

27 July 2005

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 June 2005 Report

Attached is the monthly report summarizing the June 2005 activities and progress for the Fermilab RunIIb CDF Detector Project. This report is available electronically at:

<http://www-cdf.fnal.gov/run2b.html>

cc: A. Annovi
J. Appel
E. Arroyo
D. Benjamin
J. Butler
H. Frisch
D. Hoffer
J. Huston
R. Hughes
E. James
YK Kim
D. Knapp
B. Knuteson
S. Kuhlmann
T. Liu
M. Lindgren
J. Livengood
R. Lipton
P. Lukens
T. Miao
H. Montgomery
V. O'Dell
P. Oddone
V. Pavlicek
K. Pitts
R. Roser
TJ Sarlina
T. Shaw
M. Shochet
K. Stanfield
J. Strait
E. Temple
D. Toback
C. Trimby
V. White
P. Wilson
B. Winer

RunIIb CDF Detector Project
Progress Report No. 31
1 - 30 June 2005

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 – P. Lukens

The project continues to move towards completion. The remaining subprojects are entering their commissioning phases. An Installation Review was held for the Silicon Vertex Trigger, which was useful for identifying the steps and tests needed for installing this system. This system has been making use of beam time for tests and is close to installing its first full wedge. Event builder tests are also in progress with the real system. Tests for both systems are occurring towards the end of stores, when operations are affected only minimally.

The Baseline Change Proposal was approved in June, 2005, which reduced the total project cost from \$10.375M to \$8.196M.

III. PROJECT MILESTONE SUMMARY (as of 30 June 2005)

CDF Data Acquisition & Trigger (L1 and L2) Milestones Sorted by Baseline Completion Date

WBS	Title	Baseline Comp. Date	Forecast/Actual Completion Date	Complete
1.3.2.6.3	Begin production of Level 2 Pulsar system	12 Nov 03	12 Nov 03	Yes
1.3.1.6.6	First Prototype TDC available for testing	19-Nov-03	16-Feb-04	Yes
1.3.4.4.1.4	Prototype Event Builder hardware arrives	3-Jun-04	31 Mar 04	Yes
1.3.2.10	Pulsar Hardware Ready for Installation	31-Aug-04	20-Aug-04	Yes
1.3.6.1.1.7	Begin AMS Design Work	1-Sept-04	2-Aug-04	Yes
1.3.6.1.3.7	Begin Track Fitter Design	1-Sept-04	2-Aug-04	Yes
1.3.4.5.3	Production Readiness Review - Event Builder	4-Oct-04	2-Jun-04	Yes
1.3.4.5.4.4	Arrival of the Event Builder hardware	15-Oct-04	15-Oct-04	Yes
1.3.11.8.5.5	Begin Purchase of Pulsar Board components	20-Oct-04	4-Nov-04	Yes
1.3.11.5.3.8	Begin Production TDC Mezzanine Card	28-Oct-04	3-Nov-04	Yes
1.3.6.2.6.4	Begin Amp Chip Production	10-Jan-05	22-Nov-04	Yes
1.3.6.2.1.1.5	Begin AMS Mezzanine Card Production	14-Jan-05	11-Nov-04	Yes
1.3.1.17.4	TDC Readout System Complete	21-Jan-05	10-Dec-04	Yes
1.3.11.6.3.6	Receipt of TDC to Finder cables complete	18-Mar-05	7-July-05	
1.3.5.3.7	Arrival of 15 PCs from the vendor	23-Mar-05	18-Mar-05	Yes
1.3.2.9	Pulsar Level 2 subproject ready for installation	1-Apr-05	11-Mar-05	Yes
1.3.11.8.8	Begin Joint Testing with Finder Board	4-Apr-05	22-Aug-05	
1.3.11.7.5.8	Begin Production of SLAM Boards	18-Apr-05	8-Jun-05	Yes
1.3.11.4.4.8	Begin Production TDC Fiber Transition Boards	21-Apr-05	31-May-05	Yes
1.3.11.5.3.9	Checkout of TDC Mezzanine Cards Complete	6-Jun-05	5-Jul-05	
1.3.11.2.5.1	Begin Production XFT Finder Boards	8-Jun-05	31-May-05	Yes
1.3.6.1.2.5	Hit Buffer Firmware Complete for Board Test	23-Jun-05	13-Jul-05	
1.3.6.1.3.5	Track Fitter Firmware Complete for Board Test	28-Jun-05	20-Apr-05	Yes
1.3.1.12.6	Installation of Modified TDC's Complete	27-July-05	24-Oct-05	
1.3.4.8	Finish Event-Builder Upgrade	28-July-05	28-July-05	
1.3.10.2	Ready for Accelerator Shutdown 2005	8-Aug-05	24-Oct-05	
1.3.1.12.8	TDC Modification Complete	10-Aug-05	24-Oct-05	
1.3.5.5.5	Arrival of 70 Level3 and 15 DAQ PCs	15-Aug-05	18-Mar-05	Yes
1.3.5.6.5	Arrival of 192 L3 Farm PC's from the vendor	15-Aug-05	29-Aug-05	
1.3.6.1.1.5	AMS Firmware Complete for Board Test	19-Aug-05	14-Apr-05	Yes
1.3.6.3	SVT ready for installation	25-Aug-05	28-Sept-05	
1.3.5.8	Finish Purchase of Computers for L3 DAQ system	6-Sept-05	20-Sept-05	
1.3.11.4.4.9	Checkout of TDC Transition Boards Complete	16-Sept-05	6-Oct-05	
1.3.11.7.5.9	Checkout of SLAM Boards Complete	28-Sept-05	3-Oct-05	
1.3.11.2.5.10	Finder Board Checkout Complete	29-Sept-05	16-Nov-05	
1.3.11.10	XFT Ready for Installation at CDF	29-Sep-05	16-Nov-05	
1.3.8	Finish Run 2b Trigger DAQ project	30-Sep-05	16-Nov-05	
1.3.9	DAQ and Trigger Upgrades Ready for Installation	17-Jan-06	16-Nov-05	

Run IIb Data Acquisition & Trigger Milestones (Level 1 and 2)

Name	Forecast	Baseline	Variance	2005								2006		
				Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2			
Event Builder Production Readiness Review	6/2/04	10/4/04	-17 wks	★	◆									
Begin AMS Design Work	8/2/04	9/1/04	-4.4 wks	★	◆									
Begin Track Fitter Design	8/2/04	9/1/04	-4.4 wks	★	◆									
Pulsar Hardware Ready for Installation	8/20/04	8/31/04	-1.4 wks		◆									
Arrival of the Event Builder hardware	10/15/04	10/15/04	0 wks			◆								
Begin Production TDC Mezzanine Card	11/3/04	10/28/04	0.8 wks			◆								
Begin Purchase of Pulsar Board components	11/4/04	10/20/04	2 wks			◆								
Begin AMS Mezzanine Card Production	11/11/04	1/14/05	-8.2 wks			★	◆							
Begin Ampchip Production	11/22/04	1/10/05	-5.8 wks			★	◆							
Pulsar Level 2 subproject ready for installation	3/11/05	4/1/05	-3 wks					★	◆					
Arrival of 70 Level3 and 15 DAQ PCs from the vendor	3/18/05	8/15/05	-21 wks					★		◆				
Arrival of 15 PCs from the vendor	3/18/05	3/23/05	-0.6 wks							◆				
AMS Firmware Complete for Board Test	4/14/05	8/19/05	-18 wks					★			◆			
Track Fitter Firmware Complete for Board Test	4/20/05	6/28/05	-9.8 wks					★			◆			
Begin Production XFT Finder Boards	5/31/05	6/8/05	-1.4 wks								◆			
Begin Production TDC Fiber Transition Boards	5/31/05	4/21/05	5.2 wks								◆	★		
Begin Production of SLAM Boards	6/8/05	4/18/05	7 wks								◆	★		
Checkout of TDC Mezzanine Cards Complete	7/5/05	6/6/05	4 wks									◆	◇	
Receipt of TDC to Finder cables Complete	7/7/05	3/18/05	15.4 wks								◆		◇	
Hit Buffer Firmware Complete for Board Test	7/13/05	6/23/05	2.4 wks									◆	◇	
Finish Event-Builder Upgrade	7/18/05	7/28/05	-1.6 wks										◆	
Begin Joint Testing with Finder Board	8/22/05	4/4/05	19.4 wks										◆	◇
Arrival of 192 L3 farm PCs from the vendor	8/29/05	8/15/05	2 wks											◆
Finish Purchase of Computers for Level3/DAQ system	9/20/05	9/6/05	2 wks											◆
SVT ready for installation	9/28/05	8/25/05	4.6 wks											◆
Checkout of SLAM Boards Complete	10/3/05	9/28/05	0.6 wks											◆
Checkout of TDC Transition Boards Complete	10/6/05	9/16/05	2.7 wks											◆
Installation of Modified TDC's Complete	10/24/05	7/27/05	12.4 wks											◆
TDC Modification Complete	10/24/05	8/10/05	10.4 wks											◆
Ready for Accelerator Shutdown 2005	10/24/05	8/8/05	11 wks											◆
Finder Board Checkout Complete	11/16/05	9/29/05	6.7 wks											◆
XFT Ready for Installation at CDF	11/16/05	9/29/05	6.7 wks											◆
Finish Run 2b Trigger DAQ project	11/16/05	9/30/05	6.7 wks											◆
Data Acquisition and Trigger Upgrades Ready for Installatio	11/16/05	1/17/06	-7.3 wks											◆

Project: CDF RunIIb DA
 Status Date: 6/30/05
 Print Date: 7/25/05

Completed Milestone ★
 Current Forecast ◇

Baseline Milestone ◆

IV. PROCUREMENT – P. Lukens

The purchase order was established with University of Michigan for the testing of modified TDC boards.

V. PROJECT HIGHLIGHTS

1.3 – Data Acquisition and Trigger

1.3.1 TDC (Time to Digital Converter) – Eric James

TDC modification continues at a rate of about 10 boards per week when boards are available. We installed an additional 30 modified boards on the detector in June for a total of 99 modified boards installed for the COT (out of the 204 required). Various problems with test equipment at Michigan resulted in only a small number of tested, modified boards being returned to CDF in June. Consequently, a small number will be available for installation during July. To address this problem, we've changed our testing procedure to perform more extensive testing of newly modified boards here at CDF and only send boards back to Michigan which fail some portion of this testing. This step should allow Michigan to focus more of their available manpower on fixing problem boards and speed up the overall rate of replacements on the detector. The boards which have been installed on the detector have had very little negative impact on detector operations. Over the course of the last six months, we have had only two failures which is consistent with the normal observed failure rate for these boards before modification.

Month	Board Modification		Testing at Michigan		Detector Installation	
	Complete	Remaining	Complete	Remaining	Complete	Remaining
January	39 (13%)	261	9 (3%)	291	0	204
February	61 (20%)	239	43 (14%)	257	21 (10%)	183
March	98 (33%)	202	65 (22%)	235	42 (21%)	162
April	116 (39%)	184	80 (27%)	220	69 (34%)	135
May	126 (42%)	174	109 (36%)	191	69 (34%)	135
June	150 (50%)	150	122 (41%)	178	99 (48%)	105

1.3.11 XFT (eXtremely Fast Tracker) II – Richard Hughes, Brian Winer, Kevin Pitts

Stereo Linker Association Module (SLAM) Boards: We have added new logic to the SLAM chip, properly handling the input expected from the modified Linker chip firmware, and matching the timing from the Linker and Stereo finder data. We have added firmware to the VME controller on the SLAM to allow us to communicate with the EPC16 configuration device, used to program the SLAM EP1S40 (or 60) chip. We have successfully erased, read, and wrote various addresses. We are working on the full reprogramming. We have a new design for the Output Formatter chips on the Linker boards (necessary once the SLAM boards replace the Linker Output Modules). We have a new SLAM design which produces Z0 (or Z7) and cot(theta) output, which will be needed for the Level 2 output of the SLAM board, and could be used in a possible Level 1 Track Trigger. We have new software which produces test vectors for the SLAM chip (needed in the Quartus chip simulation software) and for the SLAM board (needed on the test stand).

XTC: XTC 2 checkout and installation continued in June. By the end of the month, we had installed 67 boards on the detector (out of 126 required to instrument the full system.) After undergoing a full set of tests in Urbana, boards are retested at CDF before being installed onto the detector. After installation, the XTC boards are tested and calibrated on a regular

basis. Readout of colliding beam data using the XTC boards installed on the detector has been performed. Analysis of that data is underway.

An additional 60 XTC 2 boards are at Fermilab awaiting installation onto the detector. By July 1, we had sufficient quantity of fully checked-out XTC 2 boards to instrument the entire detector. The installation rate is limited by the availability of modified TDCs. Checkout of the remaining production boards is ongoing in Urbana at a rate of 15 boards per week. This includes a 16-hour burn-in test for every board. Checkout of all 200 production XTC 2 boards will be complete by early August.

TDC Transition Module: Testing of the preproduction TDC transition modules continues. After a series of successful internal logic and transmission tests, we successfully captured data in the Finder using the Wilson Hall 14th floor test stand. Over a period of several days, we captured more than 13 million "events" of data in the finder with zero errors.

We installed two TDC transition modules onto the detector so that we could capture data in a more realistic environment. By the end of the month, we had a finder in place and were working on the remaining infrastructure (optical fibers, patch panel) to perform this test.

Production TDC transition module fabrication is underway, with fabricated boards arriving in early August. The production boards have zero modifications from the preproduction boards. In preparation for production checkout, we are using a CDF Pulsar board to capture data using an Rx Mezzanine board built by Fermilab. Development work in Urbana continues on Pulsar capture firmware and software.

Cabling: The first half of the production TDC to Finder fibers was delivered in June. They will be tested both optically and mechanically before releasing the remaining assembly.

Stereo Finder: The production Finder design was released for fabrication in early June. The first five PCBs were delivered late in the month and were tested for shorts on major power busses. The remaining parts purchase orders were placed for the Finder, Tx and Rx mezzanine cards. All components are expected in time to start Finder assembly in mid-July. The first five assembled boards should be ready for testing at the end of July. The first copies of the production TX mezzanine card were delivered and are awaiting delivery of one final component before testing at the end of June.

Testing of the Stereo Finder continued with emphasis on higher statistics tests capturing data from the TDC transition boards (see above). Problems seen in May during these tests were solved with bug fixes in the test software and a minor change to the Finder firmware.

Development of a new firmware version for the new Finder board ramped up. We expect that the core firmware will be ready when the assembled boards are delivered in late July.

1.3.4 Event Builder – Bruce Knuteson

During June we resolved several of the problems reported in our May internal CDF review. The Trigger Manager is being modified to handle gigabit Ethernet. Test studies without beam and without silicon were conducted to ensure proper operation of the new system. As June ends, we are conducting studies without beam but with silicon, and resolving problems we see with the silicon readout controller. The plan for July is to begin taking end of store studies, first without silicon and then with silicon. By August we hope to be conducting full-store runs.

1.3.5 Level 3 computers upgrade – Doug Benjamin

A requisition has been placed for 64 Level 3 farm nodes and 28 Converter nodes and the computer racks required to hold the nodes. It was discussed with purchasing that the contract should be written with the option to purchase an addition 128 nodes and 4 racks at the end of the fiscal year.

1.3.6 SVT (Silicon Vertex Tracker) – Alberto Annovi

Software: The SVTVME and SVTSIM package have been finalized for the first two installation steps. They are now being frozen. The optimization of parameters for the 128k pattern configuration is in progress. Software to decode the SVDD bank for the vertical slice test has been written.

AM++ and AMS/RW: 16 AM++ and 28 Lambs with 16 AM chips each have been assembled, tested, and sent to Fermilab. Four additional Lambs have been produced. They will be assembled, tested, and sent to Fermilab in July. Tests with 2 AM++ full with 4 Lambs each have been successfully executed with fake hits. Full production (remaining 16 AM++ and 100 Lambs) has been ordered.

The AMSRW algorithm has been completed:

- (a) Error register and error enable register have been added; the active errors are "Parity Error" and "FIFO Full"
- (b) The end event word has been completed and error flags are propagated
- (c) Kill on bit 18 has been implemented.

Hit Buffer: Firmware development and testing continues. Most of the logic firmware is completed and needs actual inputs from board peripherals to be tested. Firmware is developed to test and understand the board inputs, outputs, and mezzanine connections before inserting the HB logic. During the month of June, firmware was developed to test the control FPGA input through the P3 connection and the SVT output. Firmware that connects the two FPGA's is being designed and debugged. Firmware which tests "at speed" (40 MHz) access of the mezzanine memories is developed. Rudimentary VME interfaces for controlling these functionalities are also prepared and will be re-used for the final board implementation.

Track Fitter: Major progress on the TF++ was made during June. We understood why the coldstart function occasionally failed, and fixed the problem. To speed up the board beyond 40 MHz, an internal FIFO was placed inside the Control FPGA to decouple the external SVT FIFO's from the rest of the TF logic. We drain the external SVT FIFO's at 40 MHz into the internal FIFO, which can then be read at higher speeds. Using this setup we tested the TF++ parasitically at 64 MHz on 2.5 million real events (~650,000 tracks) without any errors in track parameters. We still need to understand why some earlier tests showed bit errors at the level of ~1/100,000 that were not reproducible. July will be spent trying to speed to board up to ≥ 70 MHz, finalizing the error checking, and performing more extensive data quality and timing tests.

Mezzanines and Pulsars: All needed hardware has now been tested. The last units were the small memory mezzanine cards.

Integration: Configuration of the first installation step has been studied in every detail with simulation and beam tests. We're ready for a week of parasitic data to validate it.

VI. FINANCIAL STATUS (as of 30 June 2005)

The baseline cost of the Project is \$8,196K, consisting of Run IIb Project costs (\$6,855K) plus the 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 selected financial tracking quantities that do not appear in the standard Obligations or Cost Performance Reports. For the Silicon Detector portion of the project, we assume a BAC of \$1,341K and obtain the ACWP from the Obligations report. Remaining portions of the project have their costs listed in the Cost Performance Report.

	ACWP		BCWP		BAC		Cont.	EAC	ETC	Complete
	Silicon	Non-Sil	Silicon	Non-Sil	Silicon	Non-Sil				
CY 2004										
October	1342	1957	1342	2125	1673	5254	3448	6759	6908	50%
November	1357	2081	1357	2366	1673	5254	3448	6642	6652	54%
December	1341	2199	1341	2673	1673	5254	3448	6453	6361	58%
CY 2005										
January	1341	2277	1341	2909	1673	5254	3448	6295	6125	61%
February	1341	2396	1341	3095	1341	5531	3503	6173	5939	65%
March	1341	2866	1341	3361	1341	5531	3503	6377	5673	68%
April	1341	3028	1341	3378	1341	5945	3089	6936	5656	65%
May	1341	3274	1341	3850	1341	5945	3089	6710	5184	71%
June	1341	3715	1341	4378	1341	5945	910	6623	2477	78%

CDF RunIIB Obligations Report - This report provides a Level 2 summary of outstanding Purchase Orders (PO) where money has been committed but for which the Project has not been invoiced. This does not include requisitions in the system where a Fermilab PO number has not yet been assigned. A brief description of the columns included in this report is 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 – This is the total of the open commitments against the project. It includes open commitments from the current and all prior years.
- Prior Year Total Cost - This is 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 30 June 2005**

CDF RIIb EQU - June FY05 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	(0.3)	(103.7)	0.0	539.0
	SWF	0.0	0.0	(1.1)	(1.1)	0.0	571.1
	OH	0.0	0.0	(2.7)	(2.7)	0.0	230.9
	Total 1.1	0.0	0.0	(4.1)	(107.5)	0.0	1,341.0
Calorimeter	M&S	19.7	0.0	63.2	21.2	1.6	211.8
	SWF	0.0	0.0	0.0	0.0	0.0	139.1
	OH	0.3	0.0	1.2	1.2	0.0	51.5
	Total 1.2	20.0	0.0	64.3	22.4	1.6	402.3
Trigger/DAQ	M&S	266.4	149.3	1,136.6	1,564.3	485.2	708.2
	SWF	74.7	74.7	329.1	329.1	0.0	220.7
	OH	57.3	0.0	190.3	190.3	0.0	129.2
	Total 1.3	398.3	224.0	1,656.0	2,083.7	485.2	1,058.1
Administration	M&S	3.3	3.0	6.3	6.3	0.0	29.1
	SWF	14.8	14.8	111.7	111.7	0.0	268.2
	OH	4.8	0.0	34.7	34.7	0.0	84.4
	Total 1.4	22.9	17.8	152.7	152.7	0.0	381.7
Total Project	M&S	289.3	152.3	1,205.8	1,488.1	486.8	1,488.2
	SWF	89.5	89.5	439.7	439.7	0.0	1,199.0
	OH	62.4	0.0	223.4	223.4	0.0	495.9
Grand Total		441.2	241.8	1,868.9	2,151.2	486.8	3,183.1

Total Project Cost (Inception To Date): 5,052.1

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 30 June 2005**

Cost Performance Report - Work Breakdown Structure														
Contractor:					Contract Type/No:			Project Name/No:		Report Period:				
Location:								CDF Rllb Mstr Equ -		5/31/2005		6/30/2005		
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		Current Period					Cumulative to Date					At Completion		
WBS[2]		Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest Revised	
WBS[3]		Work	Work	Work	Schedule	Cost	Work	Work	Work	Schedule	Cost	Budgeted	Estimate	Variance
Item		Scheduled	Performed	Performed	Schedule	Cost	Scheduled	Performed	Performed	Schedule	Cost	Budgeted	Estimate	Variance
EQU Equipment														
1.2 Calorimeter Upgrades														
1.2.1 Central Preshower and Crack Detectors														
		0	0	19,996	0	-19,996	444,504	444,504	442,924	0	1,581	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	19,996	0	-19,996	467,908	467,908	466,327	0	1,581	467,908	467,908	0
1.3 Run 2b DAQ and Trigger Project														
1.3.1 Run 2b TDC Project														
		36,797	13,111	-58,074	-23,687	71,184	593,283	517,641	462,568	-75,641	55,073	655,792	680,145	24,353
1.3.2 Run 2b Level 2 Project														
		21,369	22,365	9,718	996	12,647	432,359	432,563	412,582	203	19,981	473,959	473,959	0
1.3.4 Event-Builder Upgrade														
		28,859	9,975	140,427	-18,884	-130,452	429,610	387,787	403,741	-41,823	-15,953	435,363	435,363	0
1.3.5 Computer for Level3 PC Farm / DAQ														
		264,082	119,358	100,275	-144,724	19,083	735,926	443,878	337,319	-292,048	106,559	1,101,492	1,101,492	0
1.3.6 SVT upgrade														
		13,891	25,948	8,754	12,057	17,194	321,997	284,839	236,564	-37,158	48,275	362,407	362,407	0
1.3.11 Revised XFTII Project														
		114,868	320,389	197,215	205,521	123,174	1,618,865	1,296,823	861,693	-322,043	435,129	1,703,357	1,705,466	2,110
WBS[2]Totals:		479,867	511,146	398,315	31,280	112,831	4,132,040	3,363,530	2,714,466	-768,510	649,064	4,732,369	4,758,832	26,463
1.4 Administration														
1.4.3 Construction Phase														
		16,873	16,873	22,884	0	-6,011	546,956	546,956	534,394	0	12,562	744,322	744,322	0
WBS[2]Totals:		16,873	16,873	22,884	0	-6,011	546,956	546,956	534,394	0	12,562	744,322	744,322	0
Funding Type-CATotals:		496,740	528,020	441,195	31,280	86,825	5,146,904	4,378,394	3,715,187	-768,510	663,207	5,944,598	5,971,061	26,463
Sub Total		496,740	528,020	441,195	31,280	86,825	5,146,904	4,378,394	3,715,187	-768,510	663,207	5,944,598	5,971,061	26,463
Management Resrv.												910,402	883,939	-26,463
Total		496,740	528,020	441,195	31,280	86,825	5,146,904	4,378,394	3,715,187	-768,510	663,207	6,855,000	6,855,000	0

VII. VARIANCE ANALYSIS – P. Lukens

Subproject	Schedule Variance	Cost Variance
Run 2b TDC	Limited by operations, and the availability of the detector and the ability to test parts at Michigan. A revised testing plan has been developed and a plan for replacing fewer TDC per access has been implemented.	\$87,000 was transferred from the TDC subproject to the Event Builder subproject to cover the cost of VME controller purchased for the Event Builder.
Run 2b XFTII	Receipt of production components for the SLAM occurred very rapidly.	Actual costs have lagged the progress.
Event Builder	None	Engineering costs for FY2004 from CD have been transferred. \$87,000 has been transferred from TDC subproject to Event Builder project.
Computers for Level 3 and DAQ	The requisition has been placed for 64 nodes the balance will be ordered at the end of the fiscal year	The price of Level 3 computers purchased in September, 2004 was higher than budgeted.
SVT Upgrade	None	Actual costs have lagged the progress.
Administration	None	Costs for support and travel have been below estimates.

VIII. BASELINE CHANGES

A change in the total baseline cost of the project was made in June, 2005. The Baseline Change Proposal reduced the total cost of the project from \$10,375K to \$8,196K without any change to the technical or schedule scope of the project. The cost reduction was made possible because the project is nearing completion, and has largely stayed within its budget (contingency use has been low).

IX. FUNDING PROFILES

The funding profile for the RunIIB CDF Detector Project is shown below. This profile has been updated to reflect the new total cost of the project.

	Funding Plan in Current Year \$K				
	FY02	FY03	FY04	FY05	Total
DOE MIE	\$ 3,460	\$ 3,509	\$ 1,227	\$ -	\$ 8,196
DOE R&D	\$ 1,670	\$ 480	\$ -	\$ -	\$ 2,150
Foreign Contributions	\$ 39	\$ 518	\$ 234	\$ 404	\$ 1,195
U.S. Universities	\$ 24	\$ 225	\$ 103	\$ 26	\$ 378
Total	\$ 5,193	\$ 4,732	\$ 1,564	\$ 430	\$ 11,918