



# **Closeout Report on the DOE/SC CD-3b Review of the**

## **Utilities Upgrade Project (UUP)**

### **Fermi National Accelerator Laboratory**

**August 11-12, 2015**

**Raymond Won**

**Committee Chair**

**Office of Science, U.S. Department of Energy**

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

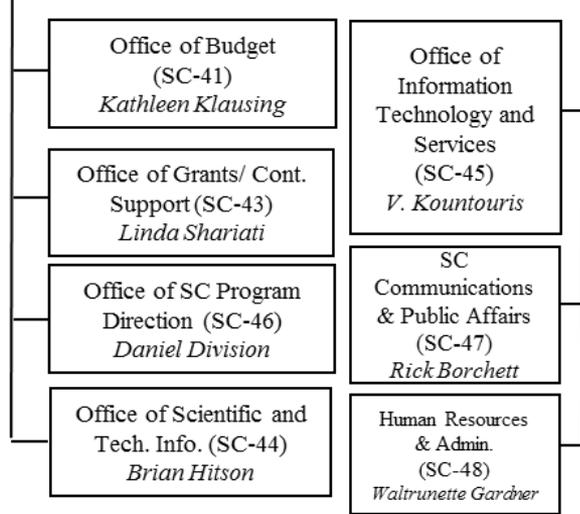
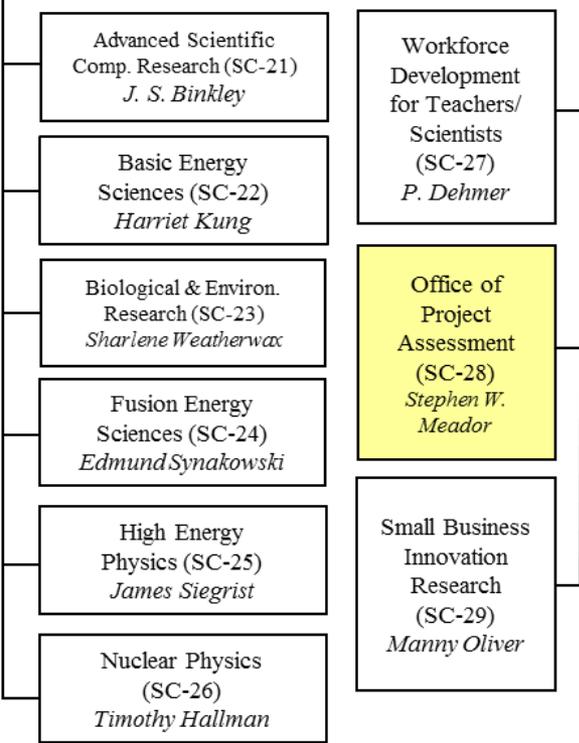
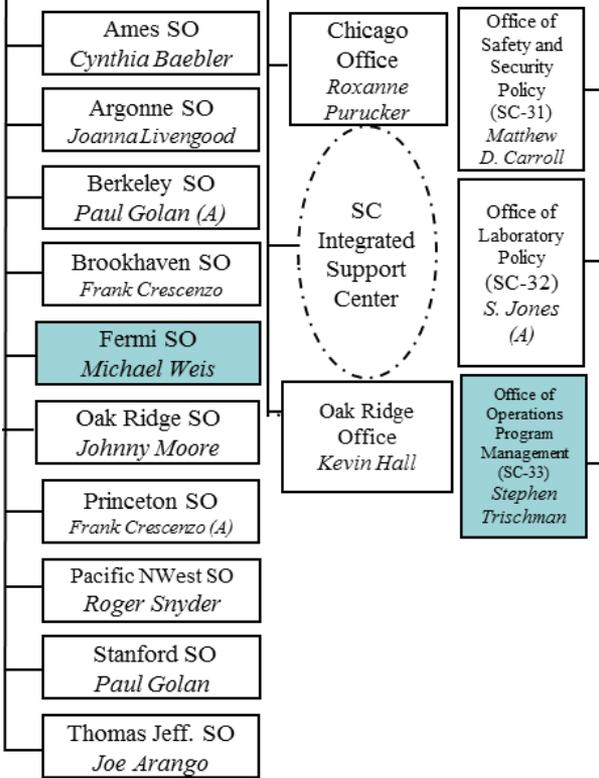


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(A) Acting



1. At this stage of the project, is the project scope, if successfully completed, sufficient to achieve the project's key performance parameters?
2. Is the bid solicitation package for Phase B scope consistent with the approved Project Execution Plan? Are bids or quotes already in hand? If so, are the base bids or quotes within the cost estimates, and consistent with the approved cost and schedule performance baseline?
3. Are cost, schedule, and scope contingency adequate to address the remaining risks? Are project risks being actively managed?
4. Are environment, safety and health requirements properly addressed? Are Integrated Safety Management principles being followed?
5. Has the Integrated Project Team responded appropriately to recommendations from prior reviews including those applicable to the proposed Phase B work?



# Review Committee Participants

## Raymond Won, DOE/SC, Chairperson

### Review Committee

#### *Subcommittee 1: Technical*

\*Shane Wells, SLAC  
Michael Finder, ANL

#### *Subcommittee 2: ES&H*

\*Betsy Dunn, ANL  
Neil Gerrish, PPPL

#### *Subcommittee 3: Cost and Schedule*

\*Stephen Langish, PPPL  
Laurie Casarole, BNL  
Jesse Saldivar, DOE/SSO

#### *Subcommittee 4: Management*

\*Gary Bloom, ORNL  
Teresa Danforth, TJNAF  
Carolyn Galayda, SLAC

\*Lead

### Observers

Stephanie Short, DOE/SC  
David Michlewicz, DOE/SC  
Steve Neus, DOE/FSO



1. At this stage of the project, is the project scope, if successfully completed, sufficient to achieve the project's key performance parameters? **Yes. Approved and reviewed designs, supported by bids in hand, exceed the threshold KPP's.**
2. Is the bid solicitation package for Phase B scope consistent with the approved Project Execution Plan? Are bids or quotes already in hand? If so, are the base bids or quotes within the cost estimates, and consistent with the approved cost and schedule performance baseline? **Yes. Solicitation packages are appropriate for scope identified in PEP, and bids are in hand that exceed the threshold requirements with alternates priced that support contingency buy down.**
5. Has the Integrated Project Team responded appropriately to recommendations from prior reviews including those applicable to the proposed Phase B work?  
**Yes**

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



- **Design packages fully developed and reviewed that fully cover the threshold KPI's, including alternates that support the buy down plan.**
- **All comments from previous reviews have been addressed**
- **MSS prefabrication on schedule. Expecting shop drawings this month. The project team plans to complete site inspections and witness factory testing.**
- **All environmental documentation in place.**
- **Competitive bids in hand.**
- **Bidders had all sequencing, schedule, and operational information to appropriately account for the limitations these conditions will present.**
- **Dependencies between different subcontractors, utility providers, and Fermilab have been well defined and planned.**
- **Strong GIS in place with information further enhanced by potholing operations at critical intersections along the ICW route during the design phase.**
- **Utility isolation plans and traffic control plans well developed at this stage and included in bid documents.**



- **A detailed MCC energization plan needs to be developed early in the MCC construction contract.**
- **Develop robust contingency plan for dealing with unidentified/abandoned utilities and contaminated or unsuitable soils during excavations.**
- **Witness factory testing on electrical equipment to the greatest extent practicable.**
- **Carefully review building shop drawings for coordination with final equipment layout to ensure all required clearances are maintained.**
- **Risk ID 03-13 identifies “Unforeseen/Undocumented subsurface conditions including problems with encountering existing structures, systems, materials (legacy issues)”. However, the NEPA Environmental Review Form does not include legacy issues/ activated soils. For document consistency, the NEPA Environmental Review Form should be updated to include the risk of encountering legacy issues/ activated soils during excavation work.**



- Approve CD-3b



4. Are environment, safety and health requirements properly addressed? Are Integrated Safety Management principles being followed? **Yes, ISM principles are integrated throughout the project documents.**
  
5. Has the Integrated Project Team responded appropriately to recommendations from prior reviews including those applicable to the proposed Phase B work? **Yes, however see comments related to subcontractor ESH representative.**

### **3.1 Cost and Schedule – Charge Questions 4 and 5 (B. Dunn, ANL / N. Gerrish, PPPL)**

#### **3.1.1 Findings**

- Project documentation appropriate for CD-3B approval is complete, including:
  - Hazard Analysis Report (HAR)
  - Quality Assurance Plan
  - Construction Project Safety and Health Plan (CPSHC)
  - Security Vulnerability Assessment Report



### **3.1 Findings (cont.)**

- Fermilab Integrated Safety Management (ISM) Program is a registered Occupational Health & Safety Assessment Series 18001 Plan.
- A full-time construction coordinator is assigned.
- ESH support is budgeted at 0.25 FTE. A project ESH coordinator is supported by the centralized Fermilab ESH&Q organization.
- Subcontractors work under Fermilab's approved Worker Safety and Health Program. ESH requirements are flowed down via the CPSHC.
- CPSHC incorporates ISM principles. It also requires that subcontractors:
  - Develop a Site Specific Construction Safety & Health Plan.
  - Develop an Excavation Plan complying with OSHA 1926 Subpart P, Excavations. Excavation permits are issued prior to commencement of subsurface excavations.

### **3.2 Comments**

### **3.3 Recommendations**



### **3.1 Findings (cont.)**

- All necessary permits are complete, to include:
  - National Environmental Policy Act (NEPA) categorical exclusion (see Technical)
  - Illinois EPA Stormwater Pollution Prevention Plan (SWPPP)
  - U.S. Army Corps of Engineers Site Review completed – no permit required
  - Surveys have already been completed for PCBs and lead paint. None found.
  - Surveys found asbestos in panels in the substation basement. Panels are to be removed by Fermilab's asbestos contractor prior to UUP work start.
- Removal of the capacitor tree, communications tower, and placement of the control building require development of lift plans.
- Recent changes in the OSHA regulations related to confined space were acknowledged by project ESH staff. Subcontractors are required to comply with OSHA regulations.
- Health physics technicians will check soil prior to directional boring across the beam line.
- ICW trenching is staged to be primarily performed when the overhead electrical lines are de-energized, thereby minimizing hazards.
- H/V and ICW work will result in spoils removal. The ICW contractor has the primary responsibility for maintaining the dump site.



### **3.1 Findings (cont.)**

- Commonwealth Edison will shut down the main feeder to the Substation. Agreements on delineations of work scope are in place and appear to be understood.
- CD-2/3A recommendation for an eyewash + safety shower has been addressed. A portable eyewash with drench hose meeting ANSI Z358.1-2009 has been specified.



- **Comments (continued)**

CD-2/3A recommended:

*Include a subcontractor safety representative in the ICW and MSS projects. It would be prudent to have a subcontractor safety representative for the entire project except perhaps low risk phases, if any, of the ICW and MSS projects. Explicit safety representative qualifications should be listed in the project specifications.*

An onsite full-time safety representative when the subcontractor headcount exceeds 20.

The safety rep is required to have:

- 10 years of construction experience,
- 3 years of safety experience, and
- OSHA 30 hour construction safety training.

For < 20 persons onsite, a competent person with OSHA 30 hour is required.

“20 persons” does not equate to “risk”. We strongly suggest that the subcontractor ESH rep be required to be present for the entire project. Especially considering risks with lifts, building installation, electrical, and excavations under overhead lines.



- **Recommendations**
  - Recommend CD-3B approval.



## 4. Cost and Schedule

(S. Langish, PPPL, Laurie Casarole, BNL,  
Jesse Saldivar, DOE/SSO)

1. At this stage of the project, is the project scope, if successfully completed, sufficient to achieve the project's key performance parameters? **Yes.**
2. Is the bid solicitation package for Phase B scope consistent with the approved Project Execution Plan? **Yes.** Are bids or quotes already in hand? **Yes.** If so, are the base bids or quotes within the cost estimates, and consistent with the approved cost and schedule performance baseline? **No.**
3. Are cost, schedule, and scope contingency adequate to address the remaining risks? Are project risks being actively managed? **Yes.**
5. Has the Integrated Project Team responded appropriately to recommendations from prior reviews including those applicable to the proposed Phase B work? **Yes.**



### 4.1 Cost and Schedule – Charge Questions 1, 2, 3 and 5 (S. Langish, PPPL, Laurie Casarole, BNL, Jesse Saldivar, DOE/SSO)

#### 4.1.1 Findings

- The UUP project TPC is \$36,000k with a TEC of \$34,900 k and OPC of \$1,100k.
- EVMS statistics as of 30 June 2015:
  - BCWS: \$6,063 k
  - BCWP: \$6,090 k
  - ACWP: \$6,051 k
  - BAC: \$31,336 k
  - CPI/SPI: ~ 1.0
- The project baseline will deliver the project threshold KPP's listed in the PEP and two scope enhancements assuming BCR007 approval.
- The project has CD-3A approval for long-lead procurement for prefabrication of Master Substation Control Building.
- Seven (7) Baseline Change Requests (BCRs) have been submitted to date. BCR's 001 through 006 have been approved.



### 4.1.1 Findings (cont.)

- BCR007 has been submitted which reduces Project Management costs in WBS 600.01, adds budget to WBS 600.2 and 600.3 as a result of high bids on both, transfers remaining PED funds to Construction contingency, and adds the first two scope enhancements to the project baseline (if approved).
- A Risk Register has been prepared which consists of 29 risks. 6 risks (valued at ~\$531 k) are shown as retired (assumption that BCR007 has been approved). The remaining risks total as follows: EMV=\$1,632 k and 10.4 months of expected schedule risk remaining. A Monte Carlo analysis has been completed which yields >80% confidence that the contingency remaining can cover the remaining risks. This is consistent with and supports the UUP Scope Enhancement Plan.
- Project contingency is 18.5% after BCR006 and 16.2% after proposed BCR007.
- The project schedule consists of 190 activities (193 with BCR007).
- The critical path has been identified as the ICW construction and is being managed.
- The project schedule contains no hard constraints which is a best practice.
- Only two activities in the project schedule have missing logic and those are the project start activity and the project finish activity. This is a best practice.
- The project schedule has 17 activities with lags – the majority of these activities were noted to be milestones.



### 4.1.1 Findings (cont.)

- The PEP identifies 5 Level 1 Milestones, 9 Level 2 Milestones, and 19 Level 3 Milestones. The baseline project schedule identifies 3 Level 1 Milestones, 8 Level 2 Milestones and 12 Level 3 Milestones. Note: The milestones completed prior to the approval of the PEP are not contained in the baseline schedule.
- The project has begun to use a Corrective Action Log to track actions from Variance Analysis Reports which is a best-practice.
- The project responded to the Director's Review comment of high EDIA. The proposed BCR007 will lower soft costs reducing EDIA from 46% to 38%. The project listed four tasks that if removed from the project would yield a 29% EDIA.
- The project is fully funded.
- The project has addressed concerns from prior reviews.



### 4.1.2 Comments

- Consider wording Milestones in project schedule consistent with PEP. Note: Not all milestones in the PEP are contained in baseline schedule.
- BCR006 was implemented after the start date of one activity (600.03.01.02.1045) affected by the BCR thereby “changing history” from an EVMS perspective.
- Consider converting lags to activities for non-milestone activities.
- Activity 600.02.02.1015 HV-MSS Control Building Procurement is base-lined at a 216 day duration and \$5.6M. Consider breaking up into smaller activities for the purposes of EVMS or showing steps in Primavera.
- Rather than combining several changes into one BCR consider separating so the change is traceable.
- Consider general housekeeping on Baseline Change documentation to ensure transparency as well as continuous improvement
  - Adding the implementation month to the Change Control Log
  - Include Control Account totals on all backup documentation so the delta is traceable
  - Show a running total of the Management Reserve (contingency) remaining
  - Include implementation date and prior budget on the Work Authorization Documents (WADs).



### 4.1.2 Comments (cont.)

- Baseline Change Control is defined in the PEP and should be implemented for “resetting” of \$500 k contingency (Management Reserve) according to this process.
- The project should continue monitoring of soft-costs needs (reduce EDIA) to allow for completion of more objective scope
- CD-3A authorized the procurement of the Master Substation Control Building which did not include Commonwealth Edison disconnection effort. This has not been identified in the project schedule.



## 4. Cost and Schedule

(S. Langish, PPPL, Laurie Casarole, BNL,  
Jesse Saldivar, DOE/SSO)

### 4.1.3 Recommendations

- Prior to ESAAB recommend preparing both a cost and schedule impact of missing the Commonwealth Edison disconnect date with a path forward recommendation.
- Recommend CD-3B approval pending completion of the above action.



**PROJECT STATUS**

Project Type	Line Item	
CD-1	Planned: Nov 2010	Actual: 11/15/2010
CD-2/3A	Planned: Jan 2015	Actual: 02/18/2015
CD-3B	Planned: Aug 2015	Actual:
CD-4	Planned: July 2017	Actual:
TPC Percent Complete	Planned: 19.35%	Actual: 19.44%
TPC Cost to Date	\$ 6,051,559	
TPC Committed to Date	\$ 10,978,351	
TPC	\$ 36,000,000	
TEC	\$ 34,900,000	
Contingency Cost (w/Mgmt Reserve)	\$ 4,664,284	
Contingency Schedule on CD-4b	18 months	
CPI Cumulative	1.00	
SPI Cumulative	1.00	



1. At this stage of the project, is the project scope, if successfully completed, sufficient to achieve the project's key performance parameters? **Yes, the threshold scope for both the High-voltage Electrical upgrade and the Industrial Cooling Water upgrade bids are in hand to achieve the key performance parameters.**
2. Is the bid solicitation package for Phase B scope consistent with the approved Project Execution Plan? **Yes, the solicitation includes the Threshold scope and the first four Objective scope items and bids are in hand.** Are bids or quotes already in hand? **Yes.** If so, are the base bids or quotes within the cost estimates, and consistent with the approved cost and schedule performance baseline? **No, the base bids were higher than the project estimates and performance baseline**
5. Has the Integrated Project Team responded appropriately to recommendations from prior reviews including those applicable to the proposed Phase B work? **Yes**



### 5.1 Management – Charge Questions 1, 2, and 5 (Bloom, Danforth, Galayda)

#### 5.1.1 Findings

- CD-3A authorized “the procurement and delivery of the pre-manufactured Master Substation Control Building.” The required utility isolations for installation of the Master Substation Control Building is not part of the approved CD-3A scope.
- The bid solicitation package is consistent with the threshold KPPs as noted in the approved Project Execution Plan.
- The project has identified \$17.0M in buy down scope consistent with the objective KPPs.
- The bid solicitation package of objective scope buy down including:
  - Replace all remaining site-wide oil switches with new air switches
  - Replace Master substation 345kV circuit breaker
  - Perform pond system improvements to increase ICW storage capacity
  - Perform Casey’s pond pump house improvements



### 5.1.1 Findings (cont.)

- Bids for High Voltage and Industrial Cooling Water construction received. Base bids are, in aggregate, 11.0% higher than cost estimates.
- Baseline change request BCR007 reduces the proposed EDIA (management costs) to 38%.
- Incorporation of BCR007 accommodates the impact of high bids through utilization of contingency.
- The project team and IPT have been identified and organization charts have been provided.



### 5.1.2 Comments

- Recommendations from previous reviews have been addressed.
- Bidding of objective scope as options to the base contract for buy down planning is a best practice.
- The project's Baseline Change Proposal (BCP) process is not consistent with the PEP Baseline Change Control requirements per table 10; changes have been made using a BCP process in all cases thus far.
- The project has been adequately staffed to support the successful completion of the project.
- The lab has experience in 413.3b projects and the support organizations provide adequate 413.3b support to the project.
- The organization chart(s) show that the Associate Project Managers (L2) are managing their respective design and construction scopes and how they report to the PM.



### 5.1.3 Recommendations

- Approve CD-3b.
- Conduct a thorough review of the cost and schedule impacts if the Com Ed disconnect effort cannot be completed per the current schedule prior to approval of the Baseline Change Proposal (BCP) incorporating BCR007