

**Critical Decision-1, Approve Alternative Selection and Cost Range
for the Utilities Upgrade Project
at the Fermi National Accelerator Laboratory**

**Office of Safety, Security and Infrastructure
Office of Science**

A. Purpose

The purpose of this paper is to document the review by the Office of Science (SC) Energy Systems Acquisition Advisory Board-equivalent for the Critical Decision, “Approve Alternative Selection and Cost Range (CD-1)” for the Utilities Upgrade Project (UUP) at the Fermi National Accelerator Laboratory (Fermilab).

B. Mission Need

The mission of the Science Laboratories Infrastructure Program within SC is to support the conduct of Departmental research missions at SC laboratories by funding line item construction to revitalize and repair the general-purpose infrastructure.

Fermilab is a Department of Energy (DOE) Office of Science (SC) Laboratory that provides a singular focus on the grand challenges of particle physics; understanding the fundamental nature of matter and energy, and of space and time. It is the only laboratory that is entirely devoted to this field. Fermilab strives to understand the universe at a more basic level by investigating the elementary particles that are the fundamental constituents of matter and the forces between them, thereby underpinning and advancing DOE missions and objectives through the development of key cutting-edge technologies and trained manpower that provide unique support to these missions. This program will provide world class, peer reviewed research results in high energy physics and related fields, including particle astrophysics and cosmology, executing a long range strategy for high energy physics and research and technology.

Fermilab is entirely focused on particle physics. Future accelerators and experimental facilities will exhaust the capabilities of the existing utility systems, in required capacity, reliability and redundancy. Existing facilities are subjected to decreased reliability as pipe breaks and electrical equipment failures become ever more frequent.

This project’s objective is to provide a dependable utility infrastructure from which science can be accomplished. To fulfill this objective, the scope of this project includes design and construction of an upgraded Industrial Cooling Water (ICW) System and an upgraded High Voltage Electrical (H/V) System. Specifically, this includes replacing components at or near end of service life, upgrading the distribution networks with secondary distribution, and additional controls (i.e. valves, pumps, or switchgear).

C. Project Preliminary Scope Baseline

The scope of the UUP includes design and construction of an upgraded ICW and H/V Systems. The project proposes to construct a newly restored ICW system including new piping, isolation valves, and new lateral connections throughout the site. For the H/V System, the project will replace unit substations and oil switches. End-of-life high voltage feeder cable will be replaced as well. The project will also replace end-of-life components in the master substation, including

the critical equipment such as main breakers and a complete replacement of the failing metering and control system as funding within this project allows.

Element	Threshold Value (Minimum)	Objective Value (Maximum)
High-Voltage Electrical (H/V) Upgrade	<ul style="list-style-type: none"> Perform all Distribution System Modifications required to isolate Master Substation Replace all oil switches with new air switches Replace seven (7) unit substations 	Threshold value plus: <ul style="list-style-type: none"> Replace feeder cable > 25 years old Replace all end-of-life unit substations Perform all Master Substation Modifications to improve system reliability, including; replace control wiring and metering, replace 345kV oil circuit breaker, and perform various yard modifications
Industrial Cooling Water (ICW) Upgrade	<ul style="list-style-type: none"> Install new backbone piping network from Casey's Pond to the Main Ring ICW system 	Threshold value plus: <ul style="list-style-type: none"> Install new Backfeed Loop System to improve reliability and to provide greater sectionalization of the ICW system, including; install new ICW transmission mains, upgrade primary and secondary pumphouses, and automate transfer of stored water in east ponds into the ICW system

D. Project Preliminary Cost and Schedule

The preliminary Total Estimated Cost range is \$31.3 – 34.9M. The preliminary Total Project Cost (TPC) range is \$32.4 to \$36.0M. Table 1 shows the funding profile for this project.

Table 1 – Funding Profile (\$000)

FY	Total Estimated Cost		Other Project Costs	Total Project Cost
	Project Engineering and Design	Construction		
2010			1,100	1,100
2011	4,450	3,070		7,520
2012		17,380		17,380
2013		10,000		10,000
Total	4,450	30,450	1,100	36,000

The preliminary schedule baseline is shown in Table 2.

CD-0	Approve Mission Need	9/18/2009 (A)
CD-1	Approve Alternative Selection and Cost Range	1Q FY2011
CD-2	Approve Performance Baseline	4Q FY2011
CD-3	Approve Start of Construction	3Q FY2012
CD-4	Project Completion	3Q FY2015

The Preliminary Schedule is driven by the funding profile. CD-4, "Project Completion" is scheduled for June 30, 2015, which includes 12 months of float.

E. Acquisition Strategy

Acquisition for this project will be performed by Fermi Research Alliance, LLC (FRA) the M&O contractor at Fermilab. FRA's standard procurement practice is to use firm fixed-price purchase orders and subcontracts for supplies, equipment and services, and to make awards through competitive solicitations. This practice has been successfully employed during the design and construction of prior projects at Fermilab and has proven to be very effective. FRA will utilize small business participation to the maximum extent practicable.

Each procurement action will be performed in a competitive environment based on the best value approach. Major efforts will involve the evaluation of technical criterion such as technical qualifications, approach, past performance (including safety performance), experience, capabilities, personnel qualifications, and resource availability to meet the schedule requirements. Awards will be made to those offerors deemed to offer the best value to the government.

G. Environmental Strategy

No environmental issues have been identified that would significantly impact this project. The environmental risk is low. The project has complied with all requirements of the NEPA and its implementing regulations and a NEPA Categorical Exclusion has been approved. All project work will be executed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and DOE Orders. All systems will be designed to applicable ASHRAE standards, and the planning, acquisition, siting, designing, construction, operation, and maintenance decisions for this project will be based on considerations of DOE's Guiding Principles (sustainable development principles) as appropriate.

H. Preliminary Hazards Analysis

A preliminary Hazard Analysis (HA) report has been issued; a final HA will be issued for CD-2. The preliminary HA report serves as the basis for planning physical and administrative controls to protect the health and safety of workers, contractors, and the environment. It identifies construction hazards and operational hazards and mitigation plans for the hazards. The construction and operational hazards are due to work activities commonly associated with the Industrial Cooling Water (ICW) and High Voltage Electrical (H/V) systems. A project specific ES&H Plan per 10 CFR 851 will be prepared for the construction phase.

I. Energy Conservation and Sustainable Design

Decisions regarding the planning, acquisition, siting, design, building, operating, and maintaining the systems, will be based on the DOE Guiding Principles of High Performance and Sustainable Buildings. New equipment and systems will be selected to maximize energy efficiency and “green” building technologies. While not a LEED registered project, the UUP will include as many of LEED elements as practical. Waste management requirements will include recycling and waste minimization actions.

J. Risk Management

The Preliminary Risk Management Plan (RMP) has been issued that identifies the potential risks and provides a comprehensive strategy for management of these risks. The objective of this plan is to proactively identify and manage project related risks throughout the project’s life cycle. The mitigation of risks minimizes their impact on the project’s cost and schedule as well as on the facility’s operational performance. Adequate contingency will be provided for these risks.

The RMP includes a risk registry that indicates assigned responsibilities of the project personnel in performing the risk management actions. The RMP will be maintained to ensure that the project incorporates appropriate, efficient and cost-effective measures to handle project risk.

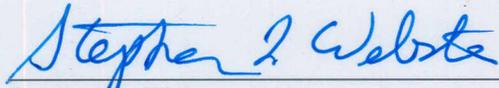
The risks anticipated during construction of the proposed systems are typical of standard utility design and construction. The risks associated with this project and acquisition strategy are judged to be manageable.

K. Security Considerations

The UUP will not result in any special safeguard and security issues, nor would they require any changes to the safeguards and security requirements at Fermilab. The site is categorized as a low hazard non-nuclear facility. Currently, access to the site is controlled primarily to ensure worker and public safety and for property protection. Normal safeguards and security requirements will be continued.

Utilities Upgrade Project at the
Fermi National Accelerator Laboratory
CD-1 Review

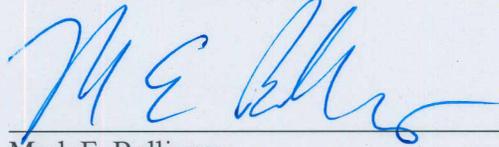
Submitted by:



Stephen L. Webster
Federal Project Director
Fermi Site Office, SC-FSO

11/1/2010

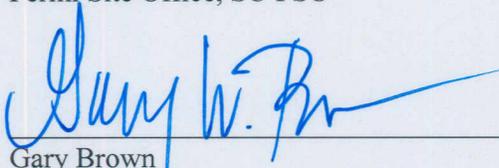
Date



Mark E. Bollinger
Acting Manager
Fermi Site Office, SC-FSO

11-1-2010

Date



Gary Brown
Program Manager
Office of Safety, Security and Infrastructure
Office of Science

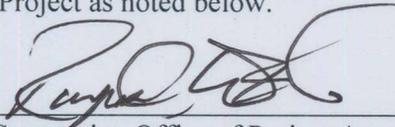
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Date

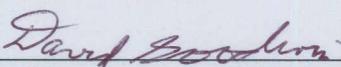
**Utilities Upgrade Project at the
Fermi National Accelerator Laboratory
CD-1 Review**

Recommendations:

The undersigned "Do Recommend" (Yes) or "Do Not Recommend" (No) approval of CD-1, for the Utilities Upgrade Project as noted below.

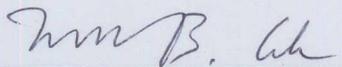


ESAAB Secretariat, Office of Project Assessment
Date 11/15/10 Yes No

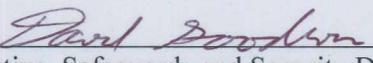


Representative, Non-Proponent SC Program Office
Date 11/15/10 Yes No

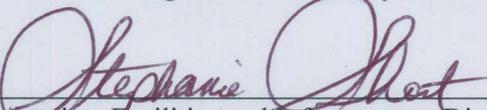
Representative, Office of Budget
Date _____ Yes No



Representative, Environmental, Safety and Health Division
Date 11-15-10 Yes No



Representative, Safeguards and Security Division
Date 11/15/10 Yes No

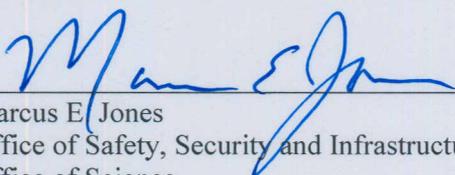


Representative, Facilities and Infrastructure Division
Date 11-15-10 Yes No

Representative, Grants and Contracts Division
Date _____ Yes No

Approval:

Based on the information presented above and at this review, Critical Decision-1, Approve Alternative Selection and Cost Range, is approved and authorization is provided to proceed to Preliminary Design.



Marcus E. Jones
Office of Safety, Security and Infrastructure
Office of Science
Date 11/15/2010