



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
SCIENCE

DOE/SC CD-3c Review
of the
**Muon to Electron Conversion
Experiment (Mu2e) Project**
Fermi National Accelerator Laboratory
June 14-16, 2016

Kurt Fisher

Committee Chair

Office of Science, U.S. Department of Energy

<http://www.science.doe.gov/opa/>



- **Closeout report (prepared in PowerPoint)**
 - Presented Thursday, June 16
 - Instructions—slide 12
 - Template—slide 14
- **Final report draft (prepared in MS Word)**
 - Due Monday, June 20 to Casey
(casey.clark@science.doe.gov)
 - Instructions—slide 13



DOE EXECUTIVE SESSION AGENDA

Tuesday, June 14, 2016—Comitium (WH2SE)

- 8:00 a.m. DOE Executive Session.....K. Fisher
- 8:15 a.m. Program Perspective.....T. Lavine
- 8:30 a.m. Federal Project Director Perspective.....P. Philp
- 8:45 a.m. Questions
- 8:55 a.m. Adjourn

Project and review information is available at:

<http://mu2e.fnal.gov/public/project/reviews/cd3c-review/cd3c-index.shtml>

Password: reviewer

Username: mu2ereviewer



Review Committee Participants

Kurt Fisher, DOE/SC, Chairperson

SC1

Accelerator Physics

- * Rod Gerig
- Graeme Murdoch, ORNL
- Geoff Pile, ANL

SC2

Superconducting Solenoids

- * Soren Prestemon, LBNL
- Mark Bird, NHFML
- Dave Koppenaal, PNNL

SC3

Detector Systems

- * Harry Nelson, UCSB
- Howard Gordon, BNL
- John Jaros, SLAC
- Yuichi Kubota, UMN
- Jeff Nelson, W&M
- Rick Van Berg, U of Penn Emeritus

SC4

Civil Construction

- * Marty Fallier, BNL

SC5

Environment, Safety and Health

- * Ian Evans, SLAC

SC6

Cost and Schedule

- * Jerry Kao, DOE/CH
- Ron Lutha, DOE/CH
- Tim Maier, DOE/SC

SC7

Project Management

- * Robert Wunderlich, DOE (retired)
- Jeff Geouque, ORNL
- Joe Ingraffia, ANL
- Stephen Meador, DOE/SC
- Don Rej, LANL

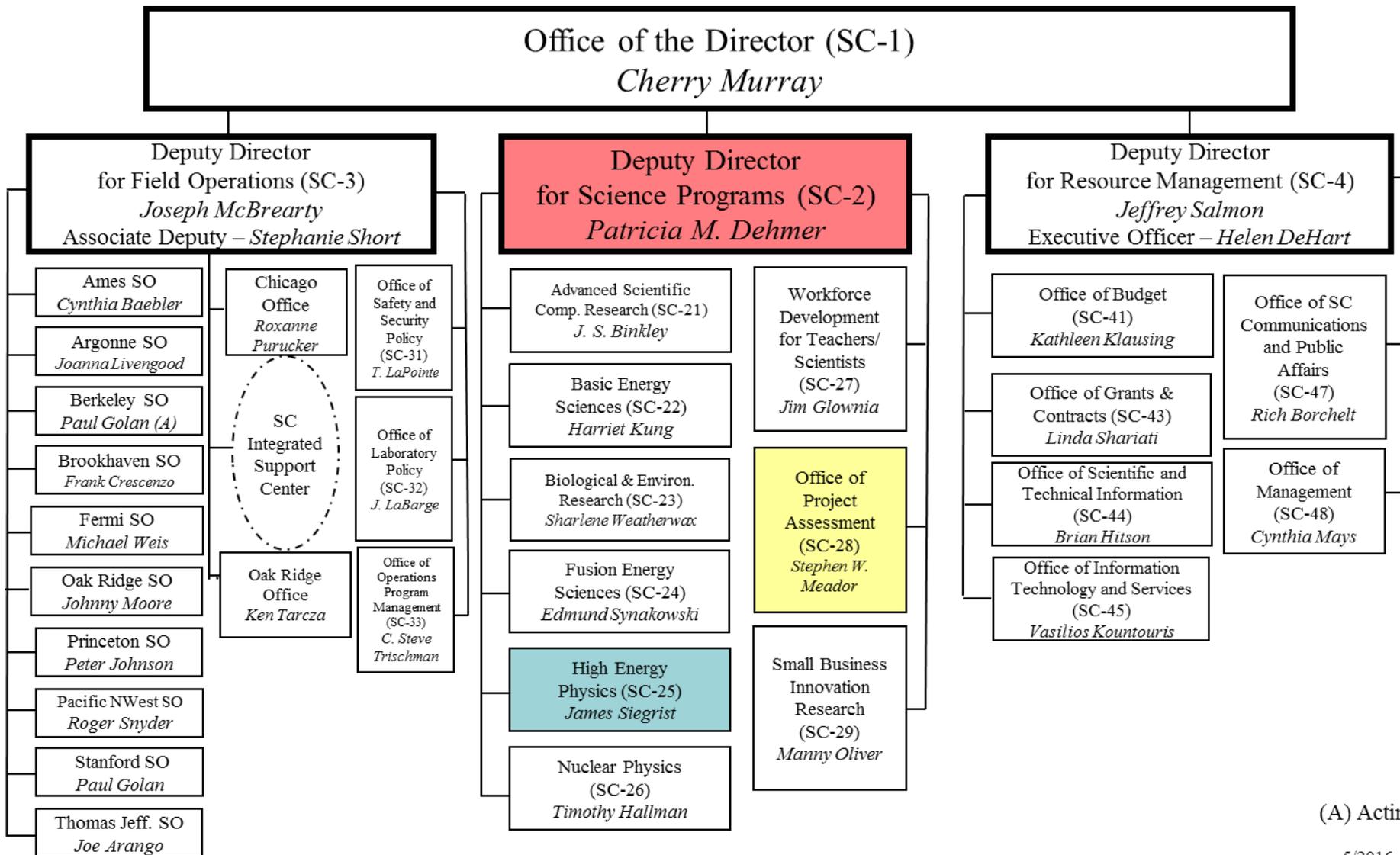
Observers

- Mike Procaro, DOE/SC
- Ted Lavine, DOE/SC
- Bruce Strauss, DOE/SC
- Ken Marken, DOE/SC
- Bill Wisniewski, DOE/SC
- Mike Weis, DOE/FSO
- Pepin Carolan, DOE/FSO
- Paul Philp, DOE/FSO

LEGEND

- SC Subcommittee
- * Chairperson

COUNT: 23 (excluding observers)



(A) Acting



1. Have the project and the laboratory responded satisfactorily to the recommendations of the previous DOE review?
2. Is the detailed design sufficiently mature and appropriately reviewed so that the project can continue, as planned, with the procurement and fabrication work?
3. Are the current project cost and schedule projections consistent with the baseline cost and schedule in the Project Execution Plan (PEP). Is the contingency adequate for the risks?
4. Are the management and resources adequate to deliver the proposed technical scope within the baseline budget and schedule as specified in the PEP?
5. Are the ES&H aspects being properly addressed, given the project's current stage of development?
6. Is the documentation required by DOE Order 413.3B for CD-3 complete?
7. Are there any outstanding issues that need to be addressed?



TOTAL PROJECT COST (TPC)		\$750M or more	Less than \$750M to \$400M	Less than \$400M to \$100M	Less than \$100M to \$50M*	Less than \$50M* to \$20M	Less than \$20M to \$10M**
DECISION / REQUIREMENTS ¹ / APPROVAL ²		Delegation Allowed					
CD-3--APPROVE START OF CONSTRUCTION		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
Approve updated CD-2 Project Documentation (PEP, AS, PDS, etc) if major changes		Reviewed by SC-28 Approved by SC-1	Reviewed by SC-28 Approved by SC-1	Reviewed by SC-28 Approved by SC-2	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD
Complete Final Design		Project	Project	Project	Project	Project	Project
Incorporate High Performance & Sustainable Bldg. & Sustainable Env. Stewardship		Project	Project	Project	Project	Project	Project
Conduct a Final Design Review		Team external to project					
Complete Final Design Report		Project	Project	Project	Project	Project	Project
Employ a certified EVMS compliant with ANSI/EIA-748A, or as defined in the contract		Certified by SC-28	Certified by SC-28	Certified by SC-28	Certified by SC-28	Contractor	N/A
Execution Readiness Review		ICE by APM if warranted or IPR by SC-28	ICE by APM if warranted or IPR by SC-28	ICE by APM if warranted or IPR by SC-28	SC-28	SC-28	SC-28
Conduct a Technology Readiness Assessment, where significant CTE modification occurs		N/A	N/A	N/A	N/A	N/A	N/A
Update the Hazard Analysis Report		Site Office or Lab					
Prepare Construction Project Safety and Health Plan		Site Office or Lab					
Update the Quality Assurance Program		Site Office or Lab					
Finalize the Security Vulnerability Assessment Report, if necessary		Site Office or Lab					
Nuclear Facility	Hazard Cat. 1,2,3 Nuclear Facility--Update Safety Design Strategy (SDS)	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate
	Hazard Cat. 1,2,3 Nuclear Facility--Prepare a Preliminary Documented Safety Analysis ⁴ that updates the PSDR	SBA Authority via the SER					
	Hazard Cat. 1,2,3 Nuclear Facility--Prepare a Safety Evaluation Report (SER)	SBAA w/ FPD concurrence					
	Hazard Cat. 1,2,3 Nuclear Facility--Revise the Code of Record	Project	Project	Project	Project	Project	Project
POST CD-3	Submit approved CD or equivalent documents to APM. If applicable, any PB BCP to APM	SC-28	SC-28	SC-28	SC-28	SC-28	SC-28
	Allow expenditure of TPC funds. Update budget document and OMB 300s if applicable.	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD
	Update PARS II with monthly status	Prog. Mgr., FPD, and Contractor	Prog. Mgr. & FPD No Earned Value (EV)				
	Continue with Monthly or Quarterly Project Reporting/Meeting	SC-AD Invite SC-1 and SC-28	SC-AD Invite SC-1 and SC-28	SC-AD Invite SC-2 and SC-28	SC-AD to invite SC-28	SC-AD to invite SC-28	SC-AD to invite SC-28
	Perform EVMS surveillance review	Bi-annually by SC-28 Annually by Contractor	Annually by Contractor	N/A			
	Submit Lessons Learned regarding up-front planning and design 90 days after CD-3	FPD	FPD	FPD	FPD	FPD	FPD
SC-AD Request Annual Project Peer Review by PMSO	SC-28	SC-28	SC-28	SC-28	SC-28 Tailored	SC-28 Tailored	



Tuesday, June 14, 2016—Comitium (WH2SE)

8:00 am	DOE Full Committee Executive Session.....	K. Fisher
9:00 am	Welcome— Curia II (WH2SW)	T. Meyer
9:10 am	Project Overview	R. Ray
10:10 am	Accelerator.....	S. Werkema
10:40 am	Break—Outside Curia II	
11:00 am	Solenoids.....	M. Lamm
11:30 am	Muon Beamline.....	G. Ginther
12:00 pm	Tracker	A. Mukerjee
12:20 pm	Working Lunch (Review Committee)—15th Floor Crossover	
1:10 pm	Reviewer Committee Photo - Atrium	
1:20 pm	Calorimeter— Curia II (WH2SW)	S. Miscetti
1:40 pm	Cosmic Ray Veto	C. Dukes
2:00 pm	Trigger and DAQ	R. Rivera
2:20 pm	Integration	K. Byrum
2:50 pm	Break—Outside Comitium (WH2SE)	
3:15 pm	<u>Subcommittee Breakout Sessions</u>	
	<ul style="list-style-type: none"> • Session 1 Management—Comitium (WH2SE) • Session 2 Accelerator—Curia II (WH2SW) • Session 3 Solenoids—Theory (WH3NW) • Session 4 Muon Beamline— Snake Pit (WH2NE) • Session 5 Calorimeter/Cosmic Ray Veto—Hornet’s Nest (WH8XO) • Session 6 Tracker/DAQ—Black Hole (WH2NW) 	
5:00 pm	Full Committee Executive Session— Comitium (WH2SE)	
6:30 pm	Adjourn	



Wednesday, June 15, 2016

- 8:00 am Subcommittee Breakout Sessions—Continued in same rooms
- 10:00 am **Break—Outside Comitium (WH2SE)**
- 10:20 am Subcommittee Breakout Sessions—Continued in same rooms
- 12:00 pm **Working Lunch (Review Committee)—Outside of Comitium**
- 1:00 pm Response to Reviewer Questions—**Comitium (WH2SE)**
- 2:00 pm Subcommittee Executive Session/Report Writing—**Breakout Rooms**
- 3:00 pm Full Committee Executive Session—**Comitium (WH2SE)**

Thursday, June 16, 2016

- 8:30 am Subcommittee Working Session – Comitium (WH2SE)
- 10:00 am DOE Full Committee Executive Session—Dry RunK. Fisher
- 11:00 am Box Lunches Provided for Review Committee
- 1:00 pm Closeout Presentation – **Curia II (WH2SW)**
- 2:00 pm Adjourn



Executive SummaryFisher*

1. Introduction Lavine*

2. Technical Systems Evaluation (Charge Questions 1, 2, 6, 7)

 2.1 Accelerator Physics Gerig*/SC-1

 2.1.1 Findings

 2.1.2 Comments

 2.1.3 Recommendations

 2.2 Superconducting Solenoids Prestemon*/SC-2

 2.3 Detector Systems Nelson*/SC-3

3. Civil Construction (Charge Questions 1, 2, 6, 7)Fallier*/SC-4

4. Environment, Safety and Health (Charge Questions 1, 5, 6, 7)..... Evans*/SC-5

5. Cost and Schedule (Charge Questions 1, 3, 6, 7)Kao*/SC-6

6. Project Management (Charge Questions 1, 2, 4, 6, 7) Wunderlich*/SC-7

*Lead



Closeout Presentation and Final Report Procedures



(Use PowerPoint / No Smaller than 18 pt Font)

2.1 Use Section Number/Title corresponding to writing assignment list.

List Review Subcommittee Members

List Assigned Charge Questions and Review Committee Answers

2.1.1 Findings – What the project told us

- In bullet form, include your account of factual technical, cost, schedule, and management. Information provided/presented by the Project

2.1.2 Comments – What we think about what the project told us

- In bullet form, include your assessment of project status (observations, concerns, feedback, suggestions, etc.) based on the findings. This section carries more emphasis than the Findings, but does not require an action as do the Recommendations. Do not number your comments.

2.1.3 Recommendations – What we think the project needs to do

- 1. Beginning with an action verb, provide a brief, concise, and clear statement with a due date.**

For Critical Decision reviews, include a specific recommendation addressing how the Committee judged the readiness for the CD, *i.e.*:

- **The project is ready to proceed to CD-2; *or***
- **The project is ready to proceed to CD-2, after addressing the following recommendations**



Format: Final Report

(Use MS Word / 12pt Font)

2.1 Use Section Number/Title corresponding to writing assignment list.

2.1.1 Findings – What the project told us

Include a brief narrative description of technical, cost, schedule, management information provided by the project. Each subcommittee will emphasize their area of responsibility.

Cost and schedule subcommittee should provide attachments for approved project cost breakdown and schedule. Management subcommittee should provide attachment for approved project organization and names of personnel.

2.1.2 Comments – What we think about what the project told us

Descriptive material assessing the findings and making observations and conclusions based on the findings. **The committee's answer to the charge questions should be contained within the text of the Comments Section.** Do not number your comments.

2.1.3 Recommendations – What we think the project needs to do

1. Beginning with an action verb, provide a brief, concise, and clear statement with a due date.
- 2.

Please Note: Recommendations are approved by the full committee and presented at the review closeout briefing. Recommendations SHOULD NOT be changed or altered from the closeout report to the Final Report.



Closeout Report on the DOE/SC CD-3c Review of the

Muon to Electron Conversion Experiment (Mu2e) Project

Fermi National Accelerator Laboratory

June 14-16, 2016

Kurt Fisher

Committee Chair

Office of Science, U.S. Department of Energy

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- **Findings**
 - **Comments**
 - **Recommendations**



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- **Findings**
 - **Comments**
 - **Recommendations**



PROJECT STATUS		
Project Type	MIE / Line Item / Cooperative Agreement	
CD-1	Planned:	Actual:
CD-2	Planned:	Actual:
CD-3	Planned:	Actual:
CD-4	Planned:	Actual:
TPC Percent Complete	Planned: _____%	Actual: _____%
TPC Cost to Date		
TPC Committed to Date		
TPC		
TEC		
Contingency Cost (w/Mgmt Reserve)	\$	
Contingency Schedule on CD-4b	_____ months	_____ %
CPI Cumulative		
SPI Cumulative		



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- **Comments**
- **Recommendations**