

NASA
PROGRAM MANAGEMENT COUNCIL
Meeting Summary, Decisions and Actions

VITAL MEETING DATA

Date: 6 December 2017
Time: 12:30 p.m. – 4:30 p.m. (EST)
Location: NASA Headquarters (HQ), 8Q40 & ViTS
Agenda: See attached.
Attendance: See attached.

Opening Comments

Robert Lightfoot, National Aeronautics and Space Administration (NASA) Acting Administrator (AA), made the following brief opening comments:

- For the Landsat-9 Key Decision Point C (KDP-C) today, we have a couple of guests, including the United States Geological Survey (USGS) Acting Deputy Director as well as the Director of the Earth Resources Observation and Science (EROS) Center. We look forward to everyone weighing in as we go through the KDP.
- During the second segment of the meeting, the Department of Energy was welcomed, as well as the White House support to the President's nuclear policy assessment.

First Item of Business: Landsat-9 KDP-C

Opening Remarks, Purpose, and Introductions

The Landsat 45-year duration, 30-meter resolution, multispectral data is humankind's longest extensive, continuous, consistently processed measurements of Earth's land use, land cover, and vegetation. Landsat 9 is a cornerstone of our nation's multi-satellite, multi-decadal, Sustainable Land Imaging (SLI) Program. Landsat provides multispectral imagery supporting key science and societal benefit areas, including mapping land use and change, forest dynamics and carbon, agriculture and evapotranspiration, ecosystem science (including coasts), surface water quality, cryospheric science, geology, and natural resources.

Landsat 8 provides significant benefits to the user community. Landsat 9 inherits these improvements, providing continued support for new applications. The President's fiscal year (FY) 2017 Budget, submittal to Congress in February 2016, included Landsat 9, with a launch target in calendar year (CY) 2020.

Landsat is an independently funded agency partnership (not reimbursable like NASA/National Oceanic and Atmospheric Administration (NOAA) missions). The partnership is codified in a NASA-Department of the Interior (DOI) interagency agreement for SLI with a NASA-USGS annex for Landsat 9. NASA is responsible for the space segment (instruments and spacecraft/observatory), mission integration, launch, and on-orbit checkout. USGS is responsible for the ground system, flight operations, and data processing and distribution.

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A Science Mission Directorate (SMD) Directorate Program Management Council (DPMC) was conducted on 24 October 2017 to review the results of the 12-15 September Mission Preliminary Design Review (PDR). SMD is recommending a Management Agreement (MA) for life cycle cost (LCC) of \$838.5M (development - \$587.7M). The project-held unallocated future expenses (UFE) for a five-month launch delay beyond December 2020 MA was transferred to Headquarters (HQ)-held UFE at the direction of SMD DPMC. The Launch Readiness Date (LRD) MA is planned for December 2020. SMD is recommending an Agency Baseline Commitment (ABC) for LCC of \$885.0M (development - \$634.2M) and a LRD of November 2021.

Lightfoot inquired regarding the contract as cost plus award fee rather than the fixed cost structure used for Operational Land Imager 2 (OLI) (similar to Landsat 8). Response was that over three years the costs have not been 100% known, therefore this contract type is more appropriate.

SMD Readiness Assessment

The SMD DPMC conducted on 24 October enabled a thorough assessment of the Landsat 9 project following the 12-15 September PDR. The Standing Review Board (SRB) report from the PDR strongly supports proceeding to Phase C. The target LRD (MA) of December 2020 is challenging but achievable. The DPMC-directed budget baseline is adequate and appropriate to achieve the December 2020 LRD.

The MA is for the LRD of December 2020 and LCC of \$838.5M (development cost of \$587.7M). The ABC is for the LRD of November 2021 and LCC of \$885.0M (development cost of \$634.2M). These cost and schedule recommendations support the Congressional and Administration direction on this highly visible project. SMD recommends approval of Landsat 9 to proceed to Phase C.

Lightfoot questioned reducing the project budget (\$851M to \$838.5M). This is due to reserve through liens and threats allowing plenty of margin.

Project Overview & Status

Landsat 9 Mission provides continuity in multi-decadal Landsat land surface observations to study, predict, and understand the consequences of land surface dynamics. It is a core component of the SLI Program. Landsat partnerships were reviewed and include the space segment, launch segment, and ground segment coordination. The Landsat 9 Annex Implementation Plan (AIP), written by NASA/Goddard Space Flight Center (GSFC) and USGS/EROS Landsat 9 project offices, defines detailed plans for project coordination.

Status was provided for the spacecraft and observatory, operational land imager 2 (OLI-2), thermal infrared sensor 2 (TIRS-2), launch vehicle accommodation, Landsat 9 Ground System (USGS contribution of mission operations center and ground network element), and data processing and archive system.

The Joint Confidence Level (JCL) analysis indicates that the project's internal Mission PDR (MPDR) cost estimate has high confidence. Baseline LRD is aggressive but credible, and the JCL indicates that the 15 December 2020 target LRD is only a few days shy of 50% schedule date given the

DPMC-directed budget baseline. There is a high project cost confidence, which maximizes the probability of achieving this aggressive LRD. The project's JCL assessment indicates that the Landsat 9 baseline plan is executable.

SRB Assessment

The SRB found the project provided a very strong, complete, and effective PDR presentation, with mature instruments, high heritage spacecraft design, high heritage ground system design, and major contracts all in place. The project's PDR budget of \$851M is well supported by JCL. Project management tools and processes are established and working well with required gate products and control documents in place. Additionally, communication and coordination across all elements of the project (NASA, USGS, Orbital ATK, and Ball) are functioning appropriately.

The lessons learned from Landsat Data Continuity Mission (LDCM) provide a retrospective look at LDCM by the integrated NASA and USGS project team, conveyed through comprehensive stories, strategic decisions, and lessons learned from pre-formulation through initiation of routine on-orbit operations. The SRB found that the Landsat 9 project office has been folding in these lessons as they proceed with acquisitions and development.

No issues were found. The SRB identified five concerns. Actions being taken by the project are appropriate to address the concerns.

In terms of cost, the project has a conservative posture for cost growth used in the JCL analysis. The Basis of Estimates (BOE) are updated to current plan, mature, and very detailed. Earned Value Management (EVM) analysis shows OLI-2 with good cost performance and TIRS-2 running with an estimate at complete above plan, but within reasonable margins. The project element schedules are mature and well constructed, and a LRD of December 2020 is aggressive but feasible. Funded schedule margin exists to protect critical paths.

Success criteria ratings were performed for NASA Procedural Requirement (NPR) 7120.5E, NPR 7123.1, and GSFC Standard (STD) 1001a with no red or yellow ratings. The SRB concluded that Landsat 9 successfully completed the MPDR and the project is ready to proceed to Phase C.

SMD Readiness Summary

The MA for the LRD of December 2020 and LCC of \$838.5M (development cost of \$587.7M) is consistent with the clear Congressional direction for a CY2020 LRD. Project performance to date supports this as a credible MA. The ABC for a LRD of November 2021 and LCC of \$885.0M (development cost of \$634.2M) recommendations support the Congressional and Administration direction on this highly visible project. SMD recommends approval of Landsat 9 to proceed to Phase C.

APMC Discussion

USGS echoed comments that this is truly a joint endeavor. It is an extraordinary legacy and Landsat 8 has been extremely popular. The team fully supports the mission including their side of it. They reiterated the comment regarding great team effort.

Lightfoot polled the members and the decision memo to proceed was approved.

Lightfoot commented that he is satisfied with the overall progress of the project. He captured several key points to success and hoped the project can incorporate some at the agency level. He is really pleased and is looking forward to seeing the project fly.

Second Item of Business: Radioisotope Power Systems (RPS) Program Implementation review (PIR) KDP-III

RPS Program Overview & PIR KDP-II Closure Status

In partnership with the Department of Energy (DOE), the RPS produces new plutonium 238 and heat source material for integration into flight RPS, and maintains the infrastructure necessary to produce flight RPS. RPS develops new thermoelectric and dynamic power conversion technologies and conducts mission studies to ensure technologies are relevant to mission requirements. They manage mission nuclear launch approval activities and provide a one-stop point of contact for the acquisition and integration of RPS for NASA missions.

RPS reviewed KDP-II findings and the actions to address PIR-II results. Actions that have been taken were related to governance, sustainment of industrial base and DOE infrastructure, streamlining launch approval, technology development, requirements, and development for future systems.

The program status was summarized, including RPS Program support of Mars 2020, the DOE RPS supply chain, re-established Pu-238 production, and nuclear launch approval recommendations and updates. DOE Constant Rate Production (CRP) will reduce mission risk and cost by 25%. Activity related to technology investments for possible future RPS include enhanced Multi-Mission Radioisotope Thermoelectric Generator (eMMRTG), the next generation RTG study, and dynamic RPS (DRPS). The next generation RTG study recommends eMMRTG completion and initiating a next generation RTG system.

Lightfoot asked if there was anything other than Mars 2020 on the books to use this technology. The program stated that there was nothing currently, but these continued investments in dynamic power will support all needs within the agency. The Space Technology Mission Directorate (STMD) is using some Sterling conversion. Current activities align with the bigger picture and other work being performed.

SRB KDP-III Findings & Recommendations

The SRB found RPS to have a knowledgeable and technically competent team. Their tactical management is very solid, and an improved DOE relationship (in terms of communication and rapport) has resulted in good insight into DOE activities. The program is tightly integrated with and responsive to the Planetary Science Division (PSD), and the majority of documents are well maintained. The SRB had two concerns and one observation.

- Concern 1: Insufficient Milestones - Several program milestones are cursory and not representative of the vital work conducted by the program. Specifically, the implementation of strategic capabilities and timing of program deliverables are not clearly stated. Further, requirements leading to meaningful milestones do not naturally flow from the Program Commitment Agreement (PCA), nor are they proposed in the PRD decomposition. The SRB recommends PSD work with the RPS Program Office (PO) to develop and document an overall strategy (for the implementation of strategic capabilities and timing of program deliverables) and appropriate requirements. RPS PO should update PRD or other program documents accordingly.
 - The program agrees. Their focus since last PIR has been on re-structuring the program and the NASA-to-DOE relationship. Proposed requirements changes include adding next generation system requirements to the PCA, and adding key milestones for launch approval process improvement, technology decision gates, and next generation readiness to program milestone documents.
- Concern 2: Risk Management - The programmatic context for the risks is not consistently clear or easily understood. The SRB recommends that the program implement its proposed disposition actions on improved traceability.
 - The program agrees. They have begun an extensive review of the risk management process, including establishing new requirements as addressed in Concern 1, ensuring traceability to the requirements, and establishing a rigorous process of closure and acceptance of risks to ensure appropriate engagement of stakeholders. The program revalidated the escalation, promotion, and demotion process and has linkage with DOE on risk management processes.

The RPS PIR III SRB recommends that the RPS Program pass the KDP checkpoint and continue.

Office of the Chief Engineer, Dawn Schaible, asked if 2028 is the year large orbital class spacecraft can be supported. The answer was affirmative.

Lightfoot commented that he is worried missions are not being proposed due to continuous fine-tuning (there is no fielded and certified system past 2025). Milestone commitments should be made to the PCA going forward. SMD mentioned that a 90-day action was taken during the internal review to update the PCA and implementation plan for planned program milestones. Lightfoot further directed that these program plan milestones for future systems be briefed by SMD at the quarterly Baseline Performance Review (BPR).

Decision Memo Review & Signatures

The decision memo was reviewed and approved after members were polled.

Members commented that there probably is, legitimately, some integrated work that has occur, and the next generation will cover the high end of mission requirements. Lightfoot agreed and reminded the team - that is rationale to get a system fielded. The work is increasing within STMD and the Human Exploration and Operations Mission Directorate (HEOMD), therefore an integrated system is required. Over the next 10 years, the agency will spend \$1.1 billion. That is a huge opportunity cost, which drives the need for production that will enable more missions.

Actions:

No new actions were taken.

Closing

Meeting was adjourned.

Prepared by:

(b) (6)

Stephanie Sowards

12/14/2017

APMC Executive

Agenda

**Agency Program Management Council
December 6, 2017 12:30pm – 4:30pm ET
NASA Headquarters, Room 8Q40 & ViTS**

12:30 Roll Call and General Admin PMC Exec/Stephanie Sowards

12:35 Opening Remarks AA/Robert Lightfoot

Landsat-9 KDP-C

12:40 Opening Remarks, Purpose & Introductions Michael Freilich
12:50 SMD Readiness Assessment Thomas Zurbuchen
1:05 Project Overview & Status Del Jenstrom
1:20 SRB Assessment Christopher Stevens
1:50 SMD Readiness Summary SMD
1:55 APMC Discussion Robert Lightfoot
2:05 Decision Memo Review & Signatures David Jarrett

2:10 Break

Radioisotope Power Systems (RPS) PIR KDP-III

2:20 RPS Program Overview & PIR KDP-II Closure Status John Hamley
3:00 SRB KDP-III Findings & Recommendations Matt Forsbacka
3:30 RPS & PSD Response; DPMC Outcome John Hamley
4:15 Decision Memo Review & Signatures John Hamley

4:20 Review New Actions/Closing/Summary AA/Robert Lightfoot

4:30 Adjourn

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6-Dec-2017
MEMBERS**

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Chief Financial Officer	Andrew Hunter, Acting	
Chief Information Officer	Renee Wynn	
Chief Information Officer	Pam Hanes (for)	
Chief Engineer	Ralph Roe	
Deputy Chief Engineer	Dawn Schaible	
Chief Health & Medical Officer	James (J.D.) Polk Mark W	
Chief Safety & Mission Assurance	Terry Wilcutt	
Deputy Chief Safety & Mission Assurance	Hal Bell (for)	
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Chief Technologist	Douglas Terrier, Acting	
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Associate Administrator, HEOMD	William Gerstenmaier	
Associate Administrator, SMD	Thomas Zurbuchen	
Associate Administrator, STMD	Prasun Desai (for)	
Associate Administrator, Mission Support	Dan Tenney	
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AFRC Center Director	CJ Bixby (for)	
GRC Center Director	Janet Kavandi	
GRC Deputy Center Director	Marla Pérez-Davis	
GSFC Center Director	Chris Scolese	
GSFC Deputy Center Director	George Morrow	
JPL Center Director	Larry James (for)	
JSC Center Director	Randy Galloway	
JSC Center Director	Vanessa Wyche (for)	
KSC Center Director	Kelvin Manning/Burt Summerfield (for)	
LaRC Center Director	David Bowles	
LaRC Center Director	David McGowan (for)	
LaRC Center Director	J.D. Reeves (for)	
MSFC Center Director	Todd May	
SSC Center Director	John Bailey (for)	
APMC Executive	Stephanie Sowards	

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Director, OCFO/SID	Tracy Osborne (for)	
Associate Administrator, Communications	Jen Rae Wang <i>Zach Asher</i>	
Associate Administrator, OLIA	Rebecca Lee, Acting	
Associate Administrator, Small Business	Glenn Delgado	
Assistant Administrator, Human Capital	Bob Gibbs <i>Alana Cober</i>	
Assistant Administrator, Procurement	Jeff Cullen (for)	
Assistant Administrator, Strategic Infrastructure	Calvin Williams	
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OSMA	Gerry Schumann	
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Staff Analyst	Jeff Beyer	
Presidential Appointments Team	Jeff Waksman	
Office of the Administrator, Senior Advisor, Technical	Lisa Guerra	
Executive Assistant, Office of the Admin	Natalie Simms	
OACS Program Support Specialist	Patrice McCannon	
OACS Analyst	Robert Hanley	
Presidential Appointments Team	Rodney Liesveld	
OACS Senior Analyst	Tim Warner	

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LANDSAT 9		
White House Support for Nuclear Policy Assessment DO/NE	Aaron Weston	
DO/NE	Andrew Richards	(b) (6)
GSFC, Deputy Program Manager, Earth Systematic Missions Program	Cathy Richardson	
Electrical Power Capability Leader	Chris Iannello	
Landsat 9 Standing Review Board (JPL)	Chris Stevens	
KSC Landsat 9 Mission Manager, Launch Services Program	Chuong Nguyen	
GSFC Director, Flight Projects Directorate	Dave Mitchell	
USGS Acting Deputy Director	David Applegate	
Landsat 9 Program Executive, ESD	David Jarrett	
GSFC Landsat 9 Project Manager	Del Jenstrom	
SMD Deputy AA	Dennis Andrucyk	
Assoc Director for Flight Programs, ESD	Eric Ianson	
GSFC Landsat 9 Project Systems Engineer	Evan Webb	
USGS Director, Earth Resource Observation and Science Center	Frank Kelly	
Landsat 9 Program Scientist, ESD	Garik Gutman	
GSFC, Program Business Manager, Earth Systematic Missions Program Office	Garry Gaukler	
SMD Deputy AA for Programs	Greg Robinson	
Sr Prog Analyst, RM Division, SMD	Holly Degn	
Assoc Director for Science, ESD	Jack Kaye	
GSFC, Program Manager, Earth Systematic Mission Program Directorate	Jeff Gramling	
GSFC Landsat 9 Project Scientist	Jeff Masek	
USGS Observing Systems Branch Chief, EROS Center	Jennifer Lacey	
USGS Landsat 9 Project Manager	Jim Nelson	
SMD Deputy Chief Engineer	Joe Gasbarre	

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Title	Name	Signature
LANDSAT 9 (continued)		
SMC OCE Representative	Joe Pellicciotti	(b) (6)
Nuclear Power and Propulsion Subteam	Lee Mason	
GSFC Landsat 9 Deputy Project Manager for Resources	Lorrie Eakin	
Deputy Assoc Director for Science, ESD	Lucia Tsaoussi	
Director, Earth Science Division (ESD)	Mike Freilich	
Nuclear Power and Propulsion Subteam	Mike Houts	
GSFC Landsat 9 SRB Manager	Neil Martin	
Sr Prog Analyst, RM Division, SMD	Peifen Heesch	
SMD OSMA Representative	Pete Panetta	
DO/NE	Raymond Furstenau	
Assistant PM, Earth Systematic Mission Program Office	Rick Carter	
Deputy Director, ESD	Sandra Cauffman	
Sr Prog Analyst, RM Division, SMD	Steve Jenne	
Deputy Assoc Director for Flight Programs, ESD	Steve Neek	
GSFC Landsat 9 Deputy Project Manager	Steven Pszcolka	
USGS Program Coordinator, Land Remote Sensing	Tim Newman	
Propulsion Capability Leader	Tom Brown	
GSFC, Deputy Director, Flight Projects Directorate	Tom McCarthy	
DO/NE	Tracey Bishop	
OCE/SMD	Joe Pellicciotti	
GSFC Deputy Director for	Wanda Peters	

