NASA
PROGRAM MANAGEMENT COUNCIL
Meeting Summary, Decisions and Actions

VITAL MEETING DATA

Date: 19 April 2017
Time: 1:00 p.m. – 3:00 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) Associate Administrator (AA), made the following brief opening comments:

- An action was previously assigned to the Science Mission Directorate (SMD) in relation to the Mars 2020 helicopter. Analysis reveals the helicopter can technically assist with Mars missions in the future; therefore, the AA has approved Jet Propulsion Laboratories (JPL) and SMD proceeding in a partnering arrangement for a plan to develop the helicopter. Initially, overhead funding will be allocated for the development of an engineering unit with no impact to the Mars2020 baseline mission. Inclusion of the helicopter in the Mars2020 mission will be considered by SMD following development of the engineering unit. The AA approved the action closed.

First Item of Business: Mars 2020 Post-CDR Management Brief

The Mars 2020 project has completed Critical Design Review (CDR) life cycle reviews and the project deliveries comply with 7120.5 CDR gate product requirements. The project will provide a summary of their implementation approach as well as the current technical and financial performance status.

Science Overview

The Mars 2020 mission has been getting a lot of good media attention and fully responds to the high priority Planetary Decadal Survey recommendation for a Mars science rover to perform in situ science and collect and cache a set of scientifically documented Martian samples for potential future return to Earth. The primary mission objectives are to characterize the geologic record of an astrobiologically relevant ancient environment, perform astrobiologically relevant investigations, assemble rigorously documented and returnable cache, and contribute to the preparation for human exploration of Mars.

Three landing site candidates remain after completing a series of workshops with the science community to sequentially down select from the original eight options. One more workshop in the summer of 2018 will be held to make the final selection. Lightfoot requested these sites be noted on a map of the planet to convey their proximity to one another.

Project Overview

The Mars 2020 organization was reviewed. It has been in a stable configuration for quite some time now, which has benefited the project. A mission overview was reviewed covering launch, cruise/approach, entry, descent, and landing (EDL), and the surface mission phases. The mission project schedule was also reviewed. It highlighted a critical path through the Mobility Control Subsystem (MCS) to the Sampling and Caching Subsystem (SCS) and through integration, test, and launch operations. The critical path is in good shape, featuring twice the recommended JPL design principle level of embedded and funded schedule reserve. Additionally, an extra four months of schedule margin on all sampling deliveries was established two years ago and is still held by the project manager and is fully unencumbered.

Project life cycle cost (LCC) and reserve status were reviewed. The project expects to process approximately $60M in liens this fiscal year (FY), which will maintain project reserves >30% going into FY18 / System Integration Review (SIR). Project reserves are compliant with JPL flight project practices (>20%) and provide sufficient to-go reserve capability given the project's cost stability to date. The project's unallocated future expenses (UFE) equal $224M, but they are very much back end loaded. The Standing Review Board (SRB) will discuss observations related to this topic.

The Mars 2020 top risk list was reviewed. In response to the risk of limited staffing resources to address problems, the project has been working with JPL since the Preliminary Design Review (PDR) to obtain the necessary work force. They have resolved multiple areas and are maintaining vigilance in order to address future issues. Mars 2020 is a top-priority mission. Other risks include the potential helicopter budgetary impact if baselined, supersonic parachute development and testing, aggregate Mars Science Laboratory (MSL) EDL residual risks, Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals (SHERLOC) implementation, Mars Oxygen In-Situ Resource Utilization (ISRU) Experiment (MOXIE) if baselined, sample contamination, SCS delivery, and the rover mechanisms.

In summary, the Mars 2020 budget is stable and adequate to complete development on schedule with acceptable risk, and the project focus has shifted to maintaining and recovering schedule where necessary. Mars 2020 is very mature at CDR due to the high level of heritage from MSL. While difficult and challenging areas exist, they are understood. The workforce is a known challenge and the project is engaging aggressively with the line management to develop acceptable solutions. The Mars 2020 project is mature and well positioned to perform all necessary work to proceed to SIR.

Lightfoot asked about visibility into the payload development projects or other foreign contributions. He stated concerns with respect to the workforce reporting to other directorates. As an example, for the SHERLOC team, where is the authority for various parts of project delivery? The project stated that their Mars 2020 payload director is actively involved with the development status of the Mars 2020 science payloads. George Tahu amplified that the visibility is high, thus alleviating those concerns.

SRB Findings/Responses

The project understands its major risk drivers and is managing them. The team is very strong and has made excellent progress. The project has done an excellent job of using the UFE advanced in FY16 to work off much of the bow wave of work observed at PDR.

- **Finding 1:** The project is executing within the Key Decision Point C (KDP-C) commitments. At this time, the SRB does not see a credible scenario that would require

more than the Phase A-D commitment from KDP-C. The phasing of the combined project- and HQ-held UFE is too back loaded to support the most likely potential needs. The SRB recommends that the Mars Program work the funding profile using flexibility within Planetary Science Division (PSD) and SMD to forward-fund FY18 and FY19 as much as is practical for risk reduction and schedule resiliency purposes. The project agrees that the phasing of UFE is not optimal; however, the project believes it is manageable by employing the techniques/actions used in years 13/14, 14/15, 15/16, 16/17; i.e., reduced carry over, service-center underruns, re-profiling contract over obligations, etc. The acceleration of back end UFE into FY17/18 can reduce development risk, but the life cycle funding for the project is not an issue. The project will await potential resolution of the Continuing Resolution (CR) in late April, and will work with the Mars Program Director to assess funding flexibility at that point.

- **Finding 2**: The late maturation of the SCS is the primary threat to meeting the launch date. The project will require help from the JPL institution to ensure timely availability of the needed critical workforce, which is currently constraining the project's ability to ramp up activities when needed, keep to schedule, and manage surges to deal with emerging technical issues. The SRB recommends that, given the science value and launch date, JPL should prioritize resolution of work-force issues for this mission through the addition of key experienced personnel. The project responded that the SCS completed a successful CDR on January 26 – 27, 2017. That said, the SCS is and always has been identified as the most challenging development for the Mars 2020 project and the critical path activity. The project is holding standard design principle funded schedule margin for the SCS. In addition, project management is holding an additional four months of unfunded SCS schedule slack to provide further protection against a late delivery. The project reviewed additional actions that have been taken to address this issue.

Lightfoot commented that the first two findings seem to contradict one another. The SRB clarified that the first finding indicates that they have the resources to do the job, while the second finding concerns getting the right skills/experience available to perform the required work.

- **Finding 3**: The flight software (FSW) development schedule is lagging and threatens the maturation of the surface system productivity enhancements. This could ultimately impact the confidence with which the project can show compliance with its 20-sample prime mission requirement. The SRB recommends that the project should examine the scope of the surface system productivity enhancements and implications for FSW development and schedule. Productivity enhancement descope options should be developed and executed to preserve FSW development schedule resiliency as necessary. Workforce augmentations should be pursued in impactful areas, and consideration should be given to advantages that may be provided by delivering more frequent interim FSW builds between major deliveries. The project responded that the FSW team is currently overstaffed by approximately two full-time equivalents (FTE)s already and they are pursuing options for accelerating the FY18 staff-up (approximately four additional FTEs) into FY17. Additionally, the project has identified functionality for potential descope.
- **Finding 4**: Mars 2020 will need JPL institutional help to ensure the timely availability of needed critical workforce. This issue is currently constraining the project's ability to ramp up activities when needed, keep to schedule, and manage surges to deal with emerging technical issues. The SRB found that JPL is continuing to add more paths for work force to handle surge capability needs, and senior management has been proactively resolving work force issues. The institution is committed to prioritizing Mars 2020 as required.

- **Finding 5**: The Mars 2020 project needs help from the program and HQ to bring open planetary protection (PP) and contamination control (CC) items to closure in a timely manner. The SRB recommends that the project continue with its identified sample cleanliness approach and program, and concurs with the decision to incorporate a drillable blank subject to the constraints and requirements established by SMD. The project responded that they are compliant with the Level I requirements for PP and CC. The project has identified a potential technical approach of a single, targeted, body-mounted drillable blank and is proceeding to implement this approach per the decision of SMD on April14, 2017.

HEOMD/STMD Input

The Mars Oxygen In-Situ Resource Utilization (ISRU) Experiment (MOXIE) team has successfully attacked key technology challenges, including the Solid OXide Electrolyzer (SOXE) performance and life, SOXE mechanical stack packaging, and the commercial off-the-shelf (COTS) compressor development. Test results meet all key technology objectives. The fixed configuration and mass, volume, and power resources remain stable. However, a combination of technology challenges, design complexity, and workforce issues have led to schedule delays and cost growth for the MOXIE JPL team, resulting in a cost increase of $7.5M for FY17-FY18. Human Exploration and Operations Mission Directorate (HEOMD) and Space Technology Mission Directorate (STMD) have requested a meeting in early May to decide whether a termination review is warranted. This meeting would focus on key technical and programmatic risks with mitigation strategies as well as the project schedule and estimated cost-to-complete. The level of confidence in those items, credibility of the electronics development plan, and impact to the Mars 2020 integrated master schedule would also be addressed, along with the program objectives and a decision on how to proceed.

The project responded that MOXIE has capitalized on a technology demonstration / Type II approach to maintain a fixed configuration and stable mass, volume, and power resources, while meeting performance requirements and key technology objectives. JPL/project believe that MOXIE should move forward and will support any go-forward plan.

Lightfoot concurred that a termination review is needed to determine if MOXIE is actually meeting the original intent. STMD and HEOMD should examine MOXIE to make sure they are getting what they need out of it. The confidence level needs to be fully understood before proceeding.

JPL Perspective

The project has completed their CDR successfully and their life cycle cost has been stable. JPL is continuing to add more paths for work force to handle surge capability needs. The project is in a good position as it continues towards SIR.

Mars Exploration Program (MEP)/SMD Summary

Mars 2020 is just over three years from launch. The project performance has been excellent, and challenges are recognized and understood. The accommodation efforts are proceeding to preserve an option for flying the helicopter, and the budget is adequate to complete development on schedule with acceptable risk. There are adequate overall reserves in the plan, including the funded schedule reserve. The project is in good position as it continues Phase C towards SIR.

Lightfoot commented that he appreciates the amount of time the project has spent keeping the PMC informed. The benefits of this approach are clear and the process warrants a lessons learned summary at the completion of Mars 2020. It emphasizes the importance of maintaining margins, a practice encouraged by the AA. While his position is to drive projects to stay on budget and on schedule, taking a bigger view on occasion can be valuable. Lightfoot looks forward to the fall when the project goes to SIR.

Actions:

No new actions. The existing actions were reviewed: 3-15-2017 Action 3, 2-15-2017 Action 1, 4-27-2016 Action 2.

Closing

Meeting was adjourned.

Prepared by: (b) (6)

Stephanie Sowards 5/5/2017

APMC Executive

Agenda

Agency Program Management Council
April 19, 2017 1:00pm – 3:00pm ET
NASA Headquarters, Room 8Q40 & ViTS

1:00	Roll Call and General Admin	PMC Exec/Stephanie Sowards
1:05	Opening Remarks	AA/Robert Lightfoot
1:10	**Mars 2020 Post-CDR Management Brief**	
	Introduction and Purpose	George Tahu
	Science Overview	Ken Farley
	Project Overview	John McNamee/Matthew Wallace
	SRB Findings/Responses	Michael Ryschkewitsch/John McNamee
	JPL Perspective	Michael Watkins/Fuk Li
	MEP/SMD Summary	Jim Watzin/Thomas Zurbuchen
2:45	Review Actions	PMC Exec/Stephanie Sowards
2:55	Closing remarks and summary	AA/Robert Lightfoot
3:00	Adjourn	

PROGRAM MANAGEMENT COUNCIL
NASA Headquarters - 8Q40/VITS
19-Apr-2017
MEMBERS

Position	Name	Signature
General Counsel	Sumara Thompson-King	(b) (6)
ARC Center Director	Tina Panontin (for)	
AFRC Center Director	~~David McBride~~ Patrick St	
GRC Center Director	Janet Kavandi	
GRC Deputy Center Director	Marla Pérez-Davis	
GSFC Center Director	Christyl Johnson (for)	
JPL Center Director	Michael Watkins	
JPL Deputy Center Director	Larry James	
JSC Center Director	Darryl Gaines (for)	
KSC Center Director	Janet Petro (for)	
LaRC Center Director	David Bowles	
MSFC Center Director	Jonathan Pettus (for)	
SSC Center Director	John Stealey (for)	
Associate Administrator, Mission Support	Krista Paquin	
Associate Administrator, STMD	Steve Jurczyk	
Associate Administrator, SMD	Thomas Zurbuchen	
Associate Administrator, HEOMD	~~William Gerstenmaier~~	
Associate Administrator, ARMD	Jaiwon Shin	
Chief Technologist	Douglas Terrier, Acting	
Chief Scientist	Gale Allen, Acting	
Chief Engineer	Ralph Roe	
Deputy Chief Engineer	Dawn Schaible (for)	
Chief Information Officer	Renee Wynn	
Chief Financial Officer	Andrew Hunter, Acting	
Chief Safety & Mission Assurance	Terry Wilcutt	
Chief Safety & Mission Assurance	Deirdre Healey (for)	
Chief Health & Medical Officer	Vince Michaud (for)	
Deputy Associate Administrator	Lesa Roe	
Associate Administrator	Robert Lightfoot, Jr	
APMC Executive	Stephanie Sowards	

PROGRAM MANAGEMENT COUNCIL
NASA Headquarters - 8Q40/VITS
19-Apr-2017
Other Attendees and Presenters

Position	Name	Signature
Administrator	Robert Lightfoot, Acting	(b) (6)
Deputy Administrator	Lesa Roe, Acting	
Chief of Staff	Shana Dale, Acting	
- Assistant Administrator, Human Capital	Lauren Leo	
Associate Administrator, Strategy and Plans	Tom Cremins	
- Assistant Administrator, Procurement	Bill McNally	
- Assistant Administrator, Strategic Infrastructure	Calvin Williams	
- Director, OCFO/SID	Cristina Guidi	
Director, NASA Management Office	Marcus Watkins	
Deputy Director, NASA Management Office	J.C. Duh	
Labor Management Liaison	Sharon Burks	
Associate Administrator, Communications	Jen Rae Wang	
Associate Administrator, OLIA	Rebecca Lee, Acting	
Associate Administrator, Small Business	Glenn Delgado	
HEOMD	Toni Mumford	

PROGRAM MANAGEMENT COUNCIL
NASA Headquarters - 8Q40/VITS
19-Apr-2017
Other Attendees and Presenters

Position	Name	Signature
SMD/Mars 2020	Betsy Pugel for Carrie Conley	(b) (6)
Mars 2020	Chris McElroy	
Mars 2020	Christopher Moore	
Planetary Division Deputy Director/SMD	David Schurr	
SMD Deputy AA	Dennis Andrucyk	
Director, OACS	Dennis Boccippio	
Mars Program Manager/JPL	Fuk Li	
Mars 2020 Program Executive	George Tahu	
OSMA	Gerry Schumann	
SMD Deputy AA for Programs	Greg Robinson	
Planetary Division Director/SMD	James Green	
Office of the Associate Administrator	James Ortiz	
PAT Team	Jeff Waksman	
Mars Program Director/SMD	Jim Watzin	
Mars 2020 Project Manager/JPL	John McNamee	
Mars 2020 Project Scientist/JPL	Ken Farley	
Office of the Deputy Assoc Administrator	Lisa Guerra	
Mars 2020 Deputy Project Manager/JPL	Matthew Wallace	
Mars Lead Scientist/SMD	Michael Meyer	
Mars 2020 SRB Chair/APL	Mike Ryschkewitsch	
Mars 2020 Program Scientist	Mitch Schulte	
JPL	Richard Cook	
PAT Team	Rodney Liesveld	
Mars Program Deputy Manager/JPL	Roger Gibbs	
OACS MSC Executive	Sarah Murray	
Mars 2020	Trudy Kortes	
Mars 2020	Victoria Friedensen	
Mars 2020 OSE	Doug Bernard	
Ave Kludze OSP	Ave Kludze	
PAT	Rod Leave	

PROGRAM MANAGEMENT COUNCIL
NASA Headquarters - 8Q40/VITS
19-Apr-2017
Other Attendees and Presenters

Position	Name	Signature
SMD PE	DAVE LAVERY	(b) (6)
OCPO SID	Kevin Gilhgan	
	OCS	
OCACS	Andre Deychman	
	Sarah Maerra.	
OACS Valador Support	Fatima Senghore	
OACS Valador Support	Ben Franzini	
OACS Valador Support	Lisa Connell	
OACS Valador Support	Donna Connell	