Revised-4 Aug 2003

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 2003 Report

Attached is the monthly report summarizing the June 2003 activities and progress for the Fermilab RunIIb CDF Detector Project. This report is available electronically at:

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

electronic cc:
J. Appel
E. Arroyo
B. Ashmanskas
N. Bacchetta
D. Benjamin
G. Bolla
J. Cooper
B. Flaugher
H. Frisch
K. Hara
J. Huston
R. Hughes
D. Knapp
J. Kotcher
S. Kuhlmann
T. Liu
N. Lockyer
P. Lukens
T. Miao
J. Monhart
H. Montgomery
C. Paus
V. Pavlicek
K. Pitts
L. Ristori
R. Roser
TJ Sarlina
K. Stanfield
E. Temple
D. Toback
C. Trimby
V. White
B. Winer
M. Witherell
P. Wittich

RunIIb CDF Detector Project
Progress Report No. 7
1 - 30 June 2003

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 main focus of the experiment in Run IIb will be the continuation of the search for the Higgs boson. The increased size of the data sample will also 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:

- Replace the silicon micro-vertex detector with a device capable of withstanding the expected radiation dose for Run IIb with fast r-ϕ (axial) and small angle stereo readout.
- 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

A review of the accelerator and future luminosity projections is planned for this summer, and we expect this to address the long range plan for Tevatron operation. We also anticipate the report from P5 on the Run IIb Detector Upgrade Project. We are hopeful that these results will be sufficient for full Critical Decision 3 for the project.

The project continues to make steady technical progress. Testing of the SVX4 chip continues and no problems have been found. Early results on the yield of good chips, and the price of the chips has allowed us to reduce our cost estimates for the production run of the SVX4. Orders are being placed for "preproduction" parts for the silicon detector. These are production versions, and should be of sufficiently high quality that they could be incorporated into the detector. The summer and fall will see construction of these parts, and we plan to be ready for production orders by the end of the year. This is well ahead of the baseline schedule.

Memoranda of Understanding and Statements of Work were signed between the project and Lawrence Berkeley Laboratory and Argonne National Laboratory in June. The requisition for preproduction TDC work at U. of Chicago was prepared, and awaits laboratory approval (MOU and SOW have been signed).

III. PROJECT MILESTONE SUMMARY

CDF Level 2 Schedule Milestones from the Resource Loaded schedules

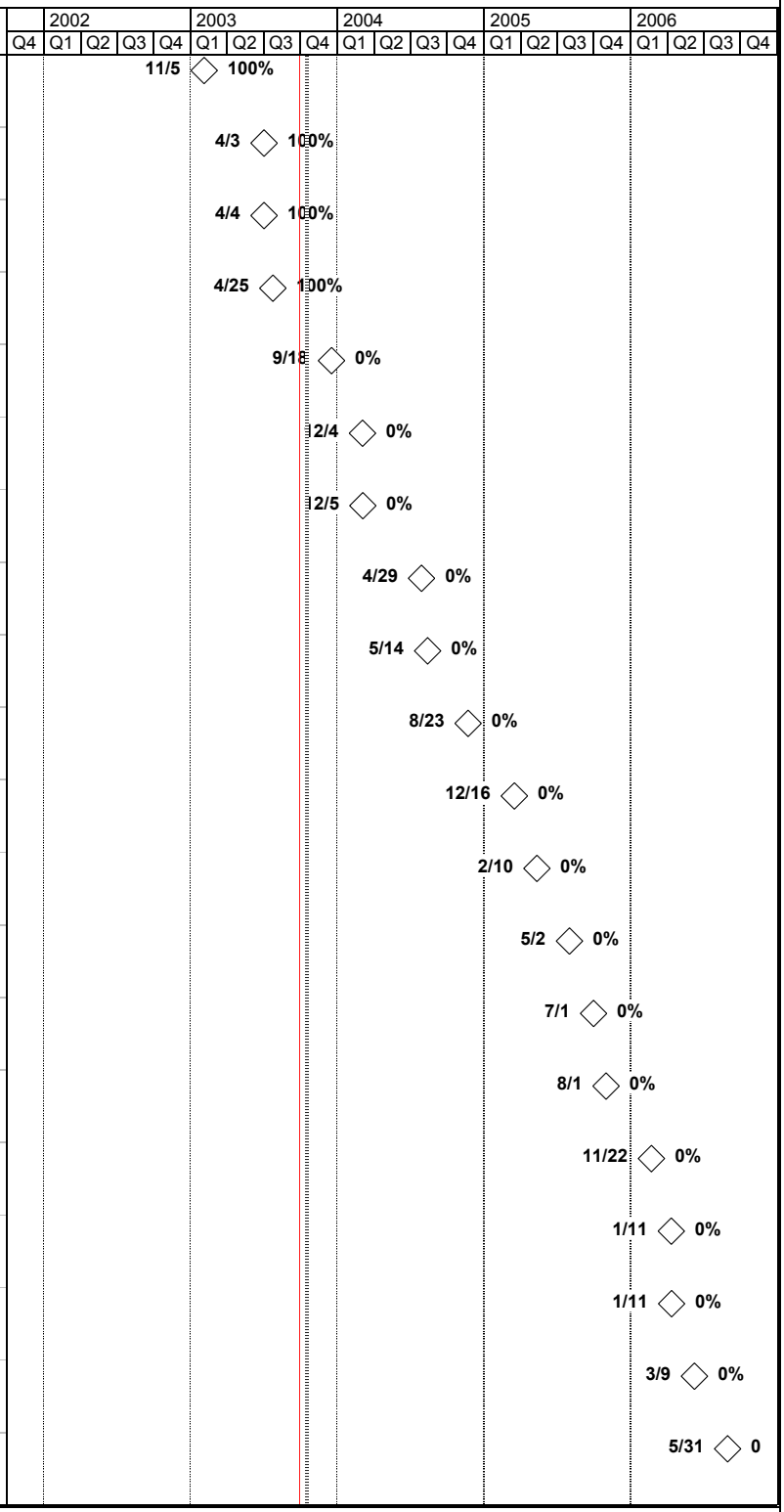
WBS	Title	Baseline Completion Date	Forecast/Actual Completion Date	Complete
1.1.5.4.1.13	Prototype stave #1 complete	5-Dec-02	5 Nov 02	Yes
1.1.2.10.2.4	Testing #1 complete- go ahead for #2	3-Apr-03	3-Apr-03	Yes
1.1.2.1.2.4	2nd chip submission	4-Apr-03	4-Apr-03	Yes
1.1.3.1.2.4	Production Sensor submission	25-Apr-03	25-Apr-03	Yes
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	
1.2.2.2.7.2	CEM Splitters ready for installation	19-May-03	29-Jul-03	
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 cables done and ready to install	2-Sep-03	26-Aug-03	
1.3.5.2.5	Arrival of 0/10 PCs from the vendor	10-Sep-03	10-Sep-03	
1.2.1.10.2	1st Calorimeter WLS fiber holder finished	7-Oct-03	4-Dec-03	
1.2.2.2.7.8	VME Crate ready for installation	7-Oct-03	30-Apr-03	Yes
1.1.2.1.3.5	Production chip submission	21-Oct-03	18-Sep-03	
1.3.1.6.7	First Prototype TDC available for test	19-Nov-03	19-Nov-03	
1.1.6.3.1.1.5	Stave & screen mounting tests complete	5-Dec-03	5-Dec-03	
1.2.1.10.4	1st CPR module finished and tested	11-Dec-03	12-Feb-04	
1.1.2.10.3.4	Go ahead for Preproduction	18-Dec-03	4-Dec-03	
1.2.2.2.7.10	Upstairs components ready to install	7-Jan-04	7-Jan-04	
1.2.2.2.7.11	All EM Timing components ready to install	7-Jan-04	8-Jan-04	
1.2.2.2.7.6	ASD/TB ready for installation	7-Jan-04	8-Jan-04	
1.2.2.2.7.7	Downstairs components ready to install	7-Jan-04	8-Jan-04	
1.2.2.2.7.9	TDC boards ready for installation	7-Jan-04	11-Jun-04	
1.3.3.2.3.4	Begin fabrication of Prototype Finder 1/3 board	8-Jan-04	8-Jan-04	
1.2.1.10.3	First set of Calorimeter phototubes tested	30-Jan-04	20-Oct-03	
1.2.1.10.6	1st CCR module finished and tested	12-Feb-04	8-Apr-04	
1.3.3.8.1.9	Prototype XFT Linker Module available for testing	26-Mar-04	26-Mar-04	
1.1.2.3.1.3.12	Preproduction hybrid available	29-Apr-04	29-Apr-04	
1.2.1.10.5	2nd set of Calorimeter phototubes tested	21-May-04	18-Feb-04	
1.1.5.2.2.8	L0 prototype modules complete	26-May-04	14-May-04	
1.3.4.4.1.4	Prototype Event Builder hardware arrives	3-Jun-04	3-Jun-04	
1.2.1.10.7	50% Calorimeter CPR Detectors Tested	4-Jun-04	2-Aug-04	
1.3.4.5.3	Production Readiness Rev - Event Builder	24-Jun-04	24-Jun-04	
1.1.2.10.4.6	Go ahead for DAQ production	23-Aug-04	23-Aug-04	

Milestone list continues on following page

WBS	Title	Baseline Completion Date	Forecast/Actual Completion Date	Complete
1.2.1.10.8	50% Calorimeter CCR Detectors tested	30-Aug-04	26-Oct-04	
1.3.2.6.3	Begin production of Level 2 Pulsar system	17-Sep-04	17-Sep-04	
1.3.3.10.3.3	Preproduction XFT Stereo Assoc Modules	29-Nov-04	29-Nov-04	
1.3.6.5	SVT ready for installation	13-Dec-04	13-Dec-04	
1.1.2.3.1.4.9	Production hybrid available	16-Dec-04	16-Dec-04	
1.3.1.12	Beginning of TDC Production	10-Jan-05	10-Jan-05	
1.3.4.5.4.4	Arrival of Event Builder hardware	3-Feb-05	3-Feb-05	
1.1.5.3.4.8	Production module available	10-Feb-05	10-Feb-05	
1.2.1.10.10	Final Calorimeter CCR Detector Tested	24-Mar-05	19-May05	
1.2.1.10.9	Final Calorimeter CPR Detector Tested	24-Mar-05	19-May05	
1.3.5.5.5	Arrival of 70 L3 & 15 DAQ PCs from the vendor	24-Mar-05	24-Mar-05	
1.3.5.6.5	Arrival of 140/20 PCs from the vendor	24-Mar-05	24-Mar-05	
1.3.3.8.3.3	Begin Production of XFT Linker Modules	24-Mar-05	24-Mar-05	
1.3.3.2.6.9	Begin Production Finder SL7 boards	28-Mar-05	28-Mar-05	
1.3.5.8	Finish Purchase of Computers for L3/DAQ	14-Apr-05	14-Apr-05	
1.1.6.1.11.3.5	Layer Zero Silicon Supports Complete	5-May-05	2-May-05	
1.3.4.8	Finish Event-Builder Upgrade	5-May-05	5-May-05	
1.2.1.10.11	Final set of Calorimeter phototubes tested	6-May-05	29-Apr-05	
1.2.1.10.12	End of Central Preshower Project	6-May-05	19-May05	
1.2.3.5	End of Calorimetry Project: Level 2	6-May-05	19-May05	
1.3.2.9	Pulsar Level 2 subproject ready for installa	9-Jun-05	9-Jun-05	
1.1.5.4.4.11	100 Production staves complete	1-Jul-05	1-Jul-05	
1.3.1.14.16	Data Concentrator Production Completed	29-Jul-05	29-Jul-05	
1.1.6.3.1.3.3	Stave Installation Begins	1-Aug-05	1-Aug-05	
1.3.3.10.4.6	XFT Production Stereo Association Modules complete	18-Aug-05	18-Aug-05	
1.3.3.23	XFT Ready for Installation at CDF	29-Sep-05	29-Sep-05	
1.3.1.13.10	TDC Production Board testing complete	30-Sep-05	23-Sep-05	
1.3.1.16	Run 2b TDC Ready for Installation	30-Sep-05	23-Sep-05	
1.3.8	Finish Run 2b Trigger DAQ project	30-Sep-05	30-Sep-05	
1.1.5.4.4.14	Production staves complete	22-Nov-05	22-Nov-05	
1.1.6.3.2.3.6	Inner detector complete	4-Jan-06	11-Jan-06	
1.1.6.3.1.3.8	Stave Installation Complete	11-Jan-06	11-Jan-06	
1.1.6.3.1.3.16	Outer detector complete	9-Mar-06	9-Mar-06	
1.1.6.4.8	SVX2b Ready for Installation into ISL	31-May-06	31-May-06	

CDF Run2b Silicon Detector Schedule Level 2 Milestones

ID	WBS	Task Name
116	1.1.5.4.1.13	Silicon Project Outer Layer Prototype Stave #1 complete
294	1.1.2.10.2.4	Silicon Project DAQ 1st round testing complete
220	1.1.2.1.2.4	2nd SVX4 Chip submission
39	1.1.3.1.2.4	Silicon Project Outer Layer Production Sensor submission
232	1.1.2.1.3.5	SVX4 Production chip submission
299	1.1.2.10.3.4	Go ahead for Silicon Project DAQ Preproduction
708	1.1.6.3.1.1.5	Silicon Project - All stave installation & screen mounting tests complete
381	1.1.2.3.1.3.12	Silicon Project preproduction hybrid available
67	1.1.5.2.2.8	Silicon Project Layer Zero prototype modules complete
306	1.1.2.10.4.6	Go ahead for Silicon Project DAQ Production
391	1.1.2.3.1.4.9	Silicon Project production hybrid available
103	1.1.5.3.4.8	Silicon Project Outer Layer Production module available
639	1.1.6.1.11.3.5	Silicon Project Layer Zero Silicon Supports Complete
151	1.1.5.4.4.11	Silicon Project - 100 Production Staves complete
718	1.1.6.3.1.3.3	Silicon Project Stave Installation Begins
156	1.1.5.4.4.14	Silicon Project - All Production Staves complete
701	1.1.6.3.2.3.6	Silicon Project Inner Detector complete
723	1.1.6.3.1.3.8	Silicon Project Stave Installation Complete
731	1.1.6.3.1.3.16	Silicon Project Outer Detector complete
740	1.1.6.4.8	SVX2b Ready for Installation into ISL

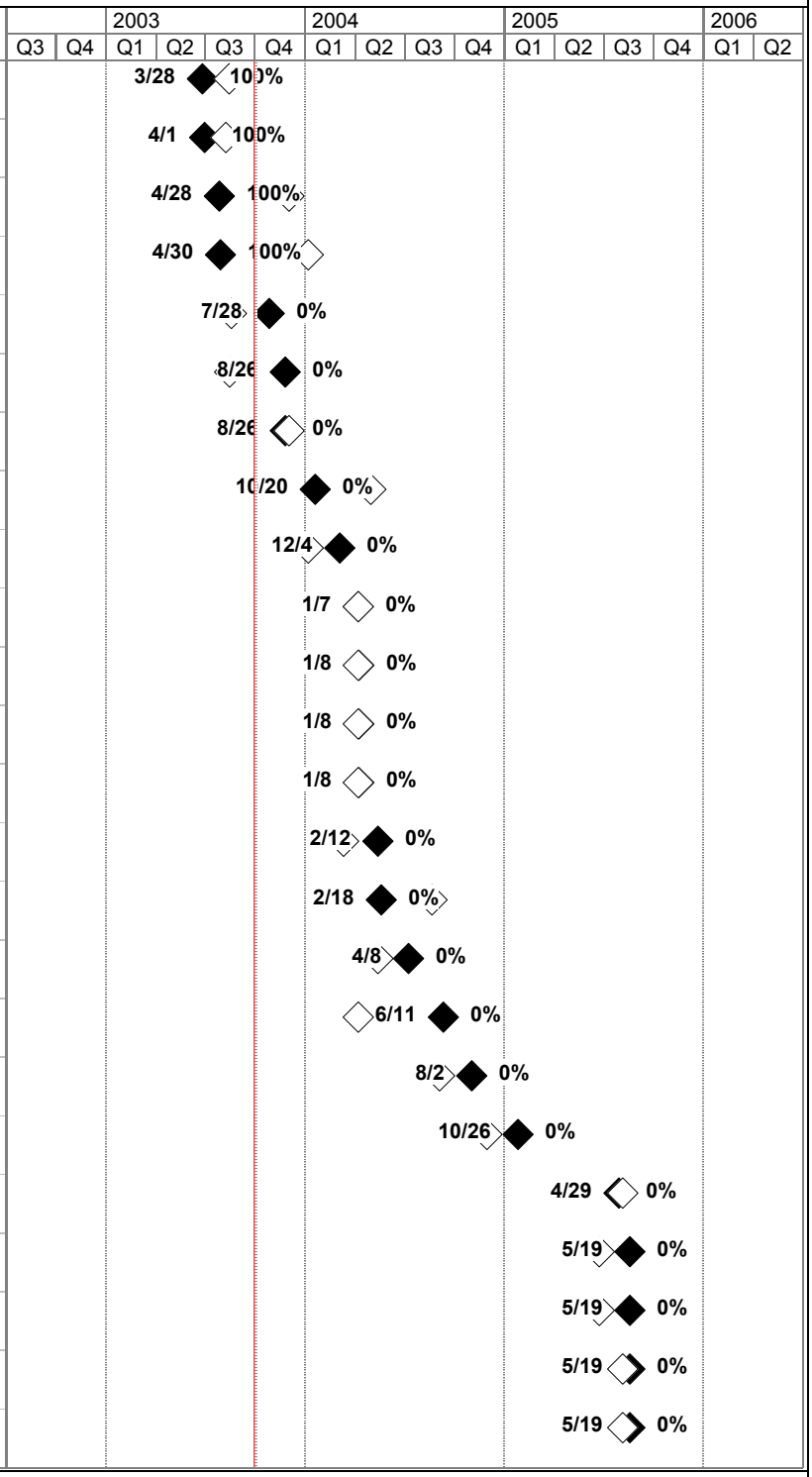


Project: CDF Run2b Silicon
Date: Jul 17 '03

Task		Baseline Summary	
Progress		Rolled Up Baseline	
Baseline		Rolled Up Baseline Milestone	
Milestone		Rolled Up Progress	
Baseline Milestone		Split	
Summary		External Tasks	
Rolled Up Task		Project Summary	
Rolled Up Milestone			

CDF RunIIb Calorimeter Schedule Level 2 Milestones

WBS	Name
1.2.2.2.7.1	**EMTiming Prototype Testing Complete**
1.2.1.10.1	**1st Calorimeter phototube order placed**
1.2.2.2.7.3	**EMTiming PEM Harnesses ready to install**
1.2.2.2.7.8	**EMTiming VME Crate ready to install**
1.2.2.2.7.2	**EMTiming CEM Splitters ready to install**
1.2.2.2.7.4	**EMTiming ASD->TDC Cables ready to installn**
1.2.2.2.7.5	**All EMTiming cables done and ready to install**
1.2.1.10.3	**1st set of Calorimeter phototubes tested**
1.2.1.10.2	**1st Calorimeter WLS fiber holder finished**
1.2.2.2.7.10	**EMTiming Upstairs components ready to install**
1.2.2.2.7.6	**EMTiming ASD/TB ready to install**
1.2.2.2.7.7	**Downstairs EMTiming components ready to install**
1.2.2.2.7.11	**All EMTiming components ready to install**
1.2.1.10.4	**1st Calorimeter CPR module finished and tested**
1.2.1.10.5	**2nd set of Calorimeter phototubes tested**
1.2.1.10.6	**1st Calorimeter CCR module finished and tested**
1.2.2.2.7.9	**EMTiming TDC boards ready to install**
1.2.1.10.7	**50% Calorimeter CPR Detectors Tested**
1.2.1.10.8	**50% Calorimeter CCR Detectors Tested**
1.2.1.10.11	**Final set of Calorimeter phototubes tested**
1.2.1.10.9	**Final Calorimeter CPR Detector Tested**
1.2.1.10.10	**Final Calorimeter CCR Detector Tested**
1.2.1.10.12	**End of Central Preshower Project**
1.2.3.5	**End of Calorimetry Project: Level 2**

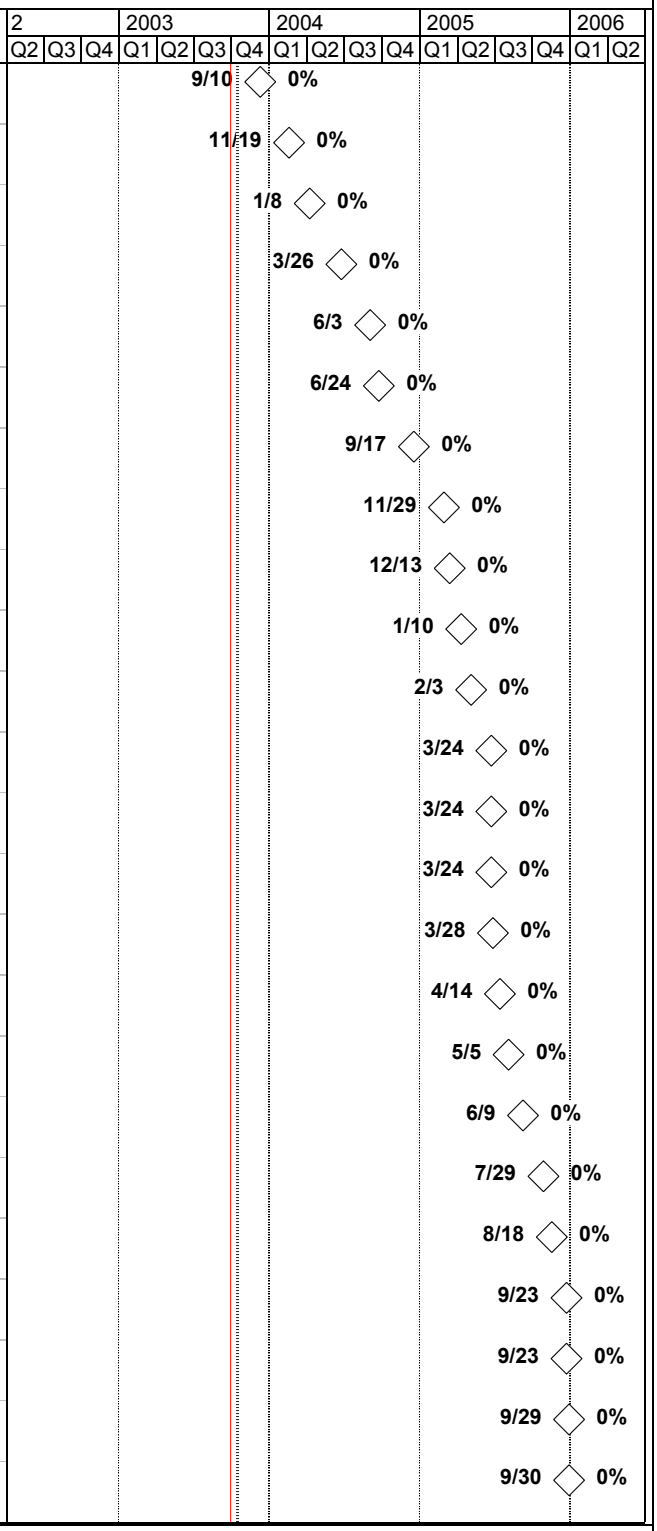


Project: CDF RunIIb Calorim
Date: Jul 2 '03

Task		Baseline Summary	
Progress		Rolled Up Baseline	
Baseline		Rolled Up Baseline Milestone	
Milestone		Rolled Up Progress	
Baseline Milestone		Split	
Summary		External Tasks	
Rolled Up Task		Project Summary	
Rolled Up Milestone			

CDF Run2b Trigger/DAQ Schedule Level 2 Milestones

ID	WBS	Name
19	1.3.5.2.5	Arrival of 0/10 PCs from the vendor
179	1.3.1.6.6	First Prototype TDC available for testing
422	1.3.3.2.3.4	Fabrication of Prototype XFT Finder 1/3 board
387	1.3.3.8.1.9	Prototype XFT Linker Module available for testing
61	1.3.4.4.1.4	Arrival of the prototype Event Builder hardware
72	1.3.4.5.3	Event Builder Production Readiness Review
105	1.3.2.6.3	Begin production of Level2 Pulsar system
361	1.3.3.10.3.3	Begin Preproduction XFT Stereo Association Modules
11	1.3.6.5	SVT ready for installation
215	1.3.1.12	Beginning of TDC Production
78	1.3.4.5.4.4	Arrival of the Event Builder hardware
397	1.3.3.8.3.3	Begin Production XFT Linker Modules
36	1.3.5.5.5	Arrival of 70 Level3 and 15 DAQ PCs from the vendor
49	1.3.5.6.5	Arrival of 140/20 PCs from the vendor
461	1.3.3.2.6.9	Begin Production XFT Finder SL7 boards
52	1.3.5.8	Finish Purchase of Computers for Level3/DAQ system
83	1.3.4.8	Finish Event-Builder Upgrade
115	1.3.2.9	Pulsar Level 2 subproject ready for installation
234	1.3.1.14.16	TDC Data Concentrator Production complete
372	1.3.3.10.4.6	XFT Production Stereo Association Modules complete
256	1.3.1.13.10	TDC Production Board testing complete
257	1.3.1.16	Run 2b TDC Ready for Installation
468	1.3.3.23	XFT Ready for Installation at CDF
469	1.3.8	Finish Run 2b Trigger DAQ project



Project: CDF Run 2B Data A
Date: Jul 15 '03

Task
Progress
Baseline
Milestone
Baseline Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Baseline Summary
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Progress
Split
External Tasks
Project Summary

IV. PROCUREMENT – P. Lukens

The requisition for preproduction TDC work at U. of Chicago was prepared, and awaits laboratory approval (MOU and SOW have been signed).

V. PROJECT HIGHLIGHTS

1.1 – Silicon Detector

1.1.1 Administration – Brenna Flaugher, Nicola Bacchetta

Work began this month on the databases that will be used for the silicon sensors and for the hybrid assembly and testing. A student from Finland is working on adapting the Atlas database for our purposes.

1.1.2 DAQ (Data AcQuisition) – Brenna Flaugher, Nicola Bacchetta

Testing of the 2nd prototype SVX4 chips continues to go very well. No problems have been found yet and we are gaining confidence that these prototype chips are the ones we will be able to use as the production chips.

The completion of the hybrid has been delayed by 3 weeks due to a problem at the manufacturing facility. Preparations continue at LBL and UC Davis for the hybrid arrival, assembly, testing, and burn-in. The first multi -hybrid burn-in prototype was tested and works well.

The Bus Cable #2 design was finished this month and submitted to the vendor for fabrication. The changes from the previous prototype incorporate all the results of the testing of the first prototype staves.

Manufacturing of the #2 MiniPort Card (MPC) continued without problems or delays during the month. Progress was made on the Junction Port Card (JPC) design and layout. A partial review of the JPC is scheduled for early July. Work continued on defining the final cables and connectors between the MPC and the JPC as well as from the JPC to the outside world.

We met with the groups from Harvard and JHU and discussed the limitations of the existing Upper DAQ system. The current SRC is outdated and very difficult to maintain. The consensus of the groups is that the SRC needs to be upgraded and Harvard is getting ready to begin work on this portion of the project.

1.1.3 Sensors – Brenna Flaugher, Nicola Bacchetta

For Layer 0 sensors we decided that no changes in the design are needed from the Run IIa L00 sensor design. The L0 sensor order was placed along with the outer layer sensor order, but they will use different masks for the outer layer sensors. Layer 0 sensor deliver is expected in the fall and is not on the critical path.

1.1.4 Cooling and Monitoring – Brenna Flaugher, Nicola Bacchetta

Progress continues on the internal manifold design and on the prototyping of the RASNIK position monitors.

1.1.5 Construction of Modules, Staves, and Layer Zero (L0) – Brenna Flaugher, Nicola Bacchetta

The 1st Layer 0 module was built and read out successfully. This completes the Research & Development work on L0 modules. The first prototype outer layer modules and staves were also completed last month. New hybrids and SVX4 chips will be used for the 2nd prototype round of modules and staves.

1.1.6 Support Mechanics – Brenna Flaugher, Nicola Bacchetta

Prototype efforts on the mechanical support tasks were completed. Parts have been ordered and are already arriving for the Bulkhead alignment fixture. The design of the spacetube was completed and sent out for quotes. The design of the Layer Zero CF support was also completed and manufacturing has begun. Progress continues on the stave installation fixturing.

1.2 – Calorimeter

1.2.1 Central Preshower and Crack Detector – Steve Kuhlmann

The Central Preshower/Crack Upgrade continued to make progress in June. The first full-scale Preshower prototype was scanned with a moving radioactive source in a test stand at Argonne. The goal was to test the uniformity of the tile-fiber system response. Overall the uniformity and quality control was quite good, better than expected for the first prototype. However, the clear optical fibers in the module and in the optical cable that goes to the phototubes appear to show more variation than the specification. It had already been planned to build the second prototype with clear fibers from a different vendor so this will enable us to investigate these variations in detail.

Tiles for the first Crack prototype are being prepared at Fermilab. Optimization tests continue at INFN. Michigan State is fabricating several optical cables, as well as overseeing the tile-fiber preparation process at Fermilab.

1.2.2 Electromagnetic Timing – Dave Toback

June 2003 saw the continued success of the EM Timing project. Nearly every component is on schedule and many are well ahead of schedule or are already completed. The PEM harnesses are complete, tested and ready to be installed.

The CEM splitter harnesses are well into in production and testing, with over 70% built and 30% tested. We are on track to have both the production and testing work completed on schedule. The on-detector integration of the CEM splitters and PEM wedges into normal data continues to go well as we improve calibrations and monitoring. The performance of the system is better than expected and is, in many ways, already out-performing the HADTDC system. The TDC crate is fully functional, well ahead of schedule. We have 20% of the TDC's in hand and it is expected the others will be available before the scheduled arrival date. The Italian funding has completely come through for EM Timing and the long cables, ASD's, and TB printed circuit

boards (PCBs) were ordered with all expected to be delivered in early to mid July, again, ahead of schedule.

Most of the electronics parts for the ASD and TB's have been purchased and have arrived at INFN. The remaining parts have been ordered or will be ordered soon and are expected to be available this summer. Our test stand room is fully functional with production quality components. The bulk of our efforts have been in debugging individual problems with the existing hardware and the online and offline software for the project. It is believed that all components will be ready by the end of the summer.

1.3 –Data Acquisition and Trigger

1.3.1 TDC (Time to Digital Converter) – Henry Frisch, Ting Miao

After looking several options of implementing the CBLT-like multi board readout scheme on the existing TDCs, we decided the best way to do this is to replace the old VME bus interface chips (CY7C960 from CYPRESS) with modern PLDs such as Altera EPM7256 chips used by CLEO-III for CBLT. Mark Kozlovsky (PPD) proposed an idea of chip replacement by adding a mezzanine-like Printed Circuit Board (PCB) where new chips for additional logics will be added. An adapter base on the PCB with the right pin arrangement takes over the space of the CYPRESS chip and makes any needed communications between the TDC board and new chips on the mezzanine board. A commercially available adapter base has been identified that will fit the CYPRESS pin arrangement and small quantities of the adapters were ordered for prototyping. On the mezzanine PCB design, we are consulting CLEO experts on the possibility of using their implementation on the Altera PLDs.

1.3.2 Level 2 – Ted Liu, Peter Wittich

The CDF Level 2 Trigger system continues to make progress on the following fronts:

- Pulsar hardware, firmware and VME software,
- PCI and CPU performance studies, and
- S-LINK data format definition for all data paths.

All Pulsar prototypes have been fully tested for robustness. No design problems have been identified therefore we are convinced there is no need for any design revisions. This includes the following components:

- Pulsar motherboard,
- Hotlink transmitter and receiver mezzanine cards,
- Taxi transmitter and receiver mezzanine cards, and
- Back of crate transition module.

Both Pulsar firmware and VME software have been greatly improved to allow fully automated testing. With the automated testing procedures and the complete success of all prototypes, we are getting ready for Pulsar hardware preproduction, roughly six months ahead of schedule.

The work on testing the CPU performance on modern CPUs with Linux operating system for the Level 2 trigger decision algorithm latency has been completed. The results indicate that modern CPUs (~2 GHz desktop PCs) with Linux operating systems have much better performance than the old Alpha's (500MHz without operating system) being used in the current Level 2 trigger system. The work on testing the SLINK to PCI card (S32PCI64, designed at CERN for Atlas) performance is continuing.

More specific details about the project progress can be found at:
http://hep.uchicago.edu/~thliu/projects/Pulsar/L2_upgrade_meeting.html

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

The Linker upgrade work at OSU has been focused on implementing the improved tracking linking algorithm in the latest Altera Stratix devices. We have fit the design into the target device (an EP1S25), but we are struggling with trying to pass a set of test vectors through the Altera simulator. We have successfully tested smaller portions of the design with the simulator, but not yet the full design.

1.3.4 Event Builder – Christoph Paus

The technical evaluation of the Gigabit prototype system has been completed. System operation was satisfactory and the design has proven reliable. No other work is scheduled to begin until later in calendar year 2003.

1.3.6 SVT (Silicon Vertex Tracker) – Bill Ashmanskas, Luciano Ristori

No work is scheduled to begin on the Silicon Vertex tracker trackfitter and merger boards until early in calendar year 2004.

VI. FINANCIAL STATUS

The accompanying tables and charts are the Cost Performance Reports generated from COBRA. These give a summary of the financial tracking of the project, as measured by the Earned Value. Input data for the earned value calculation originates with the status of project completion, as reported by the Level 2 managers, and actual costs extracted from the Fermilab accounting system.

The following charts and tables are attached:

CDF Project Variance Analysis Report - This report gives a high level summary of the cost and schedule variances of the project as a whole.

CDF Project Cost Performance Report - This report gives a complete earned value calculation of the project down to Level 3 of the Work Breakdown Structure. Earned value calculations are shown for this reporting period (columns 2-6) as well as the project to date (columns 7-11). Column 12 contains our current value of BAC, and will only be changed after the formal implementation of the Change Control process.

CDF Project Performance Indicator Plot - This graph provides a display of the Schedule and Cost Performance Indicators over time. SPI and CPI tracking bands are as follows:

Green	-	Between 0.9 and 1.15
Yellow	-	Between 0.85 and 0.95 or between 1.15 and 1.25
Red	-	Less than 0.85 or Greater than 1.25

CDF Project Financial Plot - This plot provides a monthly indication of the work scheduled, work performed, and the actual costs.

CDF RunIIb Baseline BCWS - This plot provides an integrated view of the work scheduled, work performed, and the actual costs of the Project to date.

A number of specialized terms and abbreviations are used in the reports. They 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.

CPI – Cost Performance Index. $CPI = \frac{BCWP}{ACWP}$

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. $EAC = (BAC\ (current) - BCWP) + ACWP$

EV – Earned Value. $EV = BCWP$

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

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

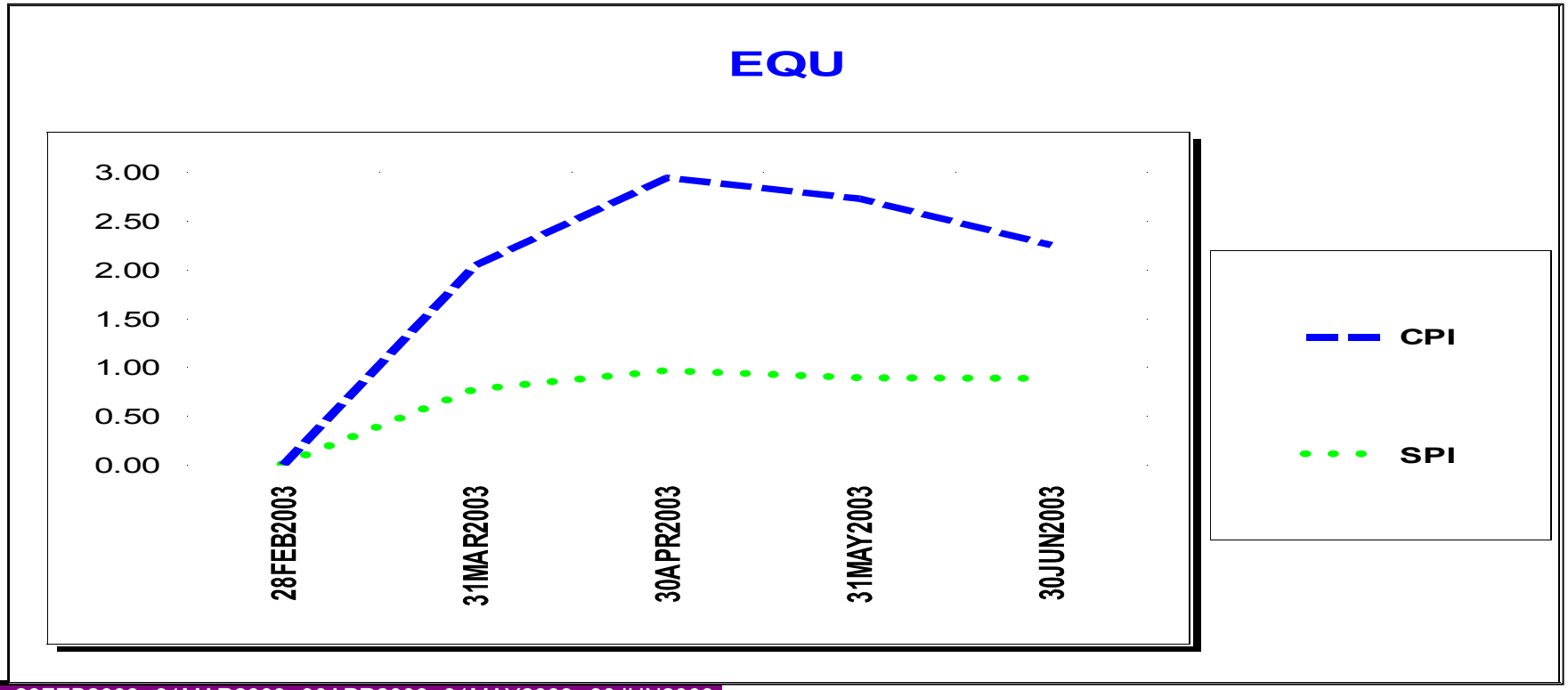
SPI – Schedule Performance Index. $SPI = \frac{BCWP}{BCWS}$

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

CDF Project EQU Cost Performance Report at WBS Level 3

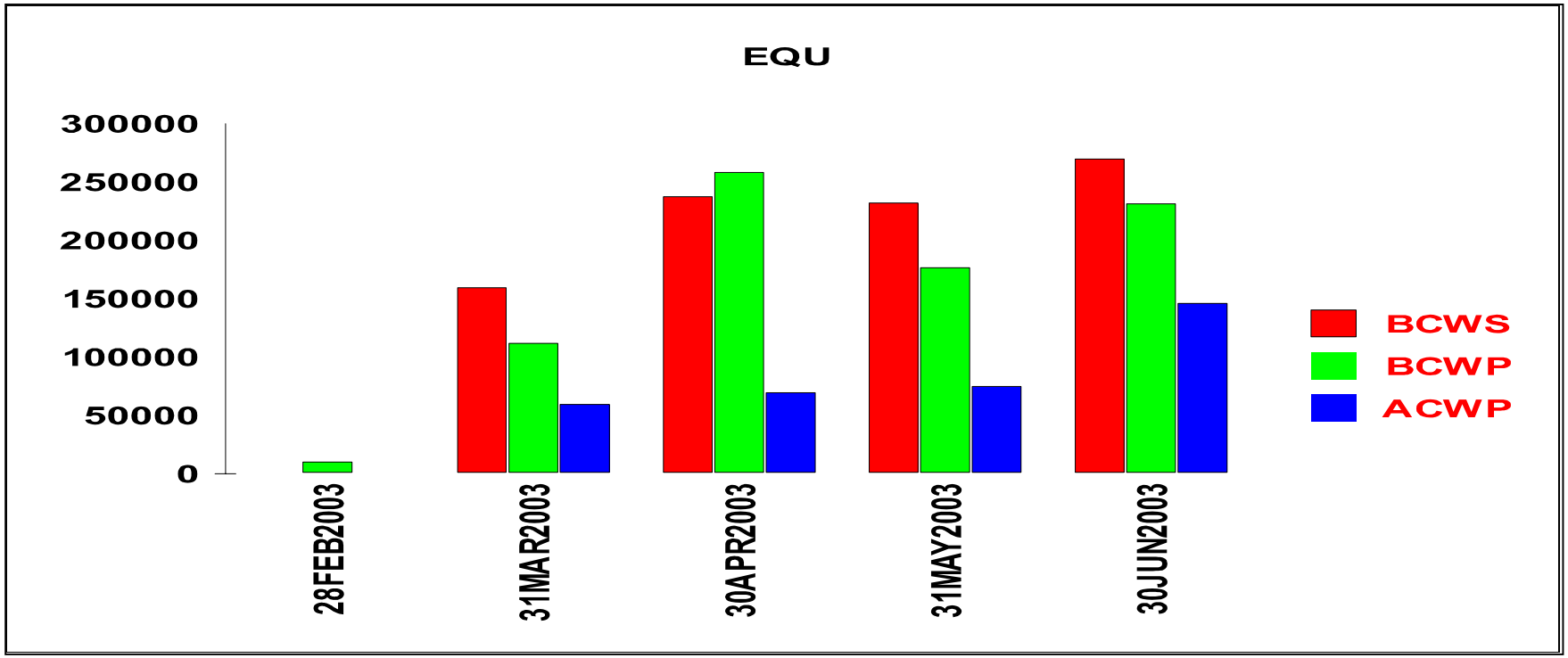
Cost Performance Report - Work Breakdown Structure											
Contractor: Location:					Contract Type/No:			Project Name/No: CDF RIIb Master EQU		Report Period: 5/31/2003 to 6/30/2003	
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %	Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling	
1	24,987,050		0		0 0	24,987,050	0		0	0	
Funding Type-CA WBS[2] WBS[3]	Current Period					Cumulative to Date					At Completion
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance		
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EQU											
1.1 Run 2b Silicon Project											
1.1.1 Administration	10,852	10,898	0	45	10,898	44,444	44,489	0	45	44,489	461,456
1.1.2 DAQ	61,604	71,629	19,802	10,025	51,826	216,732	275,473	45,930	58,741	229,543	5,187,396
1.1.3 Sensors	0	18,317	0	18,317	18,317	20,554	28,594	0	8,040	28,594	945,613
1.1.4 Cooling and Monitoring	16,195	3,736	0	-12,459	3,736	78,606	14,159	0	-64,447	14,159	464,851
1.1.5 Construction of Modules, Staves and L0	0	875	36,127	875	-35,252	0	875	36,127	875	-35,252	2,141,524
1.1.6 Support Mechanics	52,380	75,496	53,069	23,115	22,427	219,910	237,776	151,648	17,867	86,128	2,825,975
WBS[2]Totals:	141,031	180,950	108,998	39,919	71,952	580,246	601,367	233,704	21,121	367,662	12,026,814
1.2 Calorimeter Upgrades											
1.2.1 Central Preshower and Crack Detectors	6,169	10,783	1,014	4,614	9,768	11,277	12,747	1,014	1,471	11,733	306,093
1.2.2 Electromagnetic timing	0	4,576	11,129	4,576	-6,552	22,434	29,214	17,335	6,780	11,879	35,630
WBS[2]Totals:	6,169	15,359	12,143	9,190	3,216	33,710	41,961	18,349	8,251	23,613	341,723
1.3 Run 2b DAQ and Trigger Project											
1.3.1 Run 2b TDC Project	64,363	0	0	-64,363	0	64,363	0	0	-64,363	0	1,080,531
1.3.2 Run 2b Level 2 Project	0	0	0	0	0	0	0	0	0	0	366,655
1.3.3 Run 2b XFTII Project	17,008	0	0	-17,008	0	69,961	0	0	-69,961	0	1,146,970
1.3.4 Event-Builder Upgrade	0	0	0	0	0	0	0	0	0	0	515,472
1.3.5 Computer for Level3 PC Farm / DAQ	5,839	0	0	-5,839	0	5,839	0	0	-5,839	0	478,410
1.3.6 SVT upgrade	0	0	0	0	0	0	0	0	0	0	174,441
WBS[2]Totals:	87,209	0	0	-87,209	0	140,162	0	0	-140,162	0	3,762,478
1.4 Administration											
1.4.3 Construction Phase	35,446	35,152	24,936	-295	10,215	145,160	145,221	98,240	61	46,981	1,285,349
WBS[2]Totals:	35,446	35,152	24,936	-295	10,215	145,160	145,221	98,240	61	46,981	1,285,349
Funding Type-CATotals:	269,855	231,461	146,077	-38,394	85,384	899,278	788,549	350,294	-110,729	438,256	17,416,365
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0
Sub Total	269,855	231,461	146,077	-38,394	85,384	899,278	788,549	350,294	-110,729	438,256	17,416,365
Management Resrv.											7,570,685
Total	269,855	231,461	146,077	-38,394	85,384	899,278	788,549	350,294	-110,729	438,256	24,987,050

CDF Project Performance Indicator Plot - 1 July 2003



	28FEB2003	31MAR2003	30APR2003	31MAY2003	30JUN2003
CPI	N/A	204.59%	294.23%	272.79%	225.11%
SPI	N/A	76.54%	95.81%	88.51%	87.69%

CDF Project Financial Plot - 1 July 2003



	28FEB2003	31MAR2003	30APR2003	31MAY2003	30JUN2003
BCWS	0	159,588	237,585	232,251	269,855
BCWP	10,272	111,870	258,407	176,539	231,461
ACWP	0	59,700	69,635	74,882	146,077

VII. VARIANCE ANALYSIS – P. Lukens

The Cost Performance Index (CPI) has a value of almost 2.1 this month, slightly reduced from last month. The small quantity of work performed to date makes the CPI susceptible to "start-up" effects, as described last month. Several items had their cost estimates readjusted in June, which reduced the CPI. We expect this to reduce towards 1.0 as the project matures.

Rescheduling of a couple of items (described in Section VIII) resulted in a correction to our SPI, which was low last month. At this writing, technical difficulties in the use of our scheduling and earned value calculation software have prevented us from propagating the schedule changes we have made into our Cost Performance Report. In particular, schedule variances of -$64K in WBS 1.1.4 and -$69K in 1.3.3 are in error, and should be zero. The corrected BCWS at this time should be$787K, giving an SPI of 0.93

VIII. BASELINE CHANGES

Changes were made this month to the Silicon Detector and Data Acquisition schedules. In the Silicon schedule, several costs were transferred between tasks, as we learn more about the likely cost of SVX4 chips, and the costs that will be incurred for the preproduction construction A summary of the major changes is listed below, where the costs are in $AY including G&A:

WBS	Task Name	Orig Cost	New Cost
1.1.2.1	SVX4 Chips	$456,000	$205,828
1.1.2.2	Transceiver Chips	$82,151	$11,831
1.1.2.3	Hybrids	$1,690,520	$1,793,828
1.1.3.1	Outer Layers	$762,911	$833,769

The total cost estimated change to the silicon detector is a reduction of $68K

In the Data Acquisition schedule, two significant changes were needed. First, a cost increase to cover engineering charges for the TDC design is needed. We originally planned to cover this cost with R&D funds, but this source has been exhausted. The scope of the engineering effort needed for the TDCs has not changed since the baseline plan. The total increase in the project cost due to the added engineering is $111K.

Secondly, a reassessment of the schedule for the Track Trigger subproject has motivated a change in the schedule. The work on this project has been slowed, due to other demands on the time of the principals. A more realistic schedule has been drawn up that reflects the new plan. The changes in cost for the Track Trigger subproject are minimal. New milestones are listed below:

WBS	Description	Dates	
		Original	Current
1.3.3.2.3.4	Fabrication of Prototype XFT Finder 1/3 board	4/11/03	1/8/04
1.3.3.2.6.9	Begin Production XFT Finder SL7 boards	10/14/04	3/28/05
1.3.3.8.1.9	Prototype XFT Linker Module available for testing	6/9/03	3/26/04
1.3.3.8.3.3	Begin Production XFT Linker Modules	12/13/04	3/24/05
1.3.3.10.3.3	Begin Preproduction XFT Stereo Association Modules	6/21/04	11/29/04
1.3.3.10.4.6	XFT Production Stereo Association Modules complete	6/6/05	8/18/05
1.3.3.23	XFT Ready for Installation at CDF	6/6/05	9/29/05

IX. FUNDING PROFILES

The table, below, contains the funding plan for the Project. Specific information relating to spending profiles for the current fiscal year is available above in Section VI, Financial Status. This is the funding profile submitted to the DOE Office of Science in the Project Execution Plan (PEP).

	2002	2003	2004	2005	2006	Totals
US - M&S	$ 2,750,000	$ 1,580,000	$ 5,292,456	$ 7,073,262	$ 242,418	$ 16,938,135
US - Labor	$ 250,000	$ 1,250,000	$ 1,989,300	$ 2,607,789	$ 651,352	$ 6,748,441
US - G&A	$ 500,000	$ 639,000	$ 1,114,182	$ 1,616,354	$ 219,344	$ 4,088,880
US - Equip. Total	$ 3,500,000	$ 3,469,000	$ 8,395,938	$ 8,508,623	$ 1,113,114	$ 24,986,676
US - R&D	$ 1,670,000	$ 480,000				$ 2,150,000
Japan	$ 235,465	$ 867,229	$ 1,080,700	$ 9,600	$ -	$ 2,192,994
Italy	$ 64,506	$ 350,838	$ 260,946	$ -	$ -	$ 676,290
University	$ 23,557	$ 224,780	$ 103,030	$ 26,040	$ -	$ 377,407
Total Funding	$ 5,493,528	$ 5,391,847	$ 9,840,614	$ 8,544,263	$ 1,113,114	$ 30,383,366

The following table contains current values for selected financial tracking quantities that do not appear in the Cost Performance Report.

	31 May 2003	30 June 2003
Estimate to Completion	$24,614 K	$24,608 K
Percent Complete	3.2 %	4.2 %