASA's Education Office have more specific programs. There is also a need for more coordination between Headquarters and the Centers and with other agencies.

Dr. Kulcinski reviewed two slides showing graphs on FY08 NASA Education Funding by Source and by Outcome. Dr. Garriott asked whether the Office of Education has authority to direct funds to students in STEM (science, technology, engineering, and mathematics) disciplines. Dr. Kulcinski responded that half the dollars shown are earmarks. Dr. Fisk stated that he was surprised by the Mission budget number and asked for clarification. He remarked that he would be surprised if only $30 million is attributed to education. He asserted that a graduate student employed on a grant should be counted as education. Dr. Kulcinski responded that research assistants are not counted, and that definitions are an issue. Sen. Schmitt suggested that some amount should be proportionately included. Dr. Colladay concurred. Dr. Kulcinski also agreed and stated that they need to work on getting a definition. Sen. Schmitt observed that all of the

Mission Directorates would have an additional sum that is not being counted. Dr. Covert suggested that senior learners should be counted as well as junior learners. At Sen. Schmitt's request, Dr. Kulcinski agreed to identify as many opportunities as possible and to bring them back to the Council at the Stennis meeting.

Sen. Schmitt thanked Dr. Kulcinski for his presentation.

The Council adjourned for a brief break and reconvened.

Science Committee Report and Discussion

Sen. Schmitt introduced Dr. Byron Tapley, Science Committee Vice Chair. Dr. Tapley discussed the FY 2009 Budget Request for the Science Mission Directorate (SMD). It has a number of positive elements: seven new mission starts; a new lunar small mission program; an initial response to the Earth Science decadal survey; and it restores health to Research and Analysis (R&A) budgets in space science. There is continued concern, however, for future missions related to launch vehicle costs and uncertainties. Sen. Schmitt noted that there was some consternation about the new small lunar mission program, tied up in the management of the SMD. While he is willing to give them the benefit of the doubt, he hopes that the Committee will be informed by SMD when it is looking at significant new additions to its program. Dr. Tapley noted that the activities had been embargoed. Dr. Jolliff stated that the new missions were small strategic missions that cover needs that have been identified and satisfy high level needs. The Lunar Atmosphere and Dust Explorer will take a snapshot before we get on the ground. There will be two small mini-Landers. The missions nicely leverage international cooperation, he explained. Dr. Fisk expressed satisfaction with the plan, noting that there will be other nations participating, there are working groups in place, and there is room in the whole activity for overall cooperation. All these spacecraft will provide information about the Moon. There will need to be a "traffic policeman" to account for all the missions going to the Moon, he observed, and added that registration may be useful. Dr. Tapley stated that there is ongoing dialogue to expand the spacecraft into a network version. Dr. Tapley reviewed a slide showing a chart on the SMD budget by science theme, a slide comparing the SMD's Flight Program plan as of January 2007 and January 2008, and a slide illustrating newly started missions. He noted that there is good news regarding planned activities coming out of the science mission set. Sen. Schmitt observed that items had been added for the CY 10 gap and stated that the slip will help to manage the transition work force.

Dr. Jolliff described the Committee's position on NASA's International Exploration Strategy. He read the following statement to the Council for its consideration:

"Given the current international focus on lunar exploration, leading to an 'International Lunar Decade,' and given U.S. leadership in plans to return to the Moon with humans as part of the U.S. Space Exploration Policy, the Council recognizes and applauds NASA's efforts to engage the international community by means of the global Exploration Strategy.

The Council urges NASA to continue to (1) carefully consider and coordinate plans with partner agencies to further develop the lunar exploration architecture, and (2) ensure coordination of key elements such as orbital communication assets and data relays, and the geodetic coordinate control system, during the precursor robotic phase as well as the outpost/human exploration phase. Leadership in these areas is needed to develop a robust and integrated robotic and human lunar exploration program.

Lunar exploration plans, including sustained human outpost activities and scientific investigations, and U.S. efforts to engage international exploration partnerships, will lead to development of capabilities and strategies to extend human exploration from the Earth-Moon system to Mars and beyond."

Dr. Covert called the Council's attention to the middle paragraph and stated that attention should be directed to geodetic control internationally. Sen. Schmitt explained that the statement's intent is to do just that. He suggested inserting scientific networks or lunar global networks as something that needs the same kind of coordination. Sen. Schmitt asked whether the Council felt this should be communicated to the Administrator. Dr. Tapley stated that this is important to coordinate, as well as the proper units. In response to another question from Sen. Schmitt, Dr. Tapley confirmed that "geodetic coordinate system" is the correct term. Sen. Schmitt suggested that with respect to the Moon, one of the components would be to have it referenced in a systematic way. Dr. Garriott agreed to incorporate Sen. Schmitt's suggestion. Dr. Mark S. Robinson described how team members were going to Japan to ensure that there is a proper working relationship. In response to a question from Capt. Hauck, Dr. Robinson described the International Aeronautical Union (IAU) as an international body that deals with this issue.

Dr. Jolliff read the Committee's proposed recommendation on Lunar Architecture Concepts:

"Further Lunar Exploration Architecture concept developments should be reviewed by the Lunar Exploration Analysis Group, which represents a variety of lunar exploration stake holders and partners, including the science community, to assess how well continued developments align with the recommendations of the NASA Advisory Council from the Tempe workshop."

(Note: this recommendation was appropriately reassigned as an action to the LEAG under authority of the Council Chair, rather than as a recommendation to NASA. The LEAG will report back to the Council on its findings at a later date for further deliberations.)

Dr. Jolliff explained the major reasons for proposing the recommendation. The Lunar Exploration Analysis Group (LEAG) has been tasked to develop a science roadmap that is integrated with the exploration architecture and science program plans and is well-positioned, therefore, to provide ongoing evaluation to the Council as part of its assessment. It is important to evaluate associated or potential costs to support the concept studies in a manner that will be useful for decision making and that will engender a sense that the concept development will represent fiscal responsibility and reality. The development of concepts that might achieve stated objectives but that are also likely to be

far beyond affordable alternatives conveys a message that there are no fiscal limits to what may be considered as acceptable solution space. NASA's science community and other constituencies, including the public, must be assured that the lunar exploration architecture will represent fiscally responsible, as well as capable, approaches to science and other exploration objectives. Sen. Schmitt stated that it is important to not overload the LEAG and that this would fit into their existing tasking. Dr. Jolliff concurred that this would dovetail naturally into their activities. Sen. Schmitt noted it was his responsibility to coordinate with the LEAG chair to make sure they don't lose all their volunteers. Gen. Abrahamson discussed the difficulty in making tradeoffs and the desire to reach a level where standards become established. Sen. Schmitt recalled that there had been discussions that the architecture and the designs flowing from the architecture consider component upgrades to take into consideration Gen. Abrahamson's concerns. Sen. Schmitt explained that "graceful enhancement rather than graceful failure" is the concept they have been addressing. He explained that over time, we want to be able to enhance the system so that more and more of the objectives of exploration can be met. You won't be able to meet the first objective initially of going 1,000 kilometers, but you want to eventually be able to do that. In response to a question from Dr. Burns, Sen. Schmitt explained that that tradeoffs must include mass, which translates into costs. It does not dampen creativity, it enhances creativity. Dr. Jolliff observed that there has not been a response to the recommendations. Sen. Schmitt replied that a large proportion of those recommendations have been responded to, and that a few of them would have entailed another round of extensive discussions, which are the ones that are lagging behind in getting responses. All of the items are being considered by SMD, he noted. Gen. Abrahamson expressed concern over a moving set of standards and protocols. He asked about DOD communications infrastructure coordination. An audience member responded to the inquiry and stated that DOD fully supports the need for flexibility in design.

Dr. Tapley discussed the Earth Science Missions. The Decadal Survey implementation was initiated in the FY09 budget with new starts for two missions. Funds for this come from other SMD science areas. He reviewed a slide showing a chart comparing new vs. previous (hatched) mission profiles. He reviewed a slide comparing Earth and space science mission costs. He then reviewed a proposed recommendation entitled "Compare the Cost Drivers of Earth and Space Science Missions:"

"The costs of Earth Science missions appear systemically higher than Space Science missions that measure similar parameters. A cost analysis should be conducted to document the comparative costs, and to identify cost drivers for Earth Science, Space Science and Planetary missions and their sources in requirements, vendor and partner types, and ways of doing business."

Sen. Schmitt reported that one comment he received is that NASA's Earth Science programs are seeking a higher granularity than internationals, and this leads to higher costs. Dr. Tapley agreed and added that the numbers of orbits, the need for accuracy, as well as the need for calibration, are all cost drivers. Dr. Fisk noted that the Earth Science missions are very expense due to the need for accuracy. He identified several drivers, including the fact that there is no real university of Principal Investigators (PIs) to build

the instruments. More important, he added, the industrial base in the U.S. for these kinds of instruments is decreasing. There is a need to take proactive steps to increase the industrial base. Sen. Schmitt explained that there is a need to also discriminate between the costs in addition to identifying them. There are levels of contingencies that must be considered. It is more than just a comparison of costs; it includes discrimination. The Committee agreed to include this in the recommendation.

Dr. Tapley reviewed the Committee's observations on NASA's Education & Public Outreach (E/PO). They applauded the improvements to the NASA webpage. The Committee is concerned with the Agency and SMD-level approaches to E/PO. This was noted in the Astrophysics Subcommittee report. For example, there is a heavy bureaucracy and jargon-laden requirements for E/PO grant supplements. The Committee understands that SMD is developing new approaches to E/PO with the help of science education leaders.

Sen. Schmitt thanked Dr. Tapley for his presentation.

Aeronautics Committee Report and Discussion

Sen. Schmitt introduced Gen. Lester Lyles. Gen Lyles has agreed to assume the Chair of the Committee. Sen. Schmitt expressed appreciation to Mr. Neal Armstrong for his term of service as Chair.

Dr. John Sullivan described the current activities of the Aeronautics Research Mission Directorate (ARMD) and the Aeronautics and Space Engineering Board (ASEB). ASEB will be conducting a workshop to assess the R&D plan for NextGen, assessing NASA's Aeronautics R&D program, assessing the Nation's Wake Turbulence R&D program, and assessing NASA's National Aviation Operational Monitoring Service (NAOMS) Project. There will be an assessment of the Exploration Technology Development Program and an evaluation of radiation shielding for space exploration. Sen. Schmitt asked if the Committee is comfortable with the ability to scale a thermal protection system (TPS) for Orion. Dr. Sullivan replied it was not. Sen. Schmitt stated it is important that the material being manufactured is what is wanted. Dr. Covert advised that it cannot all be scaled due to ablation properties. Sen. Schmitt recalled that the Apollo heat shield had been over-designed by a factor of three. By the time this was realized, they could not modify the design, so a significant excess mass had to be carried by future missions. There is a need to keep the pressure on to be sure the actual TPS system is correct. Dr. Sullivan stated that other thermal protection systems are being examined. Dr. Covert explained that conductive, reflective, and radiated heat must be covered. Chemistry may also be involved in the heat shield and used to absorb heat as well. Dr. Sullivan stated that the manufacturing of the heat shield is being taken into consideration, which is a good thing. Gen. Lyles concluded this topic by stating that the Aeronautics Committee had requested for additional details, to be provided at their next meeting, concerning the design and manufacturing of TPS activities both within and outside of ARMD.

Dr. Covert reviewed the briefing given to the Committee on wiring health in aeronautics. He noted that wiring chafing causes half the problems. Sen. Schmitt observed that that

concern involves several thousand hours of flight. Dr. Covert reviewed a slide on the External Wireless Instrumentation System (EWIS) Gap Assessment. The Council engaged in a discussion over whether there were resources available on the problem. Gen. Lyles stated that the Air Force has a very rich wiring safety program and agreed to follow-up on identifying resources. Sen. Schmitt stated that a major data mining effort would be appropriate. Gen. Abrahamson noted that the Shuttle program had instituted wiring inspections and records on those inspections. Dr. Colladay suggested that there had to be a rich data base because a Titan had exploded due to a deteriorated wire. Col. Collins informed the Council that the Shuttle's wiring corrodes, but 100% of the wiring cannot be inspected; the Shuttle was designed for 10 years and has been flying for 26 years. It is one of the accepted risks. Sen. Schmitt stated that the Council is making a point that future spacecraft must be designed for enhancements and block changes.

Gen. Lyles stated that there will not be a formal report issued by the ASEB on the NextGen status. Sen. Schmitt asked whether the Board's composition has been determined. Dr. Covert confirmed that the Board members have been appointed and have already met several times.

Gen. Lyles reviewed a slide showing the National Aeronautics R&D Policy and Implementation Plan. A planning document came out December 21, 2007. Dr. Sullivan emphasized that this is a big deal in government since NASA does not fly airplanes. Gen. Lyles reviewed seven Policy Principles. Mobility through the air is vital to economic stability, growth, and security as a nation. Aviation is vital to national security and homeland defense. Aviation safety is paramount. Security of and within the aeronautics enterprise must be maintained. The U.S. should continue to possess, rely on, and develop its world-class aeronautics workforce. Assuring energy availability and efficiency is central to the growth of the aeronautics enterprise. The environment must be protected while sustaining growth in air transportation.

Gen. Lyles emphasized that aviation is vital to national security and homeland defense. Dr. Covert noted that the 1958 Space Act says that NASA is responsible for leadership in aeronautics. Gen. Lyles reviewed a proposed Council Observation:

"The National Aeronautics R&D Policy and the follow-on Implementation Plan lay out the roles and responsibilities of participating federal agencies, including NASA, in a collaborative effort to advance U.S. technological leadership in aeronautics. In the Council's view, the NASA Aeronautics Program, while currently conducting high quality research, is not funded at a level sufficient to achieve the leadership objectives implicit in the National Aeronautics R&D Policy. In the Council's judgment, the NASA Aeronautics Program should at least be doubled over a five-year period in order to meet these objectives."

Dr. Sullivan noted that this is a self-serving observation but is a consensus of the Committee. Aeronautics is in a state where it is sub-critical and to avoid a disconnect, the intent is for the Council to go on record approving the restructure of the program. Something needs to be done. Dr. Sullivan stated that they have historically avoided

suggesting budget levels, or that it should come at the expense of anything else, and that he is not suggesting that these resources come from someplace else in NASA. He believes that the correction should not be done at the expense of other NASA programs. Gen. Lyles explained that there are many ways to double or increase the aeronautics program, e.g. partnership with other agencies. Dr. Fisk noted it is an interesting line to walk to say more money is needed without affecting other programs. He suggested, as a potential political solution, saying the current program is inadequate by a factor of two, rather than saying it should be doubled. Gen. Lyles agreed that this is a valid consideration and stated that this falls into the category of recommendations that should be given to the next Administration. Mr. Howard J. Stanislawski expressed concern over the "is not funded" language. Sen. Schmitt asked the Committee to take this conversation into account and add a further explanatory paragraph. Gen. Lyles agreed to look at the wording, taking into consideration the suggestions that were discussed. Sen. Schmitt suggested adding a statement that NASA's leadership objectives are explicit in the Act.

Dr. Sullivan reminded the Council that the first policy principal states that aviation is vital to economic security. If we give up leadership in aviation, we will give up jobs. He noted that the stated objective of Airbus is to become number one, and he asserted that we are being threatened economically. Dr. Covert referred to a recent report released by the European Union entitled "The Next Twenty Years in Aeronautics Research," calling for Europe to assume leadership in aeronautical technology. We are under siege, he asserted.

Gen. Lyles reviewed the following proposed Recommendation:

"Systems-level research projects with discrete start and end dates should be considered in addition to and as an augmentation of the existing funded effort."

(Note: this recommendation was appropriately reassigned as an action to NASA's Aeronautics Research Mission Directorate, rather than as a recommendation, and the results will be reported back to the Council at their April meeting for further consideration as a potential recommendation to NASA)

The background for this, he explained, is that the systems-level research projects would not raise the budget run out level in perpetuity and should be focused on areas where NASA has unique demonstrated expertise in line with the National Aeronautics R&D Policy. Systems-level research is in contrast to validation and demonstration of point designs. OMB is concerned over open-ended programs; discrete end dates address that concern. Dr. Colladay noted that given the state of the current program, the natural area for growth this is suggesting is system level research. It is not demonstration or validation; it is flight research or system level research. It is the area where augmentation is needed. He added that it is easier for OMB to make a decision because the program goes away on a designated date; this is a more palatable way to package a growth in aeronautics than a level-of-effort. Gen. Lyles noted that this is classic system engineering.

Sen. Schmitt reminisced about the people who created NASA and observed that most came out of systems level research projects. He noted that we do not tap that development of systems engineers in the aircraft world. Gen. Lyles suggested that there is a DOD system engineering study that would be instructive to NASA. Gen. Abrahamson noted that the proper terminology is a "surge." Sen. Schmitt stated that the recommendation is not dependent on budget augmentation. Dr. Covert submitted that with the proper blessing of OMB they could take the first year of costs out of the agency's budget. Otherwise, it will come crashing to the floor. Dr. Sullivan asserted it would be disruptive to an already fragile program to "projectize" the research. He stated that there is nothing in the on-going level of programs to "reprogram," and it would add to the churning and instability that we've just gone through. It is important for the Council to understand that it is an augmentation. It is on the order of doubling the program and is what is needed to be consistent with the President's Policy. Dr. Sullivan observed that there has been a resurgence in the quality of the research that has been going on. The idea is to add some system level projects to that. Capt. Hauck observed that it seems that the horse is behind the cart--the Council is advisory to Mike Griffith, yet it looks like the Council is proposing that it go to the aeronautics group to solicit project recommendations. Dr. Longnecker noted that the recommendation says put more money into this program and asked whether it is urgent to get the wording right today. Sen. Schmitt stated that this recommendation relates to the next budget cycle and asked whether it could be recast so that it could be considered in the next budget cycle. Gen. Lyles agreed it could be focused on the next budget cycle. He observed that this is a way to address the observation and remain responsive to the OMB analyst. Dr. Sullivan stated that the Committee struggled with the recommendation because it seems self-serving. He'd like the Council to think about it from the "20,000 foot level." Aeronautics is in a shape that is not sustainable. He suggested that it is in a situation where we need to go on record saying that something has to be done, but there should be sufficient specificity to make the Council comfortable. Sen. Schmitt stated that he is comfortable with the Council making observations based on the members' experience and knowledge, and that asking ARMD to provide possible recommendations is something that the Council would be comfortable with. He suggested it would be a good idea to let the Administrator know that this is where the Committee is headed. Sen. Schmitt suggested rewording the recommendation to be consistent with the suggestions made during the discussion. Gen. Abrahamson asked whether the concern over becoming a third rate nation in aeronautics has been voiced elsewhere. Dr. Covert noted that the competition has not been explicitly identified and suggested an all-government study to delineate those factors. Dr. Colladay advised that it has been done and that the Council should not cross the line of program development. He stated that it is not the Council's job to develop program specifics for NASA. He asserted that those programs are vital for world competition on the civil side for noise reduction and fuel efficiency, and that the U.S. should be the lead in those areas. He emphasized that the Aeronautics Committee should evaluate NASA programs, not develop them, and that systems research is the area that needs to be augmented. Sen. Schmitt asked the Committee to work two parallel paths: have their agenda for the next meeting reflect the proposal, and revise the observations and recommendations.

After expressing his appreciation to the Council members for their service, Sen. Schmitt adjourned the meeting.

NASA Advisory Council Meeting
NASA Headquarters
February 7, 2008

Public/Plenary Session
Room 3P44/3P50

9:15 a.m. – 9:30 a.m.	Opening Remarks	Hon. Harrison Schmitt
9:30 a.m. – 10:30 a.m.	Aeronautics Committee	Gen. Lester Lyles
10:30 a.m. – 10:45 a.m.	*Break*	
10:45 a.m. – 11:45 a.m.	Audit and Finance Committee	Mr. Bob Hanisee
11:45 a.m. – 12:45 p.m.	*Lunch (Council Members Only)* HQ Bldg., Columbia Café, 9th Floor Speaker: Associate Administrator, ESMD	Dr. R. Gilbrech
12:45 p.m. – 1:45 p.m.	Exploration Committee	Gen. James Abrahamson
1:45 p.m. – 2:45 p.m.	Human Capital Committee	Dr. Gerald Kulcinski
2:45 p.m. – 3:00 p.m.	*Break*	
3:00 p.m. – 4:00 p.m.	Science Committee	Dr. Edward David
4:00 p.m. – 5:00 p.m.	Space Operations Committee	Dr. Pat Condon
5:00 p.m.	Adjourn	

NASA Advisory Council Members
February 7, 2008

Chair	• Hon. Harrison H. Schmitt, Apollo 17 Astronaut and Scientist
Aeronautics Committee	• *Chair: General Lester L. Lyles, USAF (Ret.), Consultant, The Lyles Group* • Dr. Eugene Covert, T. Wilson Professor of Aeronautics, Emeritus, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology • Dr. Ilan Kroo, Professor, Professor of Aeronautics and Astronautics, Stanford University • Dr. John Sullivan, Professor of Aeronautics and Astronautics Director of the Center for Advanced Manufacturing, Purdue University
Audit and Finance Committee	• *Chair: Mr. Robert M. Hanisee, Trust Company of the West* • Hon. Edward R. "Ted" McPherson, Chief Executive, Intersolve Group, Inc. • Mr. Howard Stanislawski, Partner, Sidley Austin, LLP
Exploration Committee	• *Chair: Lieutenant General James A. Abrahamson, USAF (Ret.)* • Dr. Kenneth Ford, Founder and Director, Florida Institute for Human & Machine Cognition • Capt. Rick Hauck, USN (Ret.), Astronaut (Ret.) • Dr. John M. Logsdon, Director, Space Policy Institute, George Washington University
Human Capital Committee	• *Chair: Dr. Gerald L. Kulcinski, Associate Dean of Research, College of Engineering, University of Wisconsin-Madison* • Dr. Ioannis Miaoulis, President and Director of the Museum of Science, Boston • Dr. R. James Milgram, Professor, Department of Mathematics, Stanford University
Science Committee	• *Chair: Dr. Edward David, President, EED, Inc.* • Dr. Owen Garriott, Astronaut (ret.) • Dr. Bradley L. Jolliff, Research Associate Professor, Department of Earth and Planetary Sciences, Washington University • Dr. Mark S. Robinson, Research Associate Professor, Department of Geological Sciences, Arizona State University • Dr. Byron Tapley, Director, Center for Space Research Professor, Aerospace Engineering, University of Texas, Austin • Dr. Jack Burns, Professor, Department of Astrophysical and Planetary Sciences, University of Colorado AND Vice President Emeritus for Academic Affairs & Research University of Colorado System
Space Operations Committee	• Col. Eileen Collins, Astronaut (ret.) • Dr. Pat Condon, Chairman of the Board, Air Force Association (ret.) • Dr. David Longnecker, Institute of Medicine, National Research Council • Adm. Benjamin Montoya, CEO, SmartSystems Technologies
Ex-Officio	• Dr. Raymond S. Colladay, Chair, Aeronautics and Space Engineering Board, National Research Council • Dr. Lennard A. Fisk, Chair, Space Studies Board, National Research Council
Unable to Attend	• Dr. Lucy Fortson, Vice President for Research, Adler Planetarium and Astronomy Museum • Dr. Donald Fraser, DRS Technologies • Dr. Thomas Jones, Astronaut (ret.) • Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases • Hon. Michael Montelongo, Senior Vice President, Strategic Marketing, Sodexho, Inc. • Dr. C. Paul Robinson, Former President and Director, Sandia National Labs (Ret.)

NASA ADVISORY COUNCIL
NASA Headquarters
Washington, DC
February 7, 2008

ATTENDEES

Council Members	*NASA Attendees*
Abrahamson, James A.	Augustine, Norm
Burns, Jack	Bloxon, Deborah
Colladay, Raymond S.	Cooke, Doug
Collins, Eileen	Dawsey, Toni
Condon, Pat	Denton, Debbie
Covert, Eugene E.	Feeley, T. Jens
David, Edward	Green, Tom
Fisk, Lennard A.	King, Marla
Ford, Kenneth	Ostrach, Louis
Garriott, Owen	Pellis, Neal
Hanisee, Robert M.	Posner, Arik
Hauck, Rick	Spoehel, Ron
Jolliff, Bradley L.	Williams, Greg
Kulcinski, Gerald L.	
Logsdon, John M.	
Longnecker, David	
Lyles, Lester L.	
McPherson, Edward R. “Ted”	
Miaoulis, Ioannis	
Milgram, R. James	
Montoya, Benjamin	
Robinson, Mark S.	
Schmitt, Harrison H.	
Stanislawski, Howard J.	
Sullivan, John	
Tapley, Byron	

Other Attendees:

Bettesworth, Anne	American Psychological Association
Blick, Don	Raytheon
Correll, Randall	Ball Aerospace
Frankel, David	*[consultant, meeting recorder]*
Gantt, John	Mizrack & Gantt, NY
Heid, Rosalind Ellis	*[self]*
Terrell, Kim	KIMS
Webber, Derek	Spaceport Associates

NASA ADVISORY COUNCIL
NASA Headquarters
Washington, DC
February 7, 2008

LIST OF PRESENTATION MATERIAL[1]

1) Space Operations Committee [Condon]
2) Report of Audit and Finance Committee [Hanisee]
3) Exploration Committee Summary Report to the NASA Advisory Council [Abrahamson]
4) *ad hoc* Biomedical Committee [Longnecker]
5) Exploration Systems Mission Directorate LAT-2 Next Steps and Answers to Questions from the October Meeting [Hauck]
6) NASA Advisory Council Human Capital Summary [Kulcinski]
7) Science Committee Presentation to NASA Advisory Council Plenary [Tapley]
8) Aeronautics Committee Report to the NASA Advisory Council [Lyles]

Other material distributed at the meeting:

1) NASA Advisory Council October 18, 2007 Meeting Minutes
2) Letter from Michael D. Griffin to Harrison H. Schmitt, responses to recommendations from the Biomedical Committee's fact-finding Lunar Biomedical Workshop

[1] Presentation and other material distributed at the meeting are on file at NASA Headquarters, OER/ACMD, 300 E Street SW, Washington, DC 20546.