

21 March 2006

To: Paul Philp
DOE Project Manager, Run IIb CDF Detector Project

From: Pat Lukens
Project Manager for the Run IIb CDF Detector Project

Subject: Run IIb CDF Detector Project February 2006 Report

Attached is the monthly report summarizing the February 2006 activities and progress for the Fermilab RunIIb CDF Detector Project.

cc: E. Arroyo
D. Benjamin
D. Knapp
J. Livengood
P. Lukens
H. Montgomery
V. O'Dell
TJ Sarlina
J. Strait
C. Trimby
P. Wilson

RunIIb CDF Detector Project
Progress Report No. 39
1 - 28 February 2006

I. PROJECT DESCRIPTION

The primary goal of the CDF Run IIb Detector Project is to enable the detector to exploit the physics opportunities available during Tevatron operation through 2008. The data from Run II will represent a set of detailed measurements that can be compared with the predictions of the Standard Model at the highest available collision energy. The increased size of the data sample will allow us to study the top quark by measuring the details of its production and decay mechanism. In addition, we plan precision electroweak and QCD measurements, continued searches for a variety of phenomena that are predicted to exist beyond the Standard Model framework, and to explore CP violation in the b quark sector. The detailed physics goals of the upgrade are described in the Technical Design Report (TDR).

The major tasks of this upgrade are:

- 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.

II. OVERVIEW OF PROJECT STATUS – Pat Lukens

The project completed its technical objectives in December, 2005. All components of the project are either installed into the experiment or are actively being tested with simulated data. This fulfills the technical objective as stated in the DOE Project Execution Plan for Run IIb CDF Detector Project and Run IIb D-Zero Detector Project, Section 7. Remaining work on the project consists of documentation, and completion of miscellaneous work needed to close out the construction.

Operations of the experiment were suspended at the end of February, for an accelerator complex shutdown. The only portions of the Run IIb project not fully included in operations were given significant time for commissioning during February. No impediments are known which will prevent all systems from being fully operational when the Tevatron resumes operations in June, 2006.

III. VARIANCE ANALYSIS

No significant variances remain.

IV. SUBPROJECT SUMMARY AND STATUS

1.1 Silicon Detector Upgrade

This detector construction was cancelled by the Director in September 2003. Closeout activities included demonstration of a small scale device. Results of the development for this detector have been published as T Akimoto, *et al.*, Nuclear Instruments and Methods, **A556** 459-481, (2006).

1.2 Calorimeter Upgrades

1.2.1 Central Pre-shower Upgrade

1.2.2 Electromagnetic Calorimeter Timing

These systems were installed in Autumn 2004, and have been included in operations since January, 2005.

1.3 – Data Acquisition and Trigger

1.3.1 TDC (Time to Digital Converter)

The work on the upgraded TDC that was developed for the project has been published as Bogdan, *et al.*, Nuclear Instruments and Methods, **A554** 444-457, (2005). A full set of modified TDCs have been used in COT operations since December, 2005.

1.3.2 Level 2 Trigger Upgrade

This system has been included in operations since April, 2005

1.3.11 XFT (eXtremely Fast Tracker) II

All the hardware for this system has been installed and is being commissioned. The system will enter operations after the March 2006 shutdown.

1.3.4 Event Builder Upgrade

This system has been included in operations since September, 2005

1.3.5 Level 3 computers upgrade

Some additional equipment has been identified as being required to log data at the new data rates, which result from the event builder and Level 3 upgrades. Work during February focused on identifying these needs and establishing appropriate specifications.

1.3.6 SVT (Silicon Vertex Tracker)

This system is now completely installed, and was included in operations during February.

V. FINANCIAL STATUS (as of 28 February 2006)

The baseline cost of the Project is \$8,196K, consisting of Run Iib Project costs (\$6,855K) plus closeout costs of the silicon detector upgrade (\$1,341K), which will no longer be constructed.

Current Financial Tracking Report - The table below contains current values for financial tracking quantities that do not appear in the standard Obligations or Cost Performance Reports.

	ACWP		BCWP		BAC		Cont.	EAC	ETC	Complete
	Silicon	Non-Sil	Silicon	Non-Sil	Silicon	Non-Sil				
CY 2005										
October	1341	4510	1341	4942	1341	5846	1009	6755	1913	87%
November	1341	5243	1341	5567	1341	5846	1009	6863	1288	96%
December	1341	5641	1341	5672	1341	5846	1009	7156	1183	98%
CY 2006										
January	1341	5521	1341	5704	1341	5846	1009	7004	1151	98%
February	1341	5568	1341	5744	1341	5846	1009	7011	1111	99%

CDF Run Iib Obligations Report - This report provides a Level 2 summary of outstanding Purchase Orders where funds have been committed but for which the Project hasn't been invoiced. This does not include requisitions in the system where a Fermilab PO number has not yet been assigned. Brief descriptions of the columns in this report are given below:

- Current Month Total Cost – The cost charged to the project for the reporting month.
- Current Month Obligation – This is the total of the obligations made against the project for the reporting month.
- Year to Date Total Cost – This is the total cost charged to the project in this fiscal year.
- Year to Date Obligations with Indirect – This is the total of the obligations made against the project for this fiscal year.
- Current Purchase Orders Open Commitment – The total of the open commitments against the project. It includes open commitments from the current and all prior years.
- Prior Year Total Cost - The total cost charged to the project in all prior fiscal years.

The total project cost is simply the sum of the Year-to-Date costs and the Prior Year costs. The total committed and spent is the Total Project Cost plus the Open Commitment value.

**CDF Project
Obligations Report
Through 28 February 2006**

CDF RIIb EQU - February FY06 IN \$K							
Task Number	Expenditure Category	Current Month Total Cost	Current Month Obligation	YTD Total Cost	YTD Obligations w/Indirect	Current PO Open Comm	Prior Yr Total Cost
Silicon	M&S	0.0	0.0	0.0	0.0	0.0	538.8
	SWF	0.0	0.0	0.0	0.0	0.0	570.0
	OH	0.0	0.0	0.0	0.0	0.0	228.2
	Total 1.1	0.0	0.0	0.0	0.0	0.0	1,336.9
Calorimeter	M&S	0.0	0.0	1.6	0.0	0.0	275.0
	SWF	0.0	0.0	0.0	0.0	0.0	139.1
	OH	0.0	0.0	0.0	0.0	0.0	52.6
	Total 1.2	0.0	0.0	1.6	0.0	0.0	466.7
Trigger/DAQ	M&S	3.1	1.5	782.5	61.3	77.8	2,315.0
	SWF	19.3	19.3	156.0	156.0	0.0	641.8
	OH	6.5	0.0	160.6	160.6	0.0	377.3
	Total 1.3	28.8	20.8	1,099.0	377.9	77.8	3,334.1
Administration	M&S	0.0	0.0	0.0	0.0	0.0	42.2
	SWF	14.2	14.2	62.9	62.9	0.0	412.6
	OH	4.4	0.0	19.5	19.5	0.0	129.2
	Total 1.4	18.6	14.2	82.4	82.4	0.0	584.0
Total Project	M&S	3.1	1.5	784.1	61.3	77.8	3,170.9
	SWF	33.5	33.5	218.9	218.9	0.0	1,763.5
	OH	10.9	0.0	180.1	180.1	0.0	787.3
Grand Total		47.4	35.0	1,183.0	460.3	77.8	5,721.7

Total Project Cost (Inception To Date): 6,904.7

CDF Project Cost Performance Report (CPR) – This report is generated from COBRA and provides a summary of the WBS 1.2-1.4 costs of the Project down to Level 3 of the Work Breakdown Structure. Silicon detector subproject closeout costs are not tracked here. Input data originates with the status (% Complete) of the Project schedules as reported by the Level 2 managers and actual costs extracted from the Fermilab accounting system. Where possible, costs are accrued for items that have been delivered, but not yet invoiced. This is only possible for a small fraction of our cost. Financial summaries are shown for this reporting period (columns 2-6) as well as the project to date (columns 7-11). Column 12 contains our baseline BAC, and will only be changed after the formal implementation of the Change Control process. Column 13 is the projected BAC, based on the current month's schedule. A number of specialized financial terms and abbreviations used in the CPR are defined here for convenience:

ACWP – Actual Cost of Work Performed. This is the actual cost of tasks that have been completed.

BAC – Budget at Completion. The BAC is the estimated total cost of the project when completed. It is equivalent to the BCWS at completion. The baseline value of the BCWS is contained in column 12 of the Cost Performance Report.

BCWP – Budgeted Cost of Work Performed. This is the scheduled cost profile of tasks that have been completed.

BCWS – Budgeted Cost of Work Scheduled. This is the sum of the budgets for all planned work to be accomplished within a given time period.

CV – Cost Variance. $CV = BCWP - ACWP$

EAC – Estimate At Completion. This is the ACWP to date, plus the BCWS (current scheduled estimate) of remaining tasks. $EAC = (BAC (current) - BCWP) + ACWP$

ETC – Estimate to Completion. $ETC = EAC - ACWP + Contingency$

Percent Complete - %Com = $\frac{BCWP}{BAC}$

SV – Schedule Variance. $SV = BCWP - BCWS$

**CDF Project
Cost Performance Report
Through 28 February 2006**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:						Contract Type/No:			Project Name/No: CDF RIIB Mstr Equ - D		Report Period: 1/31/2006 2/28/2006		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %	Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	6,855,000		0		0.00	6,855,000	0		0	0			
Funding Type-CA WBS[2] WBS[3] Item	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost Work	Variance		Budgeted Cost		Actual Cost Work	Variance		Baseline BAC	Latest Revised BAC	BAC Delta
	Work Scheduled	Work Performed		Schedule	Cost	Work Scheduled	Work Performed		Schedule	Cost			
EQU Equipment													
1.2 Calorimeter Upgrades													
1.2.1 Central Preshower and Crack Detectors	0	0	0	0	0	444,504	444,504	444,505	0	0	444,504	444,504	0
1.2.2 Electromagnetic timing	0	0	0	0	0	23,403	23,403	23,403	0	1	23,403	23,403	0
WBS[2]Totals:	0	0	0	0	0	467,908	467,908	467,907	0	0	467,908	467,908	0
1.3 Run 2b DAQ and Trigger Project													
1.3.1 Run 2b TDC Project	7,925	0	5,970	-7,925	-5,970	651,795	627,552	552,298	-24,244	75,253	651,795	652,473	678
1.3.2 Run 2b Level 2 Project	0	0	0	0	0	473,959	473,959	471,070	0	2,889	473,959	473,959	0
1.3.4 Event-Builder Upgrade	0	2,572	3,256	2,572	-684	435,624	430,480	430,548	-5,144	-68	435,624	445,651	10,027
1.3.5 Computer for Level3 PC Farm / DAQ	0	0	760	0	-760	1,080,075	1,080,075	1,032,883	0	47,192	1,080,075	1,222,979	142,904
1.3.6 SVT upgrade	0	0	3,704	0	-3,704	362,639	362,639	352,796	0	9,843	362,639	362,639	0
1.3.11 Revised XFTII Project	0	20,779	15,132	20,779	5,647	1,629,697	1,612,603	1,594,102	-17,094	18,501	1,629,697	1,745,641	115,944
WBS[2]Totals:	7,925	23,351	28,821	15,426	-5,471	4,633,789	4,587,308	4,433,697	-46,481	153,611	4,633,789	4,903,341	269,552
1.4 Administration													
1.4.3 Construction Phase	16,987	16,987	18,617	0	-1,630	688,680	688,680	666,387	0	22,293	744,322	744,322	0
WBS[2]Totals:	16,987	16,987	18,617	0	-1,630	688,680	688,680	666,387	0	22,293	744,322	744,322	0
Funding Type-CATotals:	24,912	40,338	47,439	15,426	-7,101	5,790,376	5,743,895	5,567,991	-46,481	175,904	5,846,019	6,115,571	269,552
Sub Total	24,912	40,338	47,439	15,426	-7,101	5,790,376	5,743,895	5,567,991	-46,481	175,904	5,846,019	6,115,571	269,552
Management Resrv.													
Total	24,912	40,338	47,439	15,426	-7,101	5,790,376	5,743,895	5,567,991	-46,481	175,904	6,855,000	6,855,000	0