

OPA (SC-28) Follow-Up Review Summary

Department of Energy/Office of Science Review of the Muon to Electron Conversion (Mu2e) Project

REVIEW DATE: November 19, 2012
LOCATION OF PROJECT: Fermi National Accelerator Laboratory
PROGRAM MANAGER: Ted Lavine
FEDERAL PROJECT DIRECTOR: Pepin Carolan
ACQUISITION EXECUTIVE: Patricia Dehmer
CURRENT CRITICAL DECISION: CD- 1

Mu2e Project Status – November 2012		
Project Type	Line Item	
CD-1	Planned: 4 th Qtr. FY 2012	Actual: 7/2/2012
CD-3a	Planned: 1 st Qtr. FY 2014	Actual:
CD-2/3b	Planned: 2 nd Qtr. FY 2014	Actual:
CD-3c	Planned: 2 nd Qtr. FY 2015	Actual:
CD-4	Planned: 2 nd Qtr. FY 2021	Actual:
TPC Percent Complete	Planned: N/A	Actual: N/A
TPC Cost to Date	\$21.4M	
TPC Committed to Date	\$21.8M	
TPC	\$229.3M	
TEC	\$177.7M	
Contingency Cost (w/Mgmt Reserve)	\$51.6M	32% to go
Contingency Schedule on CD-4	18 months	20%
CPI Cumulative	N/A	
SPI Cumulative	N/A	

Mu2e Project Funding Profile (\$M)

Fiscal Year	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	Total
OPC - R&D	0.5	0.5	1.0	5.0						7.0
OPC - Design	4.277	7.9	5.0							17.117
TEC - PED			24.0	20.0	5.0					49.0
TEC - Construction					20.0	27.5	37.0	41.0	30.323	155.823
Total Project Cost	4.777	8.4	30.0	25.0	25.0	27.5	37.0	41.0	30.323	229.00

1. SUMMARY

A Department of Energy/Office of Science (DOE/SC) Mini-Review of the Muon to Electron Conversion (Mu2e) project was conducted on November 19, 2012 at DOE/Headquarters via teleconference. The review was chaired by Daniel R. Lehman. The purpose of the review was to evaluate the current status of the project since receiving Critical Decision 1 approval in July

2012. The Committee found that the **project team has been proceeding well**, made good progress regarding previous recommendations, and has demonstrated good interaction with the conductor vendors. The Committee recommended that the project team undertake a more detailed analysis of specification of the conductors, particularly the magnetic field shielding required for the solenoids.

2. TECHNICAL

Findings

The Committee noted that the project team has followed the recommendations of the June 2012 CD-1 review as follows:

- Initial plan for contract/vendor oversight: The project prepared a plan for oversight responsibility of any acquisition (doc # 2490). Oversight will be carried out by technical, contract, and quality control staff, monitored by the project and Fermilab. Quality Control procedures for conductor purchases are contained in the specifications for the conductor.
- Early procurement of aluminum stabilized conductor: Requests-for-Proposals for all four types of conductor have been released. Responses to two of them have been received. The project has planned a CD-3a review in October 2013 to authorize purchase of the conductor.
- Make/buy analysis: A make/buy analysis for the three solenoids has been performed. Specifics of the “make” estimates are in doc # 2496. “Buy” estimates are based on responses to the RFIs for the PS and DS. Responses to the RFI for the TS are due in December.
- Additional practice coil winding: Discussions with INFN Genoa are ongoing.
- The specifications for the PS conductor were reexamined in light of vendor concerns that they would be difficult to achieve. The project separated the goal of demonstrating the margin in the construction of the coil (by operating at 10% over the design field) from the goal of having 1.5 K temperature margin during beam-on operation (both with $I/I_c < 70\%$). This reduced the critical current requirement from 75 kA to 51 kA.
- The project appointed a Solenoid Acquisition Oversight Committee (SAOC) to advise in regard to these acquisitions. The first meeting of the SAOC is planned for January 2013.

Comments

The project’s implementation of the Recommendations is well done.

The SAOC contains considerable expertise and should be a good asset for the acquisitions of the solenoids.

The reduction in the required critical current of the PS conductor is a good example of value engineering.

Recommendations

1. The project team should undertake a more detailed analysis of specification of the superconducting solenoids, particularly the magnetic field shielding required for the solenoids.

3. COST, SCHEDULE, and MANAGEMENT

Findings and Comments

The project team's new tailoring strategy changes what was presented at the CD-1 timeframe favorably; CD-3a is proposed six months earlier. The Committee noted the schedule contingency is 18 months or 20% of schedule activities, and the project's critical path is through the detector solenoid.

The current Total Estimated Cost is \$177.7M, the Total Project Cost is \$229.3M, and contingency/management reserve is \$51.6M or 32% of the to-go costs.

The Committee noted that the project team has made substantial progress since the August 2012 review.

The project team formed a SAOC, that is scheduled to meet in the January timeframe.

The project team is reminded that the composition of comprehensive plans are important, as is following the processes; however, execution of the project activities is the critical component of ensuring successful results.

Recommendations:

2. Conduct a televideo mini-review in the March/April 2013 timeframe.
3. Conduct a September 2013 review in support of CD-3a.

Prepared By: **Kurt Fisher, SC-28**
Date: **November 20, 2012**