

**NASA ADVISORY COUNCIL (NAC)
Exploration Committee**

CORRECTED MINUTES

Meeting Date: April 26-27, 2010

AGENDA:

- Briefing on Federal Advisory Committee Act
- Ethics Briefing
- NASA Exploration Systems Mission Directorate (ESMD) Status
- ESMD FY11 Budget Overview
- ESMD Challenges
- Exploration Committee 2010 Work Plan Content and Implementation

ATTENDING:

Exploration Committee: Richard Kohrs (Chair), Rick Hauck, John Logsdon, Nancy Ann Budden, Bo Bejmuk, Joe Cuzzupoli, Bette Siegel (acting Executive Secretary), Jane Parham (administrative officer)

Members Absent: David Longnecker, Les Lyles

Others: Doug Cooke, Mark Carreau, Diane Rausch, Alan Boss, John Rummel, Pascale Ehrenfreund, Michiel Hegener, Neal Pellis (See detailed list, p. 6)

OUTCOMES

Observations only. No Committee findings or recommendations.

ACTIONS

- NAC_100426_001:** Arrange joint sessions or other interaction with NAC Technology and Innovation Committee.
- NAC_100426_002:** July is a good time frame for Exploration Committee fact-finding sessions with the Technology and Innovation Committee.
- NAC_100426_003:** Exploration Committee and Commercial Committee should get together. May want to include SOMD Associate Administrator.
- NAC_100426_004:** Exploration Committee requested notation to Center program allocation chart, clarifying that HQ does program management and integration.
- NAC_100426_005:** Bette Siegel will contact the NAC committee executive secretaries to determine when they are planning their meetings
- NAC_100426_006:** Bette Siegel will provide Exploration Committee with the HQ office of responsibility for each NAC committee.
- NAC_100426_007:** Doug Cooke will provide an ESMD update via telecon/webex in the near future. Mr. Cooke will take this initiative.
- NAC_100426_008:** Bette Siegel will coordinate with Exploration Committee members to determine when the next meeting will be scheduled.
- NAC_100426_009:** Bette Siegel will email asteroid mission briefing to Exploration Committee members when it is available.

DISCUSSION

Diane Rausch, Executive Director of the NASA Advisory Council, provided the background, rules and regulations for the meetings and management of the NASA Advisory Council and its committees.

Donna Shafer, JSC Office of Chief Counsel, briefed the committee on legal and ethics regulations and responsibilities of members of NASA Advisory Council committee members, as Special Government Employees, including actions required in cases of financial or representational conflicts of interest, post-employment restrictions, standards of conduct, and importance of maintaining impartiality. [donna.m.shafer@nasa.gov; 281 483 3021]

NASA Exploration Systems Mission Directorate (ESMD) Status

Doug Cooke, NASA Associate Administrator – ESMD, presented an overview of FY10 activities in ESMD in response to the budget rollout, including Agency guidance on the Constellation Program, current status of the Constellation Program, and study teams and plans for new ESMD programs.

Mr. Cooke noted that there has been a major shift in direction for ESMD. He added that a new Exploration component announced in President Obama's April 15 speech at Kennedy Space Center -- development of Orion as an ISS crew return vehicle – has created the necessity to revisit ESMD planning and budget.

Discussion Points

- FY10 appropriations language directs ESMD not to start any new exploration activities, and also not to cancel any ongoing Constellation activities.
- In addition to program study teams, there is a transition team similar to the Shuttle/Constellation transition effort. Teams are not making decisions or standing up program offices at this time. However, NASA Centers have been assigned to new programs and Center points of contact for planning program offices have been named.
- In accordance with FY10 appropriations direction, ESMD is continuing those procurements that are clearly on the plan for the FY 11 budget. If it does not affect schedule and not necessary to do immediately, it is not approved.
- The ESMD Exploration Technology Development Program and the Human Research Program are continuing, with increased budgets, and are closely aligned with proposed new programs.
- Transition team is identifying elements from Constellation Program that would be applicable to new programs, such as advanced life support, higher performance solar arrays, automated rendezvous/docking, debris protection and other areas that will transition to new programs and commercial entities as well.
- ESMD is trying to identify what technologies have promise for a potential future decision to go back to the moon. Current priorities include upper stage systems and the Orion capsule and accompanying systems.
- The new NASA Chief Technologist, Bobbie Braun, will form an integrated Board of Directorate Associate Administrators and will focus on developing new technologies at an early stage of readiness, looking toward 2030. He is looking at overarching technologies that crosscut all the NASA directorates. As those technologies become mature, they may transfer to ESMD or other directorates.
- Braun is working with the NAC Technology and Innovation Committee. The Exploration Committee will want to interact with that Committee (**Action 001**)

- There are no unresolved issues on Ares I-X. ESMD obtained valuable data from Ares I-X testing.
- In assigning new ESMD programs to NASA Centers, ESMD has based decisions on the proven strengths at each Center. When further expertise is required, personnel may be detailed from another Center.
- ESMD is currently developing a set of requirements for human rating commercial transportation systems, funded by the Recovery Act. Completion is targeted by end of September 2010, when it will go out to industry for comment.
- ESMD has been communicating with international partners concerning NASA's transition from plans to return to the moon; joint architecture studies are underway. In new path forward, we are open to more international involvement in development of launch systems. Once new programs are approved, ESMD can talk to international partners about their participation.
- The Exploration Committee would like to understand the status of the Technology and Human Research efforts. The Human Research Program budget was increased 42%; however, it may be impacted by the new Orion crew vehicle requirement.

ESMD FY11 Budget Overview

Next, Mr. Cooke reviewed the FY11 President's Budget Request for Exploration in a presentation titled "*A New Space Enterprise for 2011.*" While maintaining the view of NASA's human spaceflight program as seeking to extend human presence throughout the solar system, the President's FY2011 Budget Request takes a new approach to this goal, focusing on developing the capabilities that will allow us to reach multiple potential destinations, including the Moon, Asteroids, Lagrange points, and Mars and its environs. The President's budget will invest an additional \$6 billion in NASA over the next five years – leading to an overall \$100 billion commitment to the agency.

Discussion Points:

- The Exploration Committee requested Technology Readiness Levels (TRLs) be assigned to the "Breakthrough Technologies" referenced in Chart 4 of the presentation.
- Mr. Cooke emphasized that the budget did not reflect the recently added Orion Crew Return Vehicle.
- Mission models are under discussion for Orion as an exploration vehicle as well as crew rescue vehicle.
- Committee noted that there are no actual exploration programs in the FY011 budget. It consists of precursor activities, with the hope that exploration will be funded in the future.
- July is a good time frame for Exploration Committee fact-finding sessions with the Technology and Innovation Committee. **(Action 002)**
- A new agency-wide group, the Human Exploration Framework Team, (HEFT), is working on development of Design Reference Missions to Mars and other destinations. Led by Steve Altimus and Dan Dumbacher, this integration group has met twice. There will be a HQ steering group composed of Mission Directorate Associate Administrators, Bobbie Braun, and a few others, to keep the group focused on laying out missions, goals, capabilities, and technology priorities needed. One result would be a preview of heavy lift vehicle. This will help guide investments in robotic precursors.
- Approach to commercial crew is currently in discussion regarding level of NASA insight and oversight, FAA licensing for NASA missions, launch escape, and other issues. There is an ESMD team working this; they will report to OMB as well as NASA.
- Initial 2011 budget approach for commercial crew is similar to COTS model, with fixed payments on milestones. The process will be to invest in development up to a point, then compete the contract for commercial crew services with a Request for Proposals. As vehicles are developed, there will be checkpoints for safety assessment based on process and fault tolerance.

- Exploration Committee and Commercial Committee should get together. May want to include Space Operations Mission Directorate (SOMD) AA. **(Action 003)**
- ESMD study teams are not making decisions; they are just providing information. Decisions will go through normal processes at NASA.
- The HEFT has a sub team looking at international participation. ESMD also engages in ongoing telecons with international partners to keep them up to date. As we develop Design Reference Missions, we will collaborate with international partners for final results.
- SOMD will take over commercial program at the point of buying services.
- It is NASA Headquarters responsibility to manage the programs and integrate across the programs, more so now than in the past.
- Exploration Committee requested a revision to Center program allocation chart, clarifying that HQ does program management and integration. **(Action 004)**
- Current transition is building on experience of previously planned Shuttle/Constellation transition of hardware and workforce. There is a lot of hardware to disposition. This will impact SOMD budget as well as ESMD budget.
- The HEFT is pulling together the whole transition process from Constellation to new programs, fitting various pieces into an overall framework. Communication is uppermost: HEFT will report progress to strategic management councils with all the Center Directors, and the study teams have weekly telecons with Center Directors. A web site for team data is available to employees across the Centers.
- For investment in long-term technologies, NASA may have to put nuclear propulsion back in the mix. Certain Mars missions cannot be done well with chemical propulsion.
- Radiation protection is a crucial technology; and it is a major weight consideration.
- With 85% of NASA's budget given to contractors, the transition team is looking at the new programs' impact on industry.
- Mars soil sample return is not a requirement before human landings. Unless you land exactly where you took the sample, there will be variations. In other words, the soil composition can vary for different landing sites.
- ESMD is funding use of ISS as National Lab in its Exploration Technology Development Demonstrations – will use it for ESMD Flagship Technology demonstrations.
- NASA's view is not to do anything to interfere with commercial space tourism.
- Transition will require a lot of work dealing with Construction of Facilities issues. Regarding workforce, reduction of civil servant workforce is not an option. Meaningful work will be found for all current NASA employees. Primary workforce impact will fall on contractors.

ESMD Challenges

Mr. Cooke summarized the top 12 challenges facing ESMD at this point, including the need for program stability, source of Orion funding, integration of technology initiatives across Agency, and others.

Discussion Points:

- Funding of new programs has not yet been distributed among NASA Centers, and cannot be distributed until Congress approves the new plan. ESMD will send a candidate set of projects to Centers for their input. NASA will get broader input as well from RFIs.
- Costs continue for the Constellation Program whether we stop work or not as Civil Servants have to be paid. (Congress has prohibited NASA from stopping work on Constellation Program.)
- Appropriations mark-ups will come in May. This will begin to allow NASA to solidify planning.
- An important consideration for the Orion crew rescue vehicle is the type of booster to be used.

Exploration Committee 2010 Work Plan Content and Implementation

- The function of the Exploration Committee is to provide feedback to the NAC, which will eventually be forwarded to NASA Administrator.
- Any Exploration Committee recommendations should be aligned with NASA Policy. The Committee will seek advice from NAC Chair, Ken Ford, and will request guidelines from NASA Administrator.
- Exploration Committee should meet at the same time as the NAC Commercial Space Committee and the Technology and Innovation Committee, and coordinate mutual meetings. May be beneficial for an Exploration Committee member to sit in on other committee meetings of interest, such as the Science Committee and the Ad-Hoc Task Force on Planetary Defense.
- Bette Siegel will contact the NAC committee executive secretaries to determine when they are planning their meetings. **(Action 005)**
- We need to find out the HQ office of responsibility for each NAC Committee. Bette Siegel will provide this information to the Exploration Committee. **(Action 006)**
- Dick Kohrs requested each Committee member to take an ESMD study team, including the HEFT, as his/her area to pursue fact-finding. Assignments are as follows:
 - HEFT – Rick Hauck, with Bo Bejmuk as secondary
 - Commercial Crew and Cargo – John Logsdon
 - Heavy Lift – Joe Cuzzupoli
 - Exploration Precursors – Nancy Ann Budden
 - Human Research – David Longnecker, with Rick Hauck as secondary
 - Orion CRV – Bo Bejmuk
 - Flagship Technology – Dick Kohrs
 - Enabling Technology Development – Les Lyles
- Doug Cooke will provide an ESMD update via telecon/webex in the near future. Mr. Cooke will take this initiative. **(Action 007)**
- Bette Siegel will coordinate with Exploration Committee members to determine when the next meeting will be scheduled. **(Action 008)**
- Bette Siegel will email asteroid briefing to Exploration Committee members. **(Action 009)**
- Potential recommendations
 - Exploration Committee may develop a recommendation for possible leveraging interactions between ESMD and Chief Technologist, and for ways Doug Cooke should participate on the Chief Technologist's Board.
 - More emphasis should be placed on nuclear propulsion development.
- Future EC Briefings:
 - Bobbie Braun, NASA Chief Technologist
 - Ares I-X results and Ares-1 status
 - Status of Exploration Technology Development Program and Human Research Program
 - ESMD Update – including new Orion Crew Return Vehicle
 - Results of studies of agency-wide Human Exploration Framework Team (HEFT)
 - Status of heavy lift vehicle development
 - Contract mechanisms for commercial crew development
 - Human Rating Guidelines (Space Operations Committee)
 - Flagship Technologies

(See next page for Attendees other than Exploration Committee Members)

Attendees other than Exploration Committee Members:

Mark	Carreau	Aviation Week Space Technology Writer	mark.carreau@gmail.com
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Neal	Pellis	NASA/JSC	neal.r.pellis@nasa.gov

Presentation charts and materials will be posted on the NAC Exploration Committee web site, currently under construction.