

14 January 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 December 2004 Report

Attached is the monthly report summarizing the December 2004 activities and progress for the Fermilab RunIIb CDF Detector Project. This report is available electronically at:

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

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RunIIb CDF Detector Project
Progress Report No. 25
1 - 31 December 2004

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

With the completion of the calorimeter installations, the Run IIb project is now limited to Data Acquisition and Trigger subprojects. Reviews of the Track Trigger (XFT) and Event Builder subprojects occurred in December. These were internal to CDF, but had review committees of experts who are not currently involved with these subprojects. Both reviews were useful in that they pointed out specific technical concerns that can be addressed by the project leaders. Both projects are still on schedule for installation in August, 2005.

Our current projection is that portions of the Project that require a shutdown of the experiment and access to the collision hall will be complete by 4 August 2005.

III. PROJECT MILESTONE SUMMARY (as of 31 December 2004)

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 Ampchip 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	All TDC to Finder cables Received	18-Mar-05	28-Mar-05	
1.3.5.3.7	Arrival of 15 PCs from the vendor	23-Mar-05	20-May-05	
1.3.2.9	Pulsar Level 2 subproject ready for installation	1-Apr-05	28-Feb-05	
1.3.11.8.8	Begin Joint Testing with Finder Board	4-Apr-05	2-May-05	
1.3.11.7.5.8	Begin Production of SLAM Boards	18-Apr-05	4-Apr-05	
1.3.11.4.4.8	Begin Production TDC Fiber Transition Boards	21-Apr-05	11-Apr-05	
1.3.11.5.3.9	Checkout of TDC Mezzanine Cards Complete	6-Jun-05	20-Apr-05	
1.3.11.2.5.1	Begin Production XFT Finder Boards	8-Jun-05	9-May-05	
1.3.6.1.2.5	Hit Buffer Firmware Complete	23-Jun-05	31-Aug-05	
1.3.6.1.3.5	Track Fitter Firmware Complete	28-Jun-05	2-Mar-05	
1.3.4.8	Finish Event-Builder Upgrade	28-July-05	29-Jun-05	
1.3.5.5.5	Arrival of 70 Level3 and 15 DAQ PCs	15-Aug-05	15-Aug-05	
1.3.5.6.5	Arrival of 140/20 PCs from the vendor	15-Aug-05	15-Aug-05	
1.3.6.1.1.5	AMS Firmware Complete	19-Aug-05	2-Feb-05	
1.3.6.3	SVT ready for installation	25-Aug-05	31-Aug-05	
1.3.5.8	Finish Purchase of Computers for L3 DAQ system	6-Sept-05	6-Sept-05	
1.3.11.4.4.9	Checkout of TDC Transition Boards Complete	16-Sept-05	27-Jul-05	
1.3.11.7.5.9	Checkout of SLAM Boards Complete	28-Sept-05	30-Aug-05	
1.3.11.2.5.10	Finder Board Checkout Complete	29-Sept-05	22-Sept-05	
1.3.11.10	XFT Ready for Installation at CDF	29-Sep-05	22-Sep-05	
1.3.8	Finish Run 2b Trigger DAQ project	30-Sep-05	22-Sept-05	
1.3.9	DAQ and Trigger Upgrades Ready for Installation	17-Jan-06	22-Sept-05	

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

Name	Baseline	Forecast	Variance	2004				2005				2006			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Begin production of Level2 Pulsar system	11/12/03	11/12/03	0 wks	◆											
First Prototype TDC available for testing	11/19/03	2/16/04	11.35 wks	◆	★										
Arrival of the prototype Event Builder hardware	6/3/04	3/31/04	-9 wks		★	◆									
Pulsar Hardware Ready for Installation	8/31/04	8/20/04	-1.4 wks				◆								
Begin AMS Design Work	9/1/04	8/2/04	-4.4 wks				◆	★							
Begin Track Fitter Design	9/1/04	8/2/04	-4.4 wks				◆	★							
Event Builder Production Readiness Review	10/4/04	6/2/04	-17.2 wks			★	◆								
Arrival of the Event Builder hardware	10/15/04	10/15/04	0 wks				◆								
Begin Purchase of Pulsar Board components	10/20/04	11/4/04	2 wks				◆	★							
Begin Production TDC Mezzanine Card	10/28/04	11/3/04	0.8 wks				◆	★							
Begin Ampchip Production	1/10/05	11/22/04	-5.8 wks					★	◆						
Begin AMS Mezzanine Card Production	1/14/05	11/11/04	-8.2 wks					★	◆						
TDC Readout System Complete	1/21/05	12/10/04	-5 wks					★	◆						
Receipt of TDC to Finder cables Complete	3/18/05	3/28/05	1.2 wks						◆						
Arrival of 15 PCs from the vendor	3/23/05	5/20/05	8.4 wks						◆	◇					
Pulsar Level 2 subproject ready for installation	4/1/05	2/28/05	-4.6 wks						◆	◇					
Begin Joint Testing with Finder Board	4/4/05	5/2/05	3.8 wks						◆	◇					
Begin Production of SLAM Boards	4/18/05	4/4/05	-2 wks						◆	◇					
Begin Production TDC Fiber Transition Boards	4/21/05	4/11/05	-1.6 wks						◆	◇					
Checkout of TDC Mezzanine Cards Complete	6/6/05	4/20/05	-6.5 wks						◆	◇					
Begin Production XFT Finder Boards	6/8/05	5/9/05	-4.2 wks						◆	◇					
Hit Buffer Firmware Complete	6/23/05	8/31/05	9.4 wks						◆	◇					
Track Fitter Firmware Complete	6/28/05	3/2/05	-16.6 wks						◆	◇					
Finish Event-Builder Upgrade	7/28/05	6/29/05	-4 wks						◆	◇					
Arrival of 70 Level3 and 15 DAQ PCs from the vendor	8/15/05	8/15/05	0 wks						◆	◇					
Arrival of 140/20 PCs from the vendor	8/15/05	8/15/05	0 wks						◆	◇					
AMS Firmware Complete	8/19/05	2/2/05	-28 wks						◆	◇					
SVT ready for installation	8/25/05	8/31/05	0.6 wks						◆	◇					
Finish Purchase of Computers for Level3/DAQ system	9/6/05	9/6/05	0 wks						◆	◇					
Checkout of TDC Transition Boards Complete	9/16/05	7/27/05	-7.2 wks						◆	◇					
Checkout of SLAM Boards Complete	9/28/05	8/30/05	-4 wks						◆	◇					
Finder Board Checkout Complete	9/29/05	9/22/05	-1 wk						◆	◇					
XFT Ready for Installation at CDF	9/29/05	9/22/05	-1 wk						◆	◇					
Finish Run 2b Trigger DAQ project	9/30/05	9/22/05	-1 wk						◆	◇					
Data Acquisition and Trigger Upgrades Ready To Install	1/17/06	9/22/05	-15 wks						◆	◇					◆

Project: CDF RunIIb DAQ
 Status Date: 12/31/04
 Print Date: 1/12/05

Completed Milestone ★
 Current Forecast ◇

Baseline Milestone ◆

**CDF Calorimeter Level 1 and Level 2 Milestones
Sorted by Baseline Completion Date**

WBS	Milestone	Baseline Completion Date	Forecast/Actual Completion Date	Complete
1.2.1.10.1	First phototube order placed	9-May-03	1-Apr-03	Yes
1.2.2.2.7.1	Prototype testing complete	16-May-03	28-Mar-03	Yes
1.2.2.2.7.4	ASD->TDC Cables ready for installation	16-May-03	26-Aug-03	Yes
1.2.2.2.7.2	CEM Splitters ready for installation	19-May-03	29-Jul-03	Yes
1.2.2.2.7.3	PEM Harnesses ready for installation	2-Sep-03	28-Apr-03	Yes
1.2.2.2.7.5	All EMT cables done and ready to install	2-Sep-03	26-Aug-03	Yes
1.2.2.2.7.8	VME Crate ready for installation	7-Oct-03	30-Apr-03	Yes
1.2.1.10.3	First set of Calorimeter phototubes tested	20-Oct-03	20-Oct-03	Yes
1.2.2.2.7.10	Upstairs components ready to install	7-Jan-04	16-Oct-03	Yes
1.2.2.2.7.11	All EM Timing components ready to install	7-Jan-04	16-Oct-03	Yes
1.2.2.2.7.6	ASD/TB ready for installation	7-Jan-04	16-Oct-03	Yes
1.2.2.2.7.7	Downstairs components ready to install	7-Jan-04	16-Oct-03	Yes
1.2.2.2.7.9	TDC boards ready for installation	7-Jan-04	16-Oct-03	Yes
1.2.1.10.2	1 st Calorimeter WLS fiber holder finished	1-Apr-04	17-Feb-04	Yes
1.2.1.10.4	1 st CPR module finished and tested	4-Jun-04	15-Mar-04	Yes
1.2.1.10.6	1 st CCR module finished and tested	19-Jul-04	2-Mar-04	Yes
1.2.1.10.5	2 nd set of Calorimeter phototubes tested	6-Aug-04	26-Mar-04	Yes
1.2.1.10.7	50% Calorimeter CPR Detectors Tested	14-Jan-05	30 June 04	Yes
1.2.1.10.8	50% Calorimeter CCR Detectors tested	14-Feb-05	25 Aug 04	Yes
1.2.1.10.9	Final Calorimeter CPR Detector Tested	15-Apr-05	25 Aug 04	Yes
1.2.1.10.10	Final Calorimeter CCR Detector Tested	15-Apr-05	15-Oct-04	Yes
1.2.1.10.11	Final set of Calorimeter phototubes tested	6-May-05	6-June-04	Yes
1.2.1.10.12	End of Central Pre-shower Project	6-May-05	28-Jan-05	
1.2.3.5	End of Calorimeter Project: Level 2	6-May-05	28-Jan-05	
1.2.3.6	End of Calorimeter Project: Level 1	23-Jan-06	28-Jan-05	

IV. PROCUREMENT – P. Lukens

The purchase order with University of Illinois was placed in December, for work on the Track Trigger subproject.

V. PROJECT HIGHLIGHTS

1.2 – Calorimeter

1.2.1 Central Preshower and Crack Detector – Steve Kuhlmann

Installation of the CPR upgrade was completed during November. All production parts have been delivered, while some extra spare parts are being produced at ANL and MSU. Performance of the detector with cosmic rays continues to be very good.

1.2.2 Electromagnetic Timing – Dave Toback

All EM Timing work has been completed. Installation of this system was completed in November, 2004.

1.3 – Data Acquisition and Trigger

1.3.1 TDC (Time to Digital Converter) – Eric James

The TDC review of September 28, 2004 recommended that the current TDCs be retained for the remainder of the experiment. However, a large number of them need to be modified for high luminosity operation. We will accept this recommendation. The first organizational meeting was held to coordinate the work needed for modifying the TDCs, and the tasks are begin defined. We will add this to the project baseline in the near future. The estimate of the added cost for the TDC modification appears in this month's Cost Performance Report.

1.3.2 Level 2 – Ted Liu

All Level 2 components required for operations have been produced and fully tested. We are in the process of acquiring some necessary spares. We expect this to go forward smoothly over the next few months as the components are commercially available.

Much of the work during December has involved Firmware improvements and software development. Things are going well with the online systems interface and the algorithm for all trigger paths. So far, all hardware and firmware have been tested in a beam-on condition in parasitic mode and have performed well.

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

All of the components have been purchased for the preproduction of the SLAM Boards and the boards & components were sent out to be assembled by the vendor. The board is currently being loaded and we expect it back in early January. We have developed a complete preliminary version of the firmware for the SLAM Chip. The firmware efforts for the final version continue into January.

1.3.4 Event Builder – Bruce Knuteson

An order has been generated for PCs to serve as the Event Builder Proxy. Documents have been written for the purchase of upgraded Level 3 Converter Nodes (16 nodes) and Output Nodes (8 nodes), with 4 spares. An order for 10 additional GbE network adapter cards has been placed. A switch configuration with the new Level 3 Converter nodes has been decided upon; we are currently choosing the switch itself. Progress on software development this month was largely interrupted by an internal CDF review of the Event Builder upgrade and the holidays. Remaining tasks include the completion of the Level 3 Builder, and the fleshing out of EVB Error Logging and ACE controls.

1.3.6 SVT (Silicon Vertex Tracker) – Mel Shochet

AM++: Two LAMB boards were stuffed with AM chips, the first with 8 good chips and the second with 16 chips that had a single bad pattern (which was disabled). They were tested thoroughly and successfully with random patterns and hits at both 33 MHz and 40 MHz. Production and testing of AM chips at IMEC have been ordered. The second

prototypes of both the LAMB card and AM++ board have been produced and assembled. They are ready for testing. Production orders for chips and connectors have been placed.

AMS/RW: The AMS firmware was optimized to work at 40 MHz. The backplane initialization signal and data hold signals both to and from the AMS/RW were implemented and tested. All VME registers and functions were defined, with special attention paid to reading and writing to the huge AMMAP memory. The current Road Warrior code is being modified for the AMS/RW. A first version is expected in January.

Hit Buffer: The detailed firmware specification of the firmware is close to completion. This includes the finite state machine, both READ and WRITE modes, and VME access. Early in January writing the firmware by the physicists and the firmware engineer will begin.

Track Fitter: The first iteration of the complete firmware including VME access is complete. After simulation is finished, tests with a Pulsar board will begin. The first step, which is starting now, is to test the new mezzanine memory cards.

Mezzanine Memory Cards: The prototype 4Mx48-bit cards were received and two were stuffed. Testing has begun. As soon as it is finished, in the next few weeks, two other cards will be sent to Pisa for testing the AMS/RW, the production order will be placed, and the design of the simpler 256Kx24-bit card will be completed.

Pulsar Boards: The order for both SVT and XFT Pulsar boards were placed. The first two boards are expected in mid-March; most of this time is for the vendor to receive all of the parts. The rest of the boards will be sent to us three weeks after we approve the first two.

VI. FINANCIAL STATUS (as of 31 December 2004)

The baseline cost of the Project is \$10,375K, consisting of Run IIB Project costs (\$8,702K) plus the closeout costs of the silicon detector upgrade (\$1,673K), which will no longer be constructed.

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 – Obligations made against the project in the reporting month.
- Year to Date (YTD) Total Cost – The total cost charged to the project in this fiscal year.
- YTD Obligations w/Indirect – Total obligations 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 31 December 2004**

CDF RIIb EQU - December FY05 IN \$K							
Task Number	Expenditure Category	Current Month Total Cost	Current Month Obligation	YTD Total Cost	YTD Obligations w/Indirect	Current PO Open Commitment	Prior Yr Total Cost
Silicon	M&S	(\$12.9)	(\$105.4)	\$3.3	(\$99.2)	\$1.0	\$539.0
	SWF	(\$1.1)	(\$1.1)	(\$1.1)	(\$1.1)	\$0.0	\$571.1
	OH	(\$2.4)	\$0.0	(\$2.1)	(\$2.1)	\$0.0	\$230.9
	Total 1.1	(\$16.3)	(\$106.5)	\$0.0	(\$102.4)	\$1.0	\$1,341.0
Calorimeter	M&S	\$18.5	\$0.0	\$29.5	\$0.7	\$14.7	\$211.8
	SWF	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$139.1
	OH	\$0.3	\$0.0	\$0.5	\$0.5	\$0.0	\$51.5
	Total 1.2	\$18.8	\$0.0	\$30.0	\$1.3	\$14.7	\$402.3
Trigger/DAQ	M&S	\$44.7	\$521.1	\$158.8	\$625.2	\$524.0	\$708.2
	SWF	\$24.1	\$24.1	\$73.4	\$73.4	\$0.0	\$220.7
	OH	\$14.5	\$0.0	\$46.8	\$46.8	\$0.0	\$129.2
	Total 1.3	\$83.3	\$545.3	\$279.0	\$745.4	\$524.0	\$1,058.1
Administratio	M&S	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$29.1
	SWF	\$12.6	\$12.6	\$37.2	\$37.2	\$0.0	\$268.2
	OH	\$3.8	\$0.0	\$11.3	\$11.3	\$0.0	\$84.4
	Total 1.4	\$16.4	\$12.6	\$48.5	\$48.5	\$0.0	\$381.7
Total Project	M&S	\$50.3	\$415.7	\$191.5	\$526.7	\$539.7	\$1,488.2
	SWF	\$35.6	\$35.6	\$109.6	\$109.6	\$0.0	\$1,199.0
	OH	\$16.2	\$0.0	\$56.5	\$56.5	\$0.0	\$495.9
Grand Total		\$102.2	\$451.4	\$357.6	\$692.8	\$539.7	\$3,183.1

Total Project Cost (Inception To Date): 3,540.7

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 \$1673K 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				
August	1321	1357	1321	1893	1673	5734	2967	6871	7160	43%
September	1342	1842	1342	2002	1673	5734	2967	7247	7030	45%
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%

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. The actual cost of completed tasks.

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. The scheduled cost profile of completed tasks.

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
at WBS Level 3
Through 31 December 2004**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: CDF RIIB Mstr Equ -		Report Period: 11/30/2004 12/31/2004			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	8,701,999		0		0 0.00		8,701,999	0		0	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		Baseline	Latest Revised	BAC
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	BAC	BAC	Delta
EQU Equipment													
1.2 Calorimeter Upgrades													
1.2.1 Central Preshower and Crack Detectors	599	0	18,782	-599	-18,782	377,440	375,045	408,632	-2,396	-33,588	377,440	377,590	150
1.2.2 Electromagnetic timing	0	0	0	0	0	35,630	35,630	23,403	0	12,227	35,630	35,630	0
WBS[2]Totals:	599	0	18,782	-599	-18,782	413,070	410,675	432,035	-2,396	-21,360	413,070	413,220	150
1.3 Run 2b DAQ and Trigger Project													
1.3.1 Run 2b TDC Project	43,229	131,605	54,949	88,377	76,656	538,778	536,864	494,049	-1,915	42,815	546,541	812,253	265,712
1.3.2 Run 2b Level 2 Project	37,806	7,673	11,422	-30,133	-3,748	314,898	364,086	347,158	49,188	16,928	437,236	438,964	1,729
1.3.4 Event-Builder Upgrade	46,502	36,637	0	-9,865	36,637	333,443	264,676	113,774	-68,767	150,902	518,179	559,395	41,216
1.3.5 Computer for Level3 PC Farm / DAQ	61,311	28,200	0	-33,111	28,200	117,290	159,801	210,333	42,511	-50,533	479,403	479,403	0
1.3.6 SVT upgrade	58,380	3,074	0	-55,307	3,074	142,599	42,741	0	-99,857	42,741	280,920	362,407	81,487
1.3.11 Revised XFTII Project	119,130	99,343	16,971	-19,787	82,372	454,337	350,398	171,571	-103,938	178,827	1,620,128	1,635,257	15,129
WBS[2]Totals:	366,358	306,532	83,342	-59,826	223,190	1,901,345	1,718,566	1,336,885	-182,779	381,681	3,882,406	4,287,679	405,272
1.4 Administration													
1.4.3 Construction Phase	26,008	28,462	16,399	2,455	12,064	573,200	572,377	430,222	-824	142,155	958,867	958,851	-16
WBS[2]Totals:	26,008	28,462	16,399	2,455	12,064	573,200	572,377	430,222	-824	142,155	958,867	958,851	-16
Funding Type-CA Totals:	392,965	334,995	118,523	-57,970	216,472	2,887,616	2,701,618	2,199,143	-185,998	502,475	5,254,343	5,659,750	405,407
Sub Total	392,965	334,995	118,523	-57,970	216,472	2,887,616	2,701,618	2,199,143	-185,998	502,475	5,254,343	5,659,750	405,407
Management Resrv.											3,447,656	3,042,249	-405,407
Total	392,965	334,995	118,523	-57,970	216,472	2,887,616	2,701,618	2,199,143	-185,998	502,475	8,701,999	8,701,999	0

VII. VARIANCE ANALYSIS – P. Lukens

Subproject	Schedule Variance	Cost Variance
Calorimeter Schedule	Not Significant	Not significant
Run 2b TDC	This is slipping as effort winds down on this project. No significant impact on the overall project, since this is closing out.	Labor charges are higher than planned. This is an artifact of closing this project.
Run 2b Level 2	Ahead of schedule	Not Significant
Run 2b XFTII	Finder submission is behind by a month	Not Significant
Event Builder	An element of this related to TDC readout is behind schedule.	Costs are low. Some engineering has been done with physicist (no cost) labor.
Computers for Level 3 and DAQ	Ahead of schedule	The price of Level 3 computers purchased in September, 2004 was higher than budgeted.
SVT Upgrade	None	Not significant.
Administration	None	Costs for support and travel have been below estimates.

VIII. BASELINE CHANGES

There were no Change Control documents submitted during December 2004.

IX. FUNDING PROFILES

The funding profile for the RunIIb CDF Detector Project is shown below:

	Funding Plan in Current Year \$K				
	FY02	FY03	FY04	FY05	Total
DOE MIE	\$ 3,460	\$ 3,509	\$ 1,673	\$ 1,732	\$ 10,375
DOE R&D	\$ 1,670	\$ 480			\$ 2,150
Foreign Contributions	\$ 39	\$ 342	\$ 252	\$ 10	\$ 643
U.S. Universities	\$ 24	\$ 225	\$ 103	\$ 26	\$ 378
Total	\$ 5,193	\$ 4,556	\$ 2,028	\$ 1,768	\$ 13,545