NASA OFFICE OF INSPECTOR GENERAL

OFFICE OF AUDITS
SUITE 8U71, 300 E ST SW
WASHINGTON, D.C. 20546-0001

October 9, 2014

TO: John Grunsfeld
Associate Administrator for Science

SUBJECT: *The Science Mission Directorate's Mission Extension Process*
(Report No. IG-15-001; Assignment No. A-13-014-00)

Dear Associate Administrator Grunsfeld,

The Office of Inspector General (OIG) examined the Science Mission Directorate's (SMD) expenditures for mission operations services, including the process used to decide whether to extend missions beyond the primary operations phase. (See Enclosure I for details on the review's scope and methodology.)

We concluded SMD's Astrophysics, Earth Science, and Heliophysics Divisions conducted Senior Reviews that included all eligible projects and provided budgetary and programmatic guidance for these missions for up to 5 fiscal years (FY). In contrast, we found the Planetary Science Division's Senior Review process focused too narrowly on the short term and unnecessarily excluded some projects. Furthermore, the Division had no documented rationale for extended mission budget guidelines. In our judgment, these shortcomings impair the Planetary Science Division's ability to inform its budget formulation process and ensure the effectiveness and transparency of its Senior Review process.

We also found that while the four SMD Divisions provided project teams with guidance suggesting projects in extended operations should function at reduced costs – Astrophysics and Heliophysics Divisions specifying approximately one-third less than when in prime operations – actual costs for most missions were well above this "mission extension paradigm." Specifically, only 1 of 22 projects (5 percent) that transitioned to extended operations between FYs 2005 and 2013 received a funding reduction at or greater than the stated target of 33 percent in their first year of extended operations. Moreover, 10 of the 22 projects (45 percent) actually received more funding after moving into extended operations.

To improve the effectiveness of the Planetary Science Division's Senior Review process, we recommended the Associate Administrator for SMD require the Planetary Science Division Director to (1) implement a Senior Review approach that includes consideration of proposals for at least the next 4 fiscal years, (2) conduct consolidated reviews, and (3) establish consistency between annual budget submissions and Senior Review extended mission budget guidelines. We also recommended the Associate Administrator (4) develop a standardized approach for mission extension funding that clearly articulates expectations and consistently implements those expectations across all SMD Divisions.

In response to a draft of this report, the Associate Administrator partially concurred with our first recommendation stating SMD will conduct a detailed assessment of its Senior Review practices and develop updated standards that identify where practices should be standardized and where they may be tailored if appropriately justified. The Associate Administrator concurred with the other three recommendations. We consider NASA's planned actions responsive and will close the recommendations upon verification of their completion. We also reviewed management's comments regarding the technical accuracy of the draft and made changes as appropriate. Management's response to the draft report is included as Enclosure II.

BACKGROUND

SMD spends approximately $5 billion annually on a broad portfolio of more than 90 missions and related research, including Earth- and Sun-observing satellites, Mars rovers, planetary orbiters, sounding rockets, and balloons. NASA designs these missions to operate for a set period – generally from 1 to several years. However, the Agency often extends missions beyond the initial operations phase when it determines the scientific return will be worth the continued investment. In FY 2013, NASA budgeted $501.6 million for 41 SMD missions in extended operations.

The NASA Authorization Act of 2005 requires the NASA Administrator to conduct biennial reviews within each of SMD's four science divisions – Astrophysics, Earth Science, Heliophysics, and Planetary Science – to assess the cost and benefits of extending missions that have exceeded their planned operational lives.[1] SMD uses a process known as the Senior Review to conduct these biennial assessments. The purpose of the Senior Review is to determine the value of extending mission operations and maximize the scientific returns of projects given the Agency's constrained budget. The Senior Review process has been in place since the 1990s, and since then many NASA missions have been the subject of multiple evaluations. For example, Senior Review panels have examined NASA's Voyager mission 11 times, and the Mars rover Opportunity is preparing for its ninth extension review.[2]

[1] Public Law 109-155, § 304(a) (originally codified at 42 USC § 16654 and amended and recodified at 51 USC § 30504).

[2] The Voyager mission involves two spacecraft: Voyager 1 launched in September 1977 and Voyager 2 launched in August 1977. Between them, the twin Voyager spacecraft have explored all the giant planets of our outer solar system – Jupiter, Saturn, Uranus, and Neptune – as well as 48 of their moons. Opportunity launched in July 2003 to research the history of water on Mars.

Senior Review panels consist of respected members of the science and academic communities and may include NASA employees not affiliated with the projects under review and representatives from other Federal, state, and nongovernmental organizations that use NASA data products for operational purposes. Panels provide findings and may make recommendations to the appropriate SMD Division Director, who in turn uses those findings and recommendations to develop an implementation strategy, provide direction to individual projects, and recommend funding levels.

In preparation for the Senior Review, the Division Directors provide projects with guidelines, including financial constraints and expectations for the proposed scope of science during extended operations. If project personnel believe the guidelines will support a viable mission, they identify a set of activities and products the guidelines will support and note any activities and products they will not support.

To be considered for extension, each project must respond to a solicitation for proposals – known as a call letter – with a detailed description of the scientific benefits, operating plans, health of space and ground assets, and costs. The Senior Review panel reviews each project proposal for scientific merit and feasibility against criteria and weighting factors established by Division management. For example, in the 2012 review Planetary Science Division management asked the Senior Review panel to weigh scientific merit at 60 percent and technical merit at 40 percent to determine a final score for each project. Following an initial review of each project proposal, panel members develop written questions and invite project teams to conduct a presentation. Panel members then deliberate on the strengths and weaknesses of each project and pose additional questions to project teams before making their final report to the Division Director.

The Senior Review panel produces a written report containing their evaluation of each project, as well as a rank-ordered list of projects, when requested, based on the panel's assessment of the science value gained by potential extension of each mission. Projects highly rated are more likely to receive funding for extended operations than those rated lower. The panel's report may also include findings and recommendations the Division Director can use to provide direction to projects. For example, the 2013 Heliophysics Senior Review found challenges with the distribution of data to the science community from the Voyager missions and urged the Division to work with the project management team to address the highlighted concerns. Based on the Senior Review panel's findings and the available budget, the Division Director determines which projects to extend and their respective funding levels. Projects not approved for extension are terminated.

RESULTS

The Astrophysics, Earth Science, and Heliophysics Divisions conducted Senior Reviews that included all eligible projects in their portfolios and provided the review teams with budgetary and programmatic guidance for up to 5 fiscal years. In contrast, we found the Planetary Science Division's Senior Review process focused too narrowly on the short term and unnecessarily excluded some projects. Furthermore, the Division had no documented rationale for extended mission budget guidelines. In our judgment, these shortcomings impair the Planetary Science Division's ability to inform the budget formulation process and ensure the effectiveness and transparency of its Senior Review process.

We also found that while the four SMD Divisions provided project teams with guidance suggesting projects in extended operations should function at reduced costs – Astrophysics and Heliophysics Divisions specifying approximately one-third less than when in prime operations – actual costs for most missions were well above this "mission extension paradigm."[3] Specifically, we found only 1 of 22 projects (5 percent) that transitioned to extended operations between FYs 2005 and 2013 received a funding reduction at or greater than the stated target of 33 percent in their first year of extended operations. Moreover, 10 of the 22 projects (45 percent) actually received more funding upon moving into extended operations compared to the previous primary operations period.

Narrowly Focused on Short Term

The most recent call letters for the Astrophysics, Earth Science, and Heliophysics Divisions included language highlighting the importance of the Senior Review process for establishing the Division's long-term strategic direction. For example, the 2014 Astrophysics Division call letter stated the Division would use the Senior Review panel's findings to define an implementation approach to achieve NASA's astrophysics strategic objectives, provide direction to the projects and missions for FYs 2015 and 2016, and issue initial funding guidelines for FYs 2017 and 2018. Similarly, the 2013 Heliophysics Division call letter noted the Division would use Senior Review findings to provide programmatic direction and budgetary guidelines to its missions and projects for the next 5 fiscal years.

In contrast, the Planetary Science Division's January 2014 call letter focused more narrowly on funding levels for FYs 2015 and 2016. Specifically, the letter required each mission provide a proposal outlining two scenarios – a 100-percent proposal that could be accomplished within FYs 2015 and 2016 budget guidelines and a second option that provides scenarios of incremental reductions in the scope of science obtained that may be repeated until a point is reached at which the mission is no longer viable.

The intent of the Senior Review process is to define an implementation strategy for each Division and provide programmatic direction and budgetary guidelines to the projects under consideration. By restricting the review to only FYs 2015 and 2016, we believe the Planetary Science Division has not appropriately implemented or taken full advantage of the Senior Review process.

Exclusion of Projects from the Senior Review Process

The Planetary Science Division has not held a consolidated Senior Review and has continued to hold "out-of-cycle" reviews for some projects. In October 2012, the Planetary Sciences Subcommittee of NASA's Advisory Council Science Committee expressed concern that projects falling out of the Senior Review cycle may not be evaluated in a consistent manner. We agree that this practice leaves open the possibility that some projects may receive an unfair advantage by avoiding the standardization and scrutiny of the formal consolidated Senior Review process. Moreover, we believe failing to conduct a consolidated review limits the Division's ability to strategically plan for and make investment decisions, and increases review costs.

[3] The "mission extension paradigm" states when a mission has completed its prime operations phase, NASA is willing to accept higher operational risk, lower data collection efficiency, and instrument/mission degradation due to aging. Furthermore, the costs in extended operations will be approximately two-thirds that of prime operations.

In March 2011, the National Research Council (NRC) issued a report recommending the Planetary Science Division engage in early planning to ensure adequate funding of mission extensions.[4] The Division responded that it planned to hold a consolidated Senior Review for all its missions in early calendar year 2012 to ensure consistency with SMD policy and the practices of the other Divisions.

Although the majority of eligible Planetary Science Division missions were included in the 2012 Senior Review, two missions – Mercury Surface, Space Environment, Geochemistry and Ranging (MESSENGER) and Gravity Recovery and Interior Laboratory (GRAIL) – underwent separate individual reviews.[5] In addition, the Division did not include the Deep Impact Project in its call letter, and only added the Project several months later when Division management verbally provided the Project management team with a budget target and requested a proposal.[6] Furthermore, the 2014 Senior Review did not include MESSENGER, Dawn, or the Mars Atmosphere and Volatile Evolution (MAVEN) Projects, all three of which will be eligible for extension in FYs 2015 and 2016.[7]

Planetary Science Division officials were unable to provide documentation to explain why the Division did not hold consolidated Senior Reviews, why projects had been excluded from the 2012 and 2014 reviews, and why the Deep Impact Project was initially excluded from the 2012 review. For the 2014 Review, Division officials told us they excluded MESSENGER because it was scheduled to run out of fuel and impact Mercury in March 2015, Dawn because its primary operations had been extended, and MAVEN because its primary operations phase did not begin until after its orbit insertion in September 2014. In our opinion, although it may have been logical to exclude MESSENGER from the 2014 review, both Dawn and MAVEN will complete their primary missions prior to the next scheduled Senior Review in 2016 and therefore should have been included in the 2014 review. Excluding projects from the Senior Review process and not documenting the rationale for doing so, limits the Division's ability to strategically plan for and make future investment decisions to obtain a portfolio balanced between new developments and continued operations. Moreover, such actions make the Division's extension review process less transparent.

Finally, conducting a Senior Review can be costly. Officials we spoke with said the Planetary Science Division's 2012 Senior Review cost approximately $1 million, including lodging and airfare for panel members, two consultants, and honoraria for university-affiliated panelists. Therefore, it is in the best interest of the Government to hold one review for all eligible missions rather than incurring additional costs with separate reviews.

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[4] NRC, "Vision and Voyages for Planetary Science in the Decade 2013-2022," March 2011.

[5] NASA launched MESSENGER in August 2004 to investigate Mercury's environment. GRAIL, launched in September 2011, placed two spacecraft into the same orbit around the Moon to map lunar gravity and increase understanding of the Moon's interior and thermal history.

[6] Deep Impact launched in January 2005 to probe beneath the surface of a comet and examine its interior.

[7] The Dawn mission, launched in September 2007, is investigating the asteroid Vesta and the dwarf planet Ceres to examine planetary formation. The MAVEN mission launched in November 2013 and arrived at Mars in September 2014. The mission's goal is to explore the planet's upper atmosphere, ionosphere, and interactions with the Sun and solar wind.

Lack of Rationale for Budget Guidelines

The Astrophysics, Earth Science, and Heliophysics Divisions included language in their most recent call letters requiring the proposed project budgets presented at the Senior Review match the estimates the projects provided as part of NASA's Planning, Programming, Budgeting, and Execution (PPBE) process. The PPBE process ensures traceability between the analysis conducted during budget formulation to align Agency resources and execution of the budget for the extended mission. In contrast, the Planetary Science Division does not impose this requirement.

Officials from several Planetary Science projects told us they provide the Director with budget estimates as part of the PPBE process and, following issuance of the Senior Review call letter, prepare proposal submissions while waiting for confirmation of final budget guidelines from the Director. However, the Director's guidelines may not be consistent with the budget estimates submitted by the projects during the PPBE process. Moreover, project officials indicated that when there are inconsistencies between the budget estimates and the Director's guidelines, they generally do not receive documentation to justify or explain the variances. Several project officials also stated they did not have sufficient time between receipt of the budget target and the proposal due date. Finally, they voiced concern that while they were able to begin writing their technical proposals without final budget guidelines, the time allotted to respond may not have been reasonable.

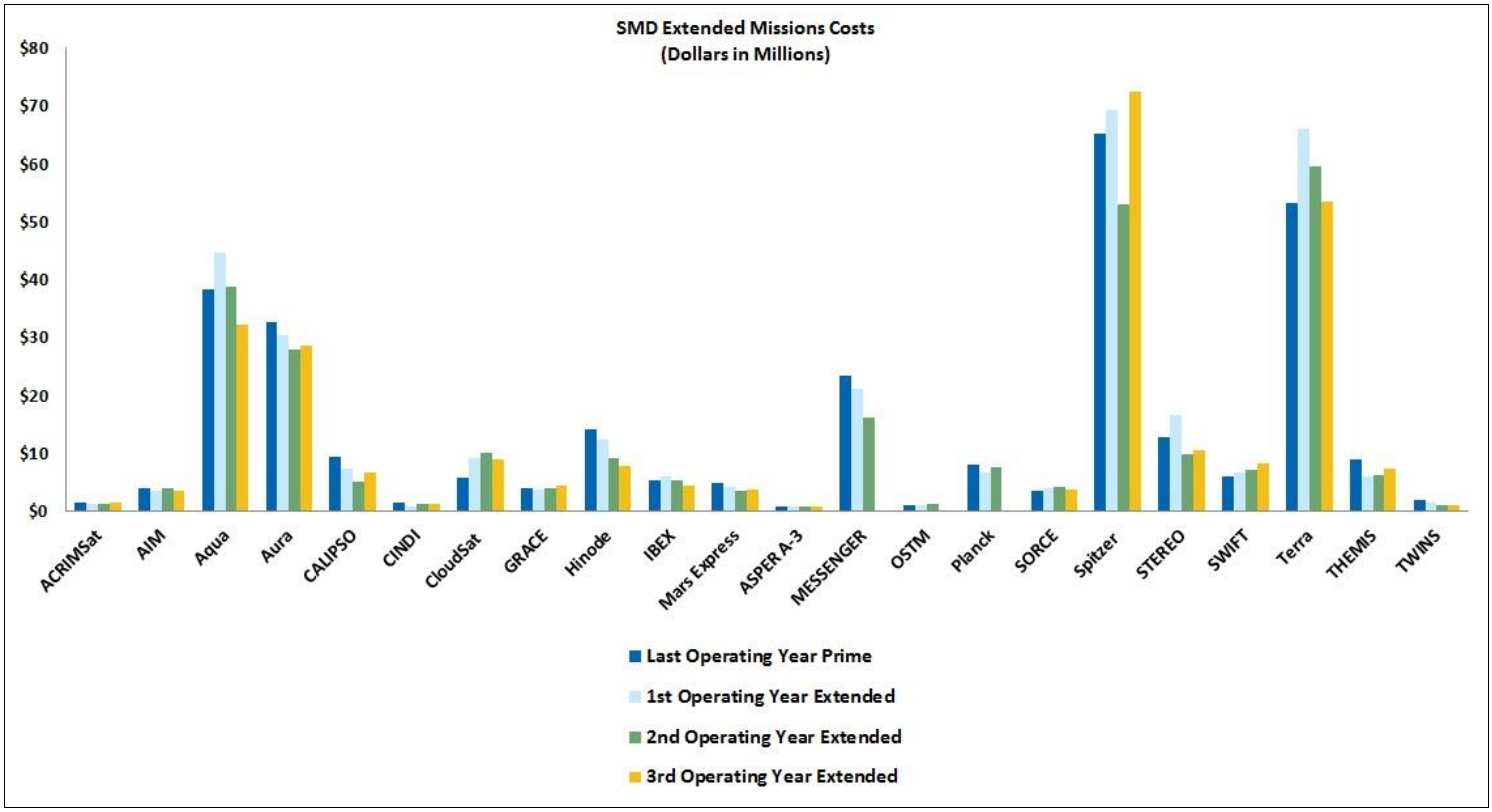
Extended Mission Costs Not Consistent with Guidance

The most recent call letters for both the Astrophysics and Heliophysics Divisions included a description of a "mission extension paradigm" under which NASA is willing to accept greater operational risks, lower data collection efficiency, and instrument degradation due to aging for extended missions, in exchange for a third (or 33 percent) less cost than the amount expended during primary operations. Although the Earth Science Division's letter does not include the 33 percent figure, it references an expectation that a continuous improvement process will result in reductions in costs during extended missions. The Planetary Science Division's letter refers to a reduction in operational scope with associated cost savings.

We reviewed cost data provided by the SMD Resource Manager for projects that transitioned from primary to extended operations between FYs 2005 and 2013 and found that they do not appear to be meeting the 33-percent target. For example, we compared actual funding for the last fiscal year of primary operations with the first fiscal year of extended operations and found that only 1 of 22 projects (5 percent) received a funding cut at or greater than 33 percent.[8] In fact, 10 of the 22 projects (45 percent) actually received more funding upon moving into their first extended operations phase when compared to their primary operations period. This pattern remained relatively constant through the first 3 years of extended operations (see Figure 1).

[8] We excluded GRAIL from consideration because it did not conduct a full 12 months of prime or extended operations.

Figure 1: Change of Funding from Prime to Extended Operations



Source: NASA OIG analysis of SMD-provided data.

Note: Active Cavity Radiometer Irradiance Monitor Satellite (ACRIMSat), Aeronomy of Ice in the Mesosphere (AIM), Analyzer of Space Plasma and Energetic Atoms (ASPER A-3), Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO), Coupled Ion Neutral Dynamic Investigation (CINDI), Gravity Recovery and Climate Experiment (GRACE), Interstellar Boundary Explorer (IBEX), Ocean Surface Topography Mission (OSTM), Solar Radiation and Climate Experiment (SORCE), Solar Terrestrial Relations Observatory (STEREO), Time History of Events and Macroscale Interactions during Substorms (THEMIS), and Two Wide-Angle Imaging Neutral-Atom Spectrometers (TWINS).

When we asked SMD officials about our analysis, they stated that additional cost reductions are likely later in an extended mission's life cycle; the "mission extension paradigm" should not be considered criteria for cost reductions; and the Senior Review is, in essence, a competitive process leading to cost reductions over time. However, we compared the proposed budgets through FY 2018 reported by the last Heliophysics Division Senior Review to the costs of the Heliophysics missions in our sample and found no appreciable decrease in proposed budgets.[9] The officials conceded there might be some confusion regarding application of the 33-percent target, but noted they rely more heavily on the Senior Review to determine the value of extending a particular mission and for subsequent funding decisions. This confusion, along with the varying approaches between Divisions for managing the Senior Review process, could negatively impact overall strategic planning and budgeting for SMD.

[9] NASA, "Senior Review 2013 of the Mission Operations and Data Analysis Program for the Heliophysics Extended Missions," June 13, 2013. The missions compared were AIM, Hinode, IBEX, STEREO, THEMIS, and TWINS.

RECOMMENDATIONS, MANAGEMENT'S RESPONSE, AND EVALUATION OF MANAGEMENT'S RESPONSE

To improve the effectiveness of the Planetary Science Division's Senior Review process, we recommended the Associate Administrator for SMD require the Planetary Science Division Director to:

1. Implement a Senior Review approach that includes consideration of proposals and provides funding and program guidance for at least the next 4 fiscal years.

2. Conduct consolidated reviews and, in instances where circumstances preclude including a project in the consolidated review, document the circumstances and rationale for conducting a separate review and obtain approval from the Associate Administrator for SMD.

3. Establish consistency between PPBE budget submissions and Senior Review extended mission budget guidelines and include appropriate language in call letters to project management.

In addition, to ensure consistency with NASA mission priorities and budget requirements, we also recommended the Associate Administrator:

4. Develop a standardized approach for mission extension funding that clearly articulates expectations and consistently implements those expectations across all SMD Divisions.

The Associate Administrator concurred or partially concurred with our recommendations and proposed responsive corrective actions that include conducting a detailed assessment of the Senior Review practices within the Directorate and developing updated standards that identify where practices should be standardized and where they may be tailored if appropriately justified, and reviewing the SMD Management Handbook to ensure it documents, where appropriate, a standardized approach and clearly articulates expectations for mission extension funding. We consider management's proposed actions responsive to our recommendations and will close them upon verification the Directorate has completed those actions.

We appreciate the courtesies extended during our review. Please direct any questions to Ray Tolomeo, Science and Aeronautics Research Program Director, Office of Audits, at 202-358-7227 or raymond.tolomeo@nasa.gov.

Sincerely,

Paul K. Martin
Inspector General

cc: Paul Hertz
Astrophysics Division Director

Michael Freilich
Earth Science Division Director

Jeffery Newmark
Heliophysics Acting Division Director

James Green
Planetary Science Division Director

Krista Paquin
Acting Director, Office of Internal Controls and Management Systems

Enclosures – 2

Enclosure I: Scope and Methodology

We performed this audit from June 2013 through August 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The primary audit locations and projects reviewed were initially selected via a random sample from the portfolio of missions at the Goddard Space Flight Center (Goddard) and the Jet Propulsion Laboratory (JPL), who combined have responsibility for the preponderance of extended missions. During the course of the audit, missions for review were selected from the Planetary Science Division's portfolio of missions in extended operations. Audit locations included Goddard, NASA Headquarters, JPL, and the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland.

To begin the audit, we obtained a listing of the FY 2014 SMD missions in extended operations for which NASA pays all or a portion of operations and sustainment costs. We then sorted the missions by responsible NASA Center and by Center-led missions or other-led missions. We determined that because Goddard and JPL missions encompassed almost the entire population that those missions would comprise the sampling frame. We used random sampling to ensure each mission in the universe had an equal probability of being selected as each sampling unit was drawn. An initial sample of 12 missions was selected for review comprised of 4 Center-led missions from both Goddard and JPL and 2 other-led missions from both Goddard and JPL. Two projects were removed – XMM-Newton and GRACE – due to significant foreign government funding of mission operations. Ultimately, we selected 10 missions for review.

We began the survey phase of the audit at the project level to determine whether extended mission operations costs were appropriate for our sample. During the detailed audit phase, we modified our audit approach to focus on the Divisions' Senior Review and budgetary processes for extended missions, budgetary trends for extended missions for the period FYs 2009 through 2013, the role of the Directorate's Associate Administrator in extended missions, and decisions made in response to the FY 2013 sequestration budget cuts. Based on our detailed audit work, we determined there were no issues regarding the Senior Review and budgetary processes for extended missions in the Astrophysics, Earth Science, or Heliophysics Divisions that justified further audit work. However, we continued our work in the Planetary Science Division and their Senior Review process.

To accomplish our objectives, we:

- Determined budgetary trends over the last 3 to 5 years for projects in extended operations.
- Determined the role of the SMD Associate Administrator in matters related to extended missions; for example, the selection of missions, funding levels for the Divisions, and funding levels for specific projects.
- Determined how the Associate Administrator made budgetary decisions related to sequestration and whether reductions were strategic or arbitrary.
- Determined if Division Directors established strategic budgets for each of the extended missions or whether they were arbitrary – taking a percentage reduction after primary operations.

- Determined if missions were subjected to a reduction in funding as a result of sequestration and the effects to the project.
- Reviewed the NASA Authorization Act of 2005 (Public Law 109-155) § 304(a), 42 USC 16654, and 51 USC § 30504.
- Reviewed Committee on the Planetary Science Decadal Survey, NRC, "Vision and Voyages for Planetary Science in the Decade 2013-2022," 2011.
- Reviewed SMD Management Handbook, October 31, 2013.
- Reviewed "2010 Science Plan for NASA's Science Mission Directorate," July 2010.
- Reviewed call letters, project proposals, senior review panel reports, steering committee minutes, and budget formulation criteria for the most recent extended mission Senior Review process:
    - Astrophysics, 2012
    - Earth Science, 2013
    - Heliophysics, 2013
    - Planetary Science, 2012 and 2014 call letters

Use of Computer-Processed Data

We used computer-processed data to perform this audit. We obtained from SMD universe data for all FY 2014 extended missions for which NASA pays at least a portion of the operations and sustainment costs, and actual funding for extended missions for FYs 2009 through 2013. We verified the completeness of the universe data – specifically, that all missions were included – by validating the two sets of data received from SMD to each other and to the "Total Missions/Spacecraft" listing as of July 17, 2013 obtained from the Heliophysics Program Executive. We verified that cost data was complete by comparing actual funding for extended missions for FYs 2011 through 2013 to costs presented in the NASA Business Warehouse.

Review of Internal Controls

We evaluated the internal controls over the Senior Review and budgetary processes for SMD's extended mission operations. We found the controls over the processes for the Astrophysics, Earth Science, and Heliophysics Divisions were adequate for the most recent reviews conducted. However, we found inconsistencies and shortcomings with the Planetary Science Division's Senior Review and budgetary process when compared to the other Directorate Division reviews that impairs the Division's ability to inform the budget process or ensure the utility, consistency, and transparency of its Senior Review process. Our recommendations, if implemented, should correct the weaknesses we identified.

Prior Coverage

During the last 5 years, no reports of particular relevance to the subject of this report have been issued.

Enclosure II: Management's Comments

National Aeronautics and Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of: Science Mission Directorate

OCT 07 2014

TO: Assistant Inspector General for Audits

FROM: Associate Administrator for Science Mission Directorate

SUBJECT: Response to OIG Draft Report "The Science Mission Directorate's Mission Extension Process" (Assignment A-13-014-00)

The Science Mission Directorate (SMD) appreciates the opportunity to review your draft report entitled "The Science Mission Directorate's Mission Extension Process" (A-13-01400), dated August 29, 2014.

In the report the Office of Inspector General (OIG) makes three recommendations intended to improve NASA's effectiveness of the Planetary Science Division's senior review process and a Directorate-wide recommendation to ensure consistency with NASA mission priorities and budget requirements. NASA's response to the OIG's recommendations outlined in the report, including planned corrective actions, follows.

To improve the effectiveness of the Planetary Sciences Division's Senior Review process, the OIG recommends the Associate Administrator for SMD:

Recommendation 1: Implement a Senior Review approach that includes consideration of proposals and provides funding and program guidance for at least the next four fiscal years.

Management's Response: NASA partially-concurs with this recommendation. The OIG report has identified instances where the divisions have taken different approaches in conducting senior reviews, including the Planetary Science Division's practice of limiting funding guidance to two fiscal years. SMD is not opposed to reconsideration of this practice, but is concerned that the scientific missions vary enough between divisions that tailored approaches to the senior review process may be warranted. SMD will conduct a detailed assessment of the senior review practices within the Directorate and develop updated standards that identify where practices should be standardized and where they may be tailored if appropriately justified.

Estimated Completion Date: August 31, 2015

Recommendation 2: Conduct consolidated reviews and, in instances where circumstances preclude including a project in the consolidated review, document the circumstances and rationale for conducting a separate review and obtain approval from the Associate Administrator for SMD.

Management's Response: NASA concurs with this recommendation as this is the current practice documented in the SMD Management Handbook. All SMD Divisions will hold consolidated reviews when practical. For cases where consolidated reviews are not done, the Division will document the rational along with the corresponding AA approval. Since senior reviews are conducted on a biennial basis for each science division, and completion of a mission's primary operations may not align with the senior review schedule, initial mission extensions will often be required outside of the senior review process to align the mission's operating commitment with the senior review cycle. NASA will continue to exclude missions from the senior review process that have not yet begun primary science operations.

Estimated Completion Date: Prior to the next planetary science senior review by June 31, 2016.

Recommendation 3: Establish consistency between PPBE budget submissions and senior review extended mission budget guidelines and include appropriate language in call letters to project management.

Management's Response: NASA concurs with this recommendation. SMD will ensure that future planetary science senior reviews align and are consistent with the Agency's PPBE process. However, sometimes circumstances change such as failure of an instrument, which would warrant changes in the guidelines for that mission.

Estimated Completion Date: Prior to the next planetary science senior review by June 31, 2016.

To ensure consistency with NASA mission priorities and budget requirements, the OIG also recommends the Associate Administrator for SMD:

Recommendation 4: Develop a standardized approach for mission funding that clearly articulates expectations and consistently implements those expectations across all SMD Divisions.

Management's Response: NASA concurs with this recommendation. SMD will

review the SMD Management Handbook to ensure it documents where appropriate a standardized approach and clearly articulate expectations for mission extension funding and make updates as necessary.

Estimated Completion Date: August 31, 2015

Again, thank you for the opportunity to review and comment on the subject draft report. If you have any questions or require additional information regarding this response, please contact Peter Meister at (202) 358-1557.

Dr. John M. Grunsfeld