21 June 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 May 2006 Report

Attached is the monthly report summarizing the May 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. 42
1 - 31 May 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. 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 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 installed into the experiment, and are included in operations. No additional work remains for the project, and this is the final monthly report.

III.   SUBPROJECT SUMMARY AND STATUS

1.1   Silicon Detector Upgrade

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

1.3.4   Event Builder Upgrade

This system has been included in operations since September, 2005

1.3.5   Level 3 computers upgrade

All the hardware for this system has been installed and is being commissioned.

1.3.6   SVT (Silicon Vertex Tracker)

This system is now completely installed, and was included in operations during February, 2006.

IV.   FINANCIAL STATUS (as of 31 May 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. All the cost codes were closed at the end of May, 2006. No additional obligations are now possible for the project.

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										
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%
March	1341	5679	1341	5791	1341	5846	1009	7075	1064	99.2%
April	1341	5739	1341	5824	1341	5846	1009	7102	1031	99.7%
May	1341	5888	1341	5846	1341	5846	1009	7229	1009	100%

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 31 May 2006

CDF RIIb EQU - May 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	116.6	0.8	988.1	197.4	8.2	2,315.0
		SWF	(2.5)	(2.5)	183.8	183.8	0.0	641.8
		OH	18.6	0.0	200.5	200.5	0.0	377.3
		Total 1.3	132.7	(1.6)	1,372.4	581.7	8.2	3,334.1
Administration		M&S	2.3	2.3	2.3	2.3	0.0	42.2
		SWF	10.0	10.0	96.1	96.1	0.0	412.6
		OH	3.5	0.0	30.1	30.1	0.0	129.2
		Total 1.4	15.8	12.3	128.6	128.6	0.0	584.0
Total Project		M&S	118.9	3.1	992.0	199.7	8.2	3,170.9
		SWF	7.6	7.6	279.9	279.9	0.0	1,763.5
		OH	22.0	0.0	230.6	230.6	0.0	787.3
Grand Total			148.5	10.7	1,502.5	710.3	8.2	5,721.7

Total Project Cost (Inception to Date) = 7,224.2

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 - $\%Com = \dfrac{BCWP}{BAC}$

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

CDF Project
Cost Performance Report
Through 31 May 2006

Cost Performance Report - Work Breakdown Structure												
Contractor: Location:				Contract Type/No:		Project Name/No: CDF RIIb Mstr Equ - [		Report Period: 4/30/2006 5/31/2006				
Quantity 1	Negotiated Cost 6,855,000	Est. Cost Authorized Unpriced Work 0		Tgt. Profit/ Fee % 0	Tgt. Price 0.00 6,855,000	Est Price 0	Share Ratio	Contract Ceiling 0	Estimated Contract Ceiling 0			
Funding Type-CA WBS[2] WBS[3] Item	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest	
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Baseline BAC	Revised BAC	BAC Delta
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	0	0	47,093	0	-47,093	651,795	651,795	609,473	0	42,322	651,795	652,473	678
1.3.2 Run 2b Level 2 Project	0	0	0	0	0	473,959	473,959	470,488	0	3,471	473,959	473,959	0
1.3.4 Event-Builder Upgrade	0	2,572	1,138	2,572	1,434	435,624	435,624	433,364	0	2,260	435,624	445,651	10,027
1.3.5 Computer for Level3 PC Farm / DAQ	0	0	87,051	0	-87,051	1,080,075	1,080,075	1,156,061	0	-75,986	1,080,075	1,222,979	142,904
1.3.6 SVT upgrade	0	0	-490	0	490	362,639	362,639	352,895	0	9,744	362,639	362,639	0
1.3.11 Revised XFTII Project	0	0	-2,065	0	2,065	1,629,697	1,629,697	1,684,778	0	-55,081	1,629,697	1,745,641	115,944
WBS[2]Totals:	0	2,572	132,727	2,572	-130,155	4,633,789	4,633,789	4,707,060	0	-73,271	4,633,789	4,903,341	269,552
1.4 Administration													
1.4.3 Construction Phase	19,173	19,173	15,779	0	3,394	744,322	744,322	712,547	0	31,775	744,322	744,322	0
WBS[2]Totals:	19,173	19,173	15,779	0	3,394	744,322	744,322	712,547	0	31,775	744,322	744,322	0
Funding Type-CATotals:	**19,173**	**21,745**	**148,506**	**2,572**	**-126,761**	**5,846,019**	**5,846,019**	**5,887,514**	**0**	**-41,496**	**5,846,019**	**6,115,571**	**269,552**
Sub Total	19,173	21,745	148,506	2,572	-126,761	5,846,019	5,846,019	5,887,514	0	-41,496	5,846,019	6,115,571	269,552
Management Resrv.											1,008,981	739,429	-269,552
Total	19,173	21,745	148,506	2,572	-126,761	5,846,019	5,846,019	5,887,514	0	-41,496	6,855,000	6,855,000	0