

Critical Decision 4
Approve Project Closeout
of the
Run IIb CDF Detector Facility
at the
Fermi National Accelerator Laboratory
Office of High Energy Physics
Office of Science

Purpose

The purpose of this paper is to document the review by the Office of Science Energy Systems Acquisition Advisory Board-equivalent for Critical Decision 4 (CD-4), “Approve Project Closeout” for the Run IIb CDF Detector Project at the Fermi National Accelerator Laboratory (Fermilab).

Project Description

The Run IIb CDF Detector Project prolongs the useful life of the Collider Detector at Fermilab (CDF) for operation at higher luminosity than expected in the original design. Specifically, the detector must be capable of handling peak luminosity up to $3 \times 10^{32} \text{ cm}^{-2} \text{ sec}^{-1}$. Several detector systems required replacement or modification in order to meet these requirements.

The major tasks of this upgrade were:

- Closeout of the cancelled silicon micro-vertex detector portion of the project.
- Upgrade the calorimeter by replacing the Central Preradiator Chamber with a device with shorter response time to allow operation in a high-luminosity environment, and adding timing information to the electromagnetic calorimeters.
- Upgrade the data acquisition and trigger systems to increase throughput needed for higher luminosity operation and efficiently trigger on the higher multiplicity events of Run IIb.

CD-4 definitions contained in the Run IIb CDF Detector Project Execution Plan were met and are included in the detailed descriptions of the subprojects presented in the Run IIb CDF Detector Project Completion Report organized by Work Breakdown Structure element. The installation activities for the Run IIb Detector were not part of this project but were managed in a similar fashion using project management tools. All components of the project have either been included into operations, or are being actively commissioned with beam.

The project received Critical Decision Zero (CD-0) “Approval Mission Need” in May 2001, and ends with Approval of CD-4, as signified below, well ahead of the milestone date of November 2006.

Critical Decision 4 Requirements

All requirements for CD-4 approval are completed:

- Safety Assessment Document—existing CDF SAD did not need to be modified for this project;
- Maintenance and Operating Procedure exist—CDF procedures updated to reflect Run IIb components;
- DOE deliverables have been delivered;
- Acceptance testing completed—all components integrated into operations or are being commissioned with beam.

Project Completion

The Run IIb CDF Detector Project was completed under budget and ahead of schedule. The final DOE MIE cost for the project was \$7.2 million. The project was able to achieve its mission need and also return \$1.0 million of unused contingency, in addition to \$2.2 million that was returned in June 2005 to the Office of High Energy Physics for other uses. Essentially all costs were paid by May 2006, well ahead of the CD-4 date of November 2006.

The following table presents the baseline and the final costs.

Run IIb CDF Detector Project Cost Table				
	Baseline		Final Cost	
	Total	DOE MIE	Total	DOE MIE
Silicon	3.5	1.3	3.5	1.3
Calorimeter	1.2	0.5	1.2	0.5
DAQ/Trigger	5.6	4.7	5.5	4.7
Administration	0.7	0.7	0.7	0.7
Contingency	0.9	0.9	0	0
Total Cost	11.9	8.2	10.9	7.2

Based on the project being completed under budget and well ahead of the CD-4 date of November 2006 and all of the project's deliverables being installed and either operational or being commissioned with beam, approval of CD-4, "Project Closeout," is recommended.

Critical Decision 4, Approve Project Closeout
of the Run IIb CDF Detector Project

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