



Closeout/Final Report

Director's Preliminary Review: Assessment of Readiness for CD-1 for the Mu2e Project

November 17, 2010

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Overall Assessment

A Director's Preliminary Review of the Muon to Electron Conversion Experiment (Mu2e) Project was held on November 17, 2010. The objective of the review was to assess the status and adequacy of the overall Mu2e project conceptual design effort towards CD-1 and evaluating the likelihood of the project being ready for a DOE CD-1 Independent Project Review (IPR) targeted for March 2011.

In a series of presentations and discussions the committee saw evidence of progress on conceptual design report (CDR) and developing a resource loaded schedule to support the cost range being developed for CD-1. All of the project management documents required for CD-1 have been drafted. There is an established project organization in place with a good deal of experience, but the project team has not reached necessary strength and some key positions are yet to be filled. Specifically the Deputy Project Manager and the Risk Manager. Additionally, there appears to be a shortage of engineering and scientific resources to support developing the CDR and cost estimate. This ramp-up in effort on the Mu2e project is essential to support CD-1 reviews and more generally to transition into a design and construction project.

The committee has assessed the risks associated with Mu2e being adequately prepared for a DOE IPR targeted for March 2011. It is evident that significant effort is required to complete the CDR, develop the schedule, and establish the cost range. The committee believes that a more realistic target date for a DOE IPR is early June 2011. This new target date still requires an increase in the level of effort necessary to prepare for a successful CD-1 review. Mu2e needs to acquire the additional resources as soon as possible to insure that the new target can be met.

Recommendations

1. Prepare a detailed list of milestones and specific deliverable dates (exact day) in support of a successful CD-1 review in June 2011 -- by the end of this month.
2. Finalize the NEPA determination as soon as possible, preferably before the CD-1 IPR.
3. Proceed expeditiously filling the Deputy Project Manager with the goal of having the person in place well before the CD-1 review.
4. Secure firm commitments, in writing, for increasing the time devoted to Mu2e by staff already assigned to the project that are expected to ramp-up effort -- within the next three months.
5. Fill additional open positions, including the risk manager, and secure additional mechanical engineering support at FNAL in time for the Director's review of CD-1 readiness. Project Controls staffing should continue to ramp up near CD-1 in preparation for CD-2.

6. Start creating your Bases of Estimate documentation now and assign a person to be responsible for tracking the development and ensure consistency of the information.
7. Finalize the CD-1 resource loaded schedule as soon as practicable but no later than the end of March 2011.
8. Develop a sound plan on how Mu2e will get from CD-1 to CD-2, to be presented at the CD-1 review. This plan needs to address any additional resource needs and how the project is going to acquire them.

1.0 Introduction

A Director's Preliminary Review was conducted on the Muon to Electron Conversion Experiment (Mu2e) Project on November 17, 2010. The review was an independent readiness check focusing on the Project team's progress towards CD-1 and evaluating the likelihood of the project being ready for a Lehman DOE CD-1 Independent Project Review (IPR) anticipated to take place in March 2011. The charge included a list of specific questions that were answered. The Committee's assessment is documented in the body of this closeout presentation.

This presentation is broken down into three basic sections. The first section is the Committee's overall assessment including recommendations. The second section has the answers to the review charge questions. Recommendations are statements of actions that should be addressed by the project team. The last section of this presentation is the Appendices that contain the reference materials for this review. Appendix A shows the charge for this review and Appendix B is the agenda that was followed. The review team with their contact information is included in Appendix C

The Mu2e Project is to develop a response to the review recommendations and present it to the Laboratory Management and regularly report on the progress during the Mu2e Working Group Meetings.

2.0 Charge Questions

2.1 Is the Project making adequate progress on the development of the technical designs and alternatives to create a sound Conceptual Design Report, as required to be ready for a successful CD-1 Review in March?

Progress is being made in developing the Conceptual Design Report. The magnitude of the task, however, implies that finishing the CDR will require several more months of effort. Completing the CDR by March 1 appears reasonable, (including incorporating the results of numerous sub-project reviews being held over the next month). To meet this date, the project management must remain vigilant and key personnel need to be retained.

2.2 Is the Project making adequate progress in developing the resource loaded schedules required to support the cost and schedule ranges to be presented for CD-1?

It does not appear likely that there will be adequate progress given the currently targeted March 2011 IPR. However, the team should be commended for the approach to developing the project resource loaded schedule (RLS) in P6 with significant detail which will pave the way for successful future critical decisions. We find the RLS has a long way to go to adequately address the CD-1 cost and schedule range considering the currently targeted mid January 2011 completion target. The review team feels that this anticipated roll up date is overly optimistic given the number of controls personnel and the remaining work to be done. In addition, there will be time needed for iterations of the RLS roll ups. We believe a more reasonable date for completing the CD-1 RLS would be the end of March 2011.

2.3 Is the Project making adequate progress in the preparation of other required documentation for CD-1?

The team has done a great job of pulling together drafts of the CD-1 project documents. It appears the maturity of many of these documents is sufficient to be prepared for CD-1 in March 2011 with the exception of the CDR and RLS output. The review team is concerned that the remaining content of the CDR is significant and it may not converge with proper coordination and integration prior to the planned March 2011 IPR. In addition, the RLS, as described above will require more time to develop a defensible cost and schedule range.

2.4 Are the Project organization and staffing levels, both current and planned, adequate to manage the work leading to a successful CD-1 review and beyond?

The project has staffed many key positions for this stage of development. The two immediate needs are for (1) a Deputy Project Manager, and (2) a Risk Manager. Both the deputy and risk manager should be identified as soon as possible, and be on board well in advance of the CD-1 Review. This is especially true for the deputy. Beyond CD-1, there are several other positions that need to be filled within the project management area, in

particular in project controls. Within the Level 2 areas, there remain many CAM's to be identified and brought on board. Maintaining existing resources and adding additional engineering will be required beyond CD-1.

2.5 Are there other issues related to CD-1 readiness that the Project needs to address?

The specific requirements and general expectations for CD-1 readiness are well understood by the Mu2e Project Manager and the project team. The status of each item was presented and the Committee believes the project's status assessments are accurate. The Committee's concerns focus primarily on the challenge of completing the CD-1 deliverables on the currently advertised schedule. The highest priority items for CD-1 are the Conceptual Design Report (CDR) and the CD-1 quality Resource Loaded Schedule (RLS). These two items are currently being finalized in parallel and are planned to converge by January 15, 2011, two months from the date of this review. The main issue is likely to be the time required to: assemble and integrate the information; iterate on the preliminary scope, cost, and schedule; and, produce a high quality CDR and reasonably accurate RLS to inform the CD-1 cost range.

The effort necessary to reach closure on a preliminary baseline for the Mu2e Project and CD-1 is considerable. The Mu2e organization structure is appropriately defined and the majority of the key management positions are filled. The main issues facing the project are to secure an increase in the fraction of time on project for many individuals and to continue to add staff, including a Deputy Project Manager. This ramp-up in effort on the Mu2e project is essential to support CD-1 reviews and more generally to transition into a design and construction project.

There are issues external to the project that will undoubtedly impact the Mu2e Project preliminary baseline including: possible extension of the Tevatron run, availability of funding for Mu2e, and general competition for resources within Fermilab. There was limited discussion of these issues in order to focus the discussion on issues more directly within the Mu2e Project's control.

2.6 Does it appear likely that the Mu2e Project can be ready for a CD-1 review in March 2011?

It appears unlikely that the Mu2e Project will be ready for a CD-1 review in March 2011. A CD-1 review in June 2011 is a realistic goal.

The project manager has a very clear view of the requirements for a successful CD-1 review. There is an ambitious plan to complete the Conceptual Design Report (CDR) and the final cost & schedule and associated documentation by January 15, 2011, a few weeks prior to a Director's review. The CDR preparations are well underway and it is feasible that a fairly complete draft of the CDR will be available in January. The timeline for completing the CD-1 quality Resource Loaded Schedule is not realistic given current status.

3.0 Appendices

Charge

Agenda

Reviewers Contact Information

Appendix A

Charge

Director's Preliminary Review: Assessment of Readiness for CD-1 for the Mu2e Project
November 17, 2010

The Committee is to conduct a Director's Preliminary Review of the Muon to Electron Conversion Experiment (Mu2e) Project to assess its progress towards a planned CD-1 Lehman Review, anticipated to take place in March 2011. The Mu2e Project will construct a new facility to enable the world's most sensitive search for charged lepton flavor violation by searching for the conversion of a muon to an electron in the field of a nucleus. Mu2e will be ~10,000 more sensitive than the world's current best limit. The project consists of modifications to the existing Fermilab accelerator complex, construction of a new external beamline, construction of a new detector hall on the Fermilab site and construction of a new detector to search for muon conversion. The detector includes a complex system of superconducting solenoids, a collimation and charge selection scheme for producing the world's most intense muon beam, a low mass tracking detector operating in vacuum, a crystal calorimeter and a cosmic ray veto. Many aspects of the project will be executed by other collaborating National Laboratories and universities.

Mu2e received CD-0 on November 25, 2009. The Project is now working towards CD-1, with the goal of being ready for a Lehman Review in March 2011. The purpose of this review is to assess the progress that the project team is making towards readiness for CD-1, evaluate the likelihood of being ready for a CD-1 review by March of 2011 and to recommend any actions to be taken to improve the likelihood of being ready on that time scale.

The review team is asked to address the following questions:

1. Is the Project making adequate progress on the development of the technical designs and alternatives to create a sound Conceptual Design Report, as required to be ready for a successful CD-1 Review in March?
2. Is the Project making adequate progress in developing the resource loaded schedules required to support the cost and schedule ranges to be presented for CD-1?
3. Is the Project making adequate progress in the preparation of other required documentation for CD-1?
4. Are the Project organization and staffing levels, both current and planned, adequate to manage the work leading to a successful CD-1 review and beyond?
5. Are there other issues related to CD-1 readiness that the Project needs to address?
6. Does it appear likely that the Mu2e Project can be ready for a CD-1 review in March of 2011?

The review is scheduled to last one day. At the close of the review the Committee is asked to present its answers to the charge questions and include recommendations concerning actions that need to be taken to ensure a successful CD-1 Review on the planned time scale. The report presented at the closeout should be in written form and will be the final report from this review.

Appendix B
Agenda

Director's Preliminary Review: Assessment of Readiness for CD-1 for the Mu2e Project
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AGENDA

Wednesday, November 17, 2010 (Black Hole – WH2NW)

8:00 am	Committee Executive Session (30)	Jim Yeck
8:30 am	Welcome (10).....	Peter Garbincius
8:40 am	Project Overview (60)	Ron Ray
9:40 am	WBS 1.7 Calorimeter (25)	Stefano Miscetti (video)
10:05 am	Break (15)	
10:20 am	Preliminary HA (15).....	Nathan Duff
10:35 am	NEPA Strategy (15)	Teri Dykhuis
10:50 am	Resource Loaded Schedule Development (20)	David Leeb
11:10 am	WBS 1.2 Accelerator (30)	SteveWerkema
11:40 am	WBS 1.3 Civil (20).....	Tom Lackowski
12:00 pm	Working Lunch – Committee (60)	
1:00 pm	WBS 1.4 Solenoids (30).....	Mike Lamm
1:30 pm	WBS 1.5 Muon Channel (20).....	Sandor Feher
1:50 pm	WBS 1.6 Tracker (20)	Aseet Mukerjee
2:10 pm	WBS 1.8 Cosmic Ray Veto (20)	Craig Dukes
2:30 pm	WBS 1.9 DAQ (20)	Mark Bowden
2:50 pm	Break (15)	
3:05 pm	Wrap-up Discussion (30)	All
3:35 pm	Committee Executive Session/Write-up	Jim Yeck
5:00 pm	Closeout.....	All
5:30 pm	Adjourn	

Appendix C

Reviewers' Contact Information

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November 17, 2010

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