

31 May 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 April 2005 Report**

Attached is the monthly report summarizing the April 2005 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. 29**  
**1 - 30 April 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 made steady progress during April, 2005. The Level 2 trigger upgrade was fully integrated into operations during April, and the obsolete Level 2 system has been taken out of service. The project is estimating that all components that require collision hall access for installation will be available by 5 Sept. 2005.

A review of contingency needs was performed during April, and presented to laboratory management at a Project Management Group meeting. A reduction of the contingency held by the project is being considered as a result of this reevaluation.

### III. PROJECT MILESTONE SUMMARY (as of 30 April 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	3-May-05	
1.3.5.3.7	Arrival of 15 PCs from the vendor	23-Mar-05	15-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	2-May-05	
1.3.11.7.5.8	Begin Production of SLAM Boards	18-Apr-05	1-Jun-05	
1.3.11.4.4.8	Begin Production TDC Fiber Transition Boards	21-Apr-05	24-May-05	
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	24-May-05	
1.3.6.1.2.5	Hit Buffer Firmware Complete for Board Test	23-Jun-05	14-Jun-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	31-Aug-05	
1.3.4.8	Finish Event-Builder Upgrade	28-July-05	29-Jun-05	
1.3.10.2	Ready for Accelerator Shutdown 2005	8-Aug-05	9-Sept-05	
1.3.1.12.8	TDC Modification Complete	10-Aug-05	15-Sept-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	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	9-Aug-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	9-Sept-05	
1.3.11.7.5.9	Checkout of SLAM Boards Complete	28-Sept-05	29-Sept-05	
1.3.11.2.5.10	Finder Board Checkout Complete	29-Sept-05	28-Oct-05	
1.3.11.10	XFT Ready for Installation at CDF	29-Sep-05	28-Oct-05	
1.3.8	Finish Run 2b Trigger DAQ project	30-Sep-05	28-Oct-05	
1.3.9	DAQ and Trigger Upgrades Ready for Installation	17-Jan-06	28-Oct-05	

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

Name	Baseline	Forecast	Variance	2004				2005				2006						
				Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
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			★	◆											
Event Builder Production Readiness Review	10/4/04	6/2/04	-17 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					★	◆									
Pulsar Hardware Ready for Installation	8/31/04	8/20/04	-1.4 wks						◆									
Arrival of the Event Builder hardware	10/15/04	10/15/04	0 wks							◆								
Begin Production TDC Mezzanine Card	10/28/04	11/3/04	0.8 wks							◆								
Begin Purchase of Pulsar Board components	10/20/04	11/4/04	2 wks							◆	★							
Begin AMS Mezzanine Card Production	1/14/05	11/11/04	-8.2 wks								★	◆						
Begin Ampchip Production	1/10/05	11/22/04	-5.8 wks								★	◆						
TDC Readout System Complete	6/6/05	12/10/04	-23.8 wks									★	◆					
Pulsar Level 2 subproject ready for installation	4/1/05	3/11/05	-3 wks									★	◆					
Arrival of 15 PCs from the vendor	3/23/05	3/18/05	-0.6 wks										◆					
AMS Firmware Complete for Board Test	8/19/05	4/14/05	-18 wks										★	◆				
Begin Production TDC Fiber Transition Boards	4/21/05	5/24/05	4.6 wks											◆	◇			
Track Fitter Firmware Complete for Board Test	6/28/05	4/20/05	-9.8 wks										★	◆				
Begin Joint Testing with Finder Board	4/4/05	5/2/05	3.8 wks											◆	◇			
Receipt of TDC to Finder cables Complete	3/18/05	5/3/05	6.4 wks											◆	◇			
Begin Production of SLAM Boards	4/18/05	6/1/05	6 wks											◆	◇			
Begin Production XFT Finder Boards	6/8/05	5/24/05	-2 wks											◆	◇			
Hit Buffer Firmware Complete for Board Test	6/23/05	6/14/05	-1.6 wks											◆	◇			
Checkout of TDC Mezzanine Cards Complete	6/6/05	7/5/05	4 wks											◆	◇			
Finish Event-Builder Upgrade	7/28/05	6/29/05	-4 wks												◆	◇		
Checkout of TDC Transition Boards Complete	9/16/05	9/9/05	-1 wk												◆	◇		
SVT ready for installation	8/25/05	8/9/05	-2.4 wks												◆	◇		
Arrival of 70 Level3 and 15 DAQ PCs from the vendor	8/15/05	8/15/05	0 wks												◆	◇		
Arrival of 192 L3 farm PCs from the vendor	8/15/05	8/29/05	2 wks												◆	◇		
Installation of Modified TDC's Complete	7/27/05	8/31/05	5 wks												◆	◇		
Checkout of SLAM Boards Complete	9/28/05	9/29/05	0.2 wks												◆	◇		
Ready for Accelerator Shutdown 2005	8/8/05	9/9/05	4.8 wks												◆	◇		
TDC Modification Complete	8/10/05	9/15/05	5 wks												◆	◇		
Finish Purchase of Computers for Level3/DAQ system	9/6/05	9/20/05	2 wks												◆	◇		
Finder Board Checkout Complete	9/29/05	10/28/05	4.2 wks												◆	◇		
XFT Ready for Installation at CDF	9/29/05	10/28/05	4.2 wks												◆	◇		
Finish Run 2b Trigger DAQ project	9/30/05	10/28/05	4.2 wks												◆	◇		
DAQ and Trigger Upgrades Ready for Installation	1/17/06	10/28/05	-9.8 wks												◆	◇		◆

Project: CDF RunIIb DAQ  
 Status Date: 4/30/05  
 Print Date: 5/18/05

Completed Milestone ★  
 Current Forecast ◇

Baseline Milestone ◆

#### IV. PROCUREMENT – P. Lukens

No large procurements were made in April, 2005.

#### 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. A total of 116 boards out of 300 to be modified were completed by the end of the month. The success rate for the modifications remains well above ninety percent. We have continued to install modified boards on the detector as they become available. As of the end of the month, modified boards had been installed in six of the twenty COT TDC crates in the CDF collision hall. The newly installed boards have performed well and have not had a negative impact on normal detector operations. XTC II mezzanine cards (one component of the XFT upgrade) were for the first time available for installation in April and were installed on the appropriate TDC boards in the two crates modified this month. We will continue installation of these mezzanine boards as we proceed through modification of the remaining fourteen crates.

Month	Board Modification		Testing at Michigan		Detector Installation	
	Complete	Remaining	Complete	Remaining	Complete	Remaining
January	39	261	9	291	0	233
February	61	239	43	257	21	212
March	98 (33%)	202	65 (22%)	235	42 (18%)	191
April	116 (39%)	184	80 (27%)	220	69 (30%)	164

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

**Stereo Linker Association Module (SLAM) Boards:** Firmware development continued for the full stereo road finding algorithm for the SLAM chip. This algorithm will be loaded and tested in May. Firmware that configures a SLAM board as a data source for a second SLAM was completed and tested. We can drive data on all nine fibers from one SLAM board to another. Using this design, a SLAM board was taken to Fermilab and tested with a Stereo Finder. These initial integration tests were very successful. We were able to drive data at speed from two Stereo Finder boards to a SLAM board and successfully capture the data. Software development for the SLAM test stand continued to mature. We are developing the software for the tests expected in May.

**XTC:** The 200 fully assembled production XTC 2 boards were received in April. One ECO was required on the boards. This minor modification has been completed on all boards. A full battery of testing and burn-in is underway in Urbana. We can easily accommodate 30 or more boards per week through complete checkout. This quantity is more than sufficient to maintain the detector installation schedule with the modified TDC boards.

The preproduction TDC Transition Module was fully laid out and submitted in April. The preproduction design went through a careful internal engineering design review. While the preproduction boards are fabricated, tests are ongoing with the prototype boards. These tests include data capture and timing measurements in the XFT test stand (vertical slice test) at Fermilab.

**Cabling:** The first fiber optic cables were received at the end of April. Evaluation of these cables for release of the remaining assembly was started.

**Stereo Finder:** Tests of the first Stereo XFT Finder boards continued. Initial tests of sending data from the TDC transition module to the Finder and from the Finder to the SLAM were completed. No data transmission errors were found. Tests of the finder algorithm firmware with small numbers of events were successfully completed.

The first copies of the production RX mezzanine card were received and passed initial tests. Start of full production will await tests on the Pulsar board for receiving data in L2. The schematics for the preproduction Finder board design were completed and layout of the board started.

#### **1.3.4 Event Builder – Bruce Knuteson**

We have continued testing the new system in the control room between stores. Data is being successfully sent through the VME crates to the Level 3 nodes. We are currently in the final stages of debugging the code that passes off the data to the Level 3 filter executable. Documentation and a control GUI for the ACE shifters are being written.

#### **1.3.5 Level 3 computers upgrade – Pat Lukens**

An increase in the scope of the Level 3 computer upgrade was proposed at the April, 2005 PMG meeting. This change was motivated by new estimates for the processing power needed at high luminosities, and an underestimate of the costs, based on recent purchases.

#### **1.3.6 SVT (Silicon Vertex Tracker) – Alberto Annovi**

**Software:** The work on the SVT configuration software (patterns, constants, etc.) can be considered completed. Work on simulation is still going on. Monitoring is fine, we have good hopes to meet the next deadline (second half of May), with the changes for the new road id format.

**AM++ and AMS/RW:** The standard cell chips have been produced and tested. The yield is 70%, much better than prototype yield: we have 2080 good chips that satisfy our needs (2000 chips). New LAMBs have been assembled with the new chips and successfully tested at 40 MHz. Tests of an AM++ with 60 AM chips (almost full) have been done. Design of a fourth AM++ version is ready.

Mezzanine cards have been installed on the AMS/RW and used both for the SSmap and AMmap. The output parity and parity error have been implemented in the AMS/RW.

**Hit Buffer:** Hit Buffer firmware is being written. Progress is made in parallel on three fronts: low level port assignments are being studied for establishing connections between the chips as well as inputs, outputs and mezzanine access ports. The logic components are being written up and tested as per specifications. Rudimentary VME interfaces are being designed. Effort was started merge the individual projects so that tests can be performed on the Pulsar boards.

**Track Fitter:** We started the first TF++ stand-alone tests in the month of March. After fixing the backplane signals and a few control signals, we successfully fit for the parameters of a single track in a Pulsar board at 40 MHz. The fit was done using the normal 8 clock cycles for the fit arithmetic, ISPY memory as input, and OSPY memory

to read the output. In the immediate future, we plan to tweak some more of the I/O logic and attempt further tests reading and writing data through cables.

**Mezzanines and Pulsars:** All large memory mezzanine cards were delivered and tested. All Pulsar boards were delivered. The first 5 small memory mezzanine cards were delivered and tested. The remaining small memory mezzanine cards are now being assembled.

**VI. FINANCIAL STATUS (as of 30 April 2005)**

The baseline cost of the Project is \$10,375K, consisting of Run IIb Project costs (\$9,034K) 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				
<b>CY 2004</b>										
<b>October</b>	1342	1957	1342	2125	1673	5254	3448	6759	6908	50%
<b>November</b>	1357	2081	1357	2366	1673	5254	3448	6642	6652	54%
<b>December</b>	1341	2199	1341	2673	1673	5254	3448	6453	6361	58%
<b>CY 2005</b>										
<b>January</b>	1341	2277	1341	2909	1673	5254	3448	6295	6125	61%
<b>February</b>	1341	2396	1341	3095	1341	5531	3503	6173	5939	65%
<b>March</b>	1341	2866	1341	3361	1341	5531	3503	6377	5673	68%
<b>April</b>	1341	3028	1341	3378	1341	5945	3089	6936	5656	65%

**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 April 2005**

CDF RIIb EQU - April FY05 IN \$K								
Schedule	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		0.0	0.0	43.5	21.2	21.3	211.8
	SWF		0.0	0.0	0.0	0.0	0.0	139.1
	OH		0.0	0.0	0.9	0.9	0.0	51.5
	Total 1.2		0.0	0.0	44.3	22.1	21.3	402.3
Trigger/DAQ	M&S		97.0	15.1	701.6	1,138.2	494.2	708.2
	SWF		35.6	35.6	219.1	219.1	0.0	220.7
	OH		15.4	0.0	109.6	109.6	0.0	129.2
	Total 1.3		148.0	50.7	1,030.2	1,466.8	494.2	1,058.1
Administration	M&S		0.9	0.9	1.2	1.2	0.0	29.1
	SWF		10.1	10.1	84.8	84.8	0.0	268.2
	OH		3.2	0.0	25.9	25.9	0.0	84.4
	Total 1.4		14.2	11.0	111.8	111.8	0.0	381.7
Total Project	M&S		97.8	16.0	745.9	1,056.8	515.4	1,488.2
	SWF		45.7	45.7	302.8	302.8	0.0	1,199.0
	OH		18.6	0.0	133.6	133.6	0.0	495.9
Grand Total		162.1	61.7	1,182.3	1,493.2	515.4	3,183.1	

**Total Project Cost (Inception To Date): 4,365.4**

**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 April 2005**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:				Contract Type/No:				Project Name/No: CDF RIIb Mstr Equ - De		Report Period: 3/31/2005 4/30/2005			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %	Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	9,033,999		0		0	0.00	9,033,999	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 Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Estimate	Variance
Item													
<b>EQU Equipment</b>													
<b>1.2 Calorimeter Upgrades</b>													
1.2.1 Central Preshower and Crack Detectors	26,344	3,993	0	-22,351	3,993	444,504	444,504	422,928	0	21,576	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
<b>WBS[2]Totals:</b>	<b>26,344</b>	<b>3,993</b>	<b>0</b>	<b>-22,351</b>	<b>3,993</b>	<b>467,908</b>	<b>467,908</b>	<b>446,331</b>	<b>0</b>	<b>21,577</b>	<b>467,908</b>	<b>467,908</b>	<b>0</b>
<b>1.3 Run 2b DAQ and Trigger Project</b>													
1.3.1 Run 2b TDC Project	-1,232	3,831	8,339	5,063	-4,507	516,830	493,325	515,888	-23,505	-22,564	655,792	655,792	0
1.3.2 Run 2b Level 2 Project	6,231	7,781	16,645	1,550	-8,864	395,545	397,735	386,815	2,191	10,920	473,959	473,959	0
1.3.4 Event-Builder Upgrade	28,448	38,184	164	9,736	38,021	370,948	362,136	208,432	-8,812	153,705	435,363	435,363	0
1.3.5 Computer for Level3 PC Farm / DAQ	16,450	0	16,238	-16,450	-16,238	178,601	178,601	237,044	0	-58,443	1,101,492	1,101,492	0
1.3.6 SVT upgrade	50,131	38,461	7,546	-11,670	30,915	270,972	252,125	195,969	-18,847	56,156	362,407	362,407	0
1.3.11 Revised XFTII Project	376,899	269,383	99,023	-107,517	170,359	1,207,236	712,709	544,535	-494,527	168,173	1,703,357	1,703,357	0
<b>WBS[2]Totals:</b>	<b>476,928</b>	<b>357,640</b>	<b>147,954</b>	<b>-119,288</b>	<b>209,686</b>	<b>2,940,131</b>	<b>2,396,631</b>	<b>2,088,683</b>	<b>-543,501</b>	<b>307,948</b>	<b>4,732,369</b>	<b>4,732,369</b>	<b>0</b>
<b>1.4 Administration</b>													
1.4.3 Construction Phase	-44,245	-130,437	14,154	-86,192	-144,591	513,209	513,209	493,555	0	19,654	744,322	744,322	0
<b>WBS[2]Totals:</b>	<b>-44,245</b>	<b>-130,437</b>	<b>14,154</b>	<b>-86,192</b>	<b>-144,591</b>	<b>513,209</b>	<b>513,209</b>	<b>493,555</b>	<b>0</b>	<b>19,654</b>	<b>744,322</b>	<b>744,322</b>	<b>0</b>
<b>Funding Type-CATotals:</b>	<b>459,027</b>	<b>231,196</b>	<b>162,108</b>	<b>-227,830</b>	<b>69,088</b>	<b>3,921,248</b>	<b>3,377,748</b>	<b>3,028,569</b>	<b>-543,501</b>	<b>349,179</b>	<b>5,944,598</b>	<b>5,944,598</b>	<b>0</b>
Sub Total	459,027	231,196	162,108	-227,830	69,088	3,921,248	3,377,748	3,028,569	-543,501	349,179	5,944,598	5,944,598	0
Management Resrv.											3,089,401	3,089,401	0
Total	459,027	231,196	162,108	-227,830	69,088	3,921,248	3,377,748	3,028,569	-543,501	349,179	9,033,999	9,033,999	0

**VII. VARIANCE ANALYSIS – P. Lukens**

<b>Subproject</b>	<b>Schedule Variance</b>	<b>Cost Variance</b>
Run 2b TDC	Not significant. Limited by operations, and the availability of the detector.	None.
Run 2b XFTII	Problems with first Finder board delayed testing. Submission of SLAM, TDC transition board delayed by testing.	Actual costs have lagged the progress. Costs will be accrued next month.
Event Builder	None	Costs are low. Some engineering has been done with physicist (no cost) labor. Engineering costs from CD have not all been transferred, yet.
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	Actual costs have lagged the progress. Costs will be accrued next month.
Administration	None	Costs for support and travel have been below estimates.

**VIII. BASELINE CHANGES**

There were no baseline changes made during April, 2005. However, several changes were made in early May, and the results of these changes are reflected in the financial reports presented here. These changes each readjust the costs of the subprojects to better reflect our current understanding. The changes were:

- Change Request #19 – Adjust the cost of the Calorimeter upgrade from \$442K to \$468K. This change is needed to cover miscellaneous closeout costs of this activity.
- Change Requests #20, #22 – Adjust the cost of the Data Acquisition and Trigger upgrade from \$4159K to \$4732K. The increase was largely due to additional computing needed for Level 3.
- Change Request #21 – Adjust the costs of project Administration.

**IX. FUNDING PROFILES**

The funding profile for the RunIIb CDF Detector Project is shown below. This profile has been updated to include additional Italian contributions to the Silicon Vertex Trigger subproject. These contributions are a result of the scope established in August, 2004.

	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	\$ 518	\$ 234	\$ 404	\$ 1,195
U.S. Universities	\$ 24	\$ 225	\$ 103	\$ 26	\$ 378
<b>Total</b>	<b>\$ 5,193</b>	<b>\$ 4,732</b>	<b>\$ 2,010</b>	<b>\$ 2,162</b>	<b>\$ 14,097</b>