25 September 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 August 2003 Report

Attached is the monthly report summarizing the August 2003 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. 9
1 - 31 August 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

This monthly report will contain the report on progress made during the month of August, and financial tables that cover the costs incurred up to the end of the month, as is our custom.

The silicon detector subproject, which has been the area of greatest activity, was cancelled by the Director on 3 September, 2003. The full explanation can be found at the internet link

http://www-cdf.fnal.gov/internal/spokes/Detector_upgrade_decision.pdf

The project status is now uncertain. The collaboration will review all of the other subprojects in the context of an extended run with the current silicon detector. The strategy for the later years of run II without a silicon replacement has not been discussed. We will resolve this in the coming weeks, as well as establishing a "close out" plan for the silicon detector work. A Baseline Change Proposal is expected to be submitted before the end of the year.

III. PROJECT MILESTONE SUMMARY

CDF Level 2 Schedule Milestones from the Resource Loaded schedules

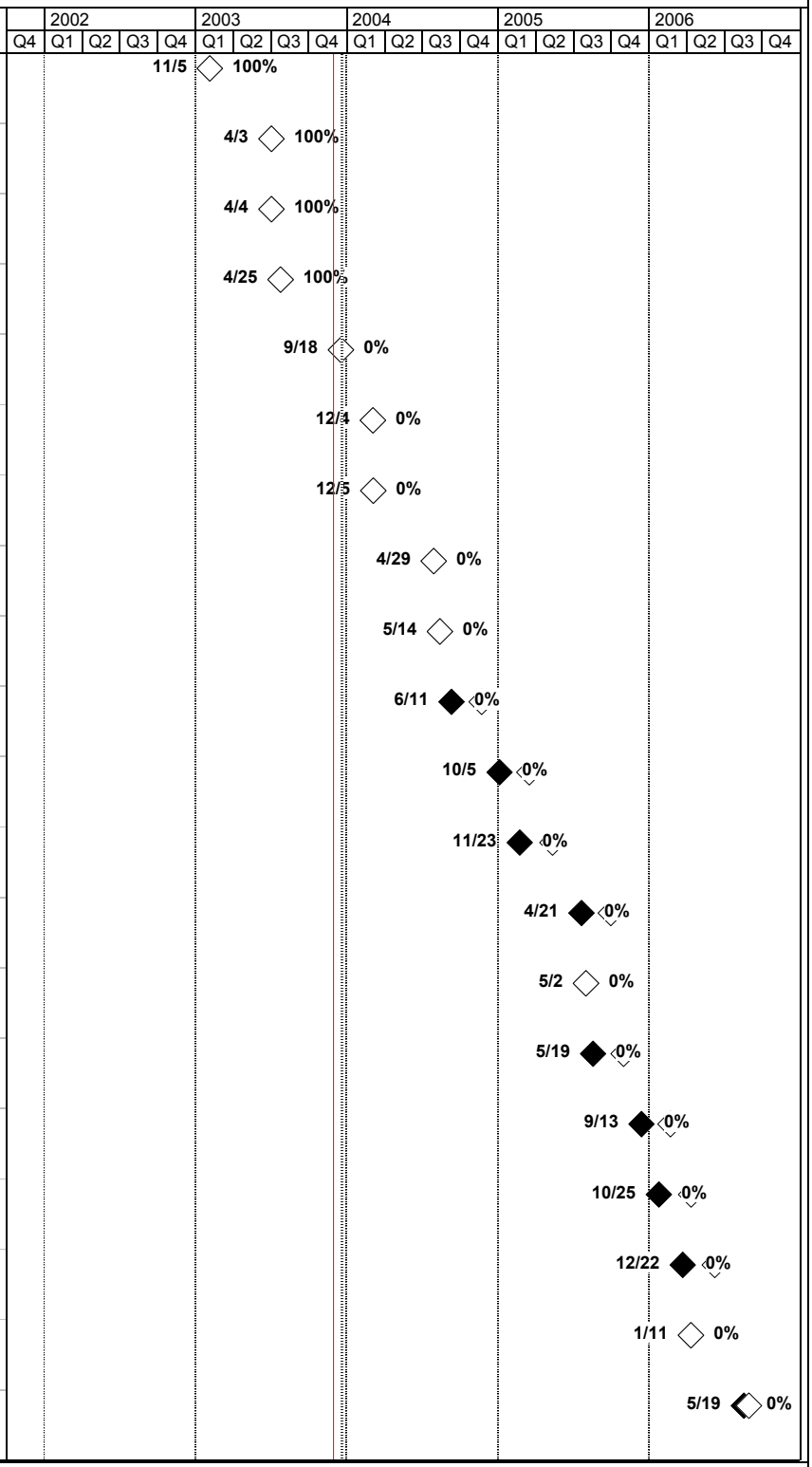
WBS	Title	Baseline Completion Date	Forecast/Actual Completion Date	Complete
1.1.5.4.1.13	Prototype stave #1 complete	5-Dec-02	5 Nov 02	Yes
1.1.2.10.2.4	Testing #1 complete- go ahead for #2	3-Apr-03	3-Apr-03	Yes
1.1.2.1.2.4	2nd chip submission	4-Apr-03	4-Apr-03	Yes
1.1.3.1.2.4	Production Sensor submission	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	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 cables done and ready to install	2-Sep-03	26-Aug-03	Yes
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
297	1.1.2.10.2.4	Silicon Project DAQ 1st round testing complete
223	1.1.2.1.2.4	2nd SVX4 Chip submission
39	1.1.3.1.2.4	Silicon Project Outer Layer Production Sensor submission
235	1.1.2.1.3.5	SVX4 Production chip submission
302	1.1.2.10.3.4	Go ahead for Silicon Project DAQ Preproduction
686	1.1.6.3.1.1.5	Silicon Project - All stave installation & screen mounting tests complete
384	1.1.2.3.1.3.12	Silicon Project preproduction hybrid available
99	1.1.5.2.2.8	Silicon Project Layer Zero prototype modules complete
309	1.1.2.10.4.6	Go ahead for Silicon Project DAQ Production
394	1.1.2.3.1.4.9	Silicon Project production hybrid available
84	1.1.5.3.4.8	Silicon Project Outer Layer Production module available
151	1.1.5.4.4.11	Silicon Project - 100 Production Staves complete
625	1.1.6.1.11.3.5	Silicon Project Layer Zero Silicon Supports Complete
696	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	1.1.6.3.1.3.8	Silicon Project Stave Installation Complete
709	1.1.6.3.1.3.16	Silicon Project Outer Detector complete
726	1.1.6.3.2.3.6	Silicon Project Inner Detector complete
735	1.1.6.4.8	SVX2b Ready for Installation into ISL

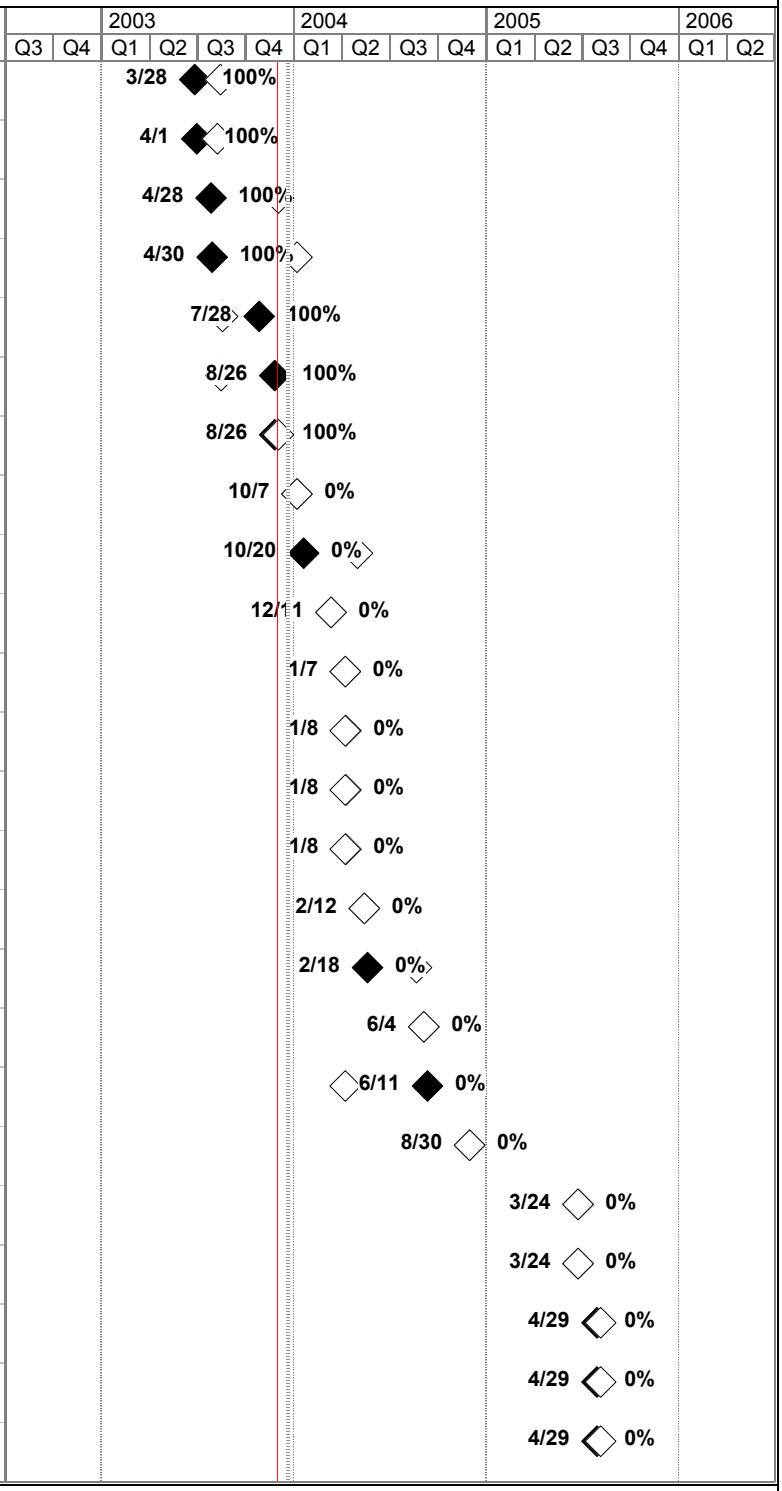


Project: CDF Run2b Silicon
Date: Sep 19 '03

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 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 installn**
1.2.2.2.7.2	**EMTiming CEM Splitters ready to install**
1.2.2.2.7.4	**EMTiming ASD->TDC Cables ready to install**
1.2.2.2.7.5	**All EMTiming cables done and ready to install**
1.2.1.10.2	**1st Calorimeter WLS fiber holder finished**
1.2.1.10.3	**1st set of Calorimeter phototubes tested**
1.2.1.10.4	**1st Calorimeter CPR module finished and tested**
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**
1.2.1.10.6	**1st Calorimeter CCR module finished and tested**
1.2.1.10.5	**2nd set of Calorimeter phototubes tested**
1.2.1.10.7	**50% Calorimeter CPR Detectors Tested**
1.2.2.2.7.9	**EMTiming TDC boards ready to install**
1.2.1.10.8	**50% Calorimeter CCR Detectors Tested**
1.2.1.10.9	**Final Calorimeter CPR Detector Tested**
1.2.1.10.10	**Final Calorimeter CCR Detector Tested**
1.2.1.10.11	**Final set of Calorimeter phototubes tested**
1.2.1.10.12	**End of Central Preshower Project**
1.2.3.5	**End of Calorimetry Project: Level 2**

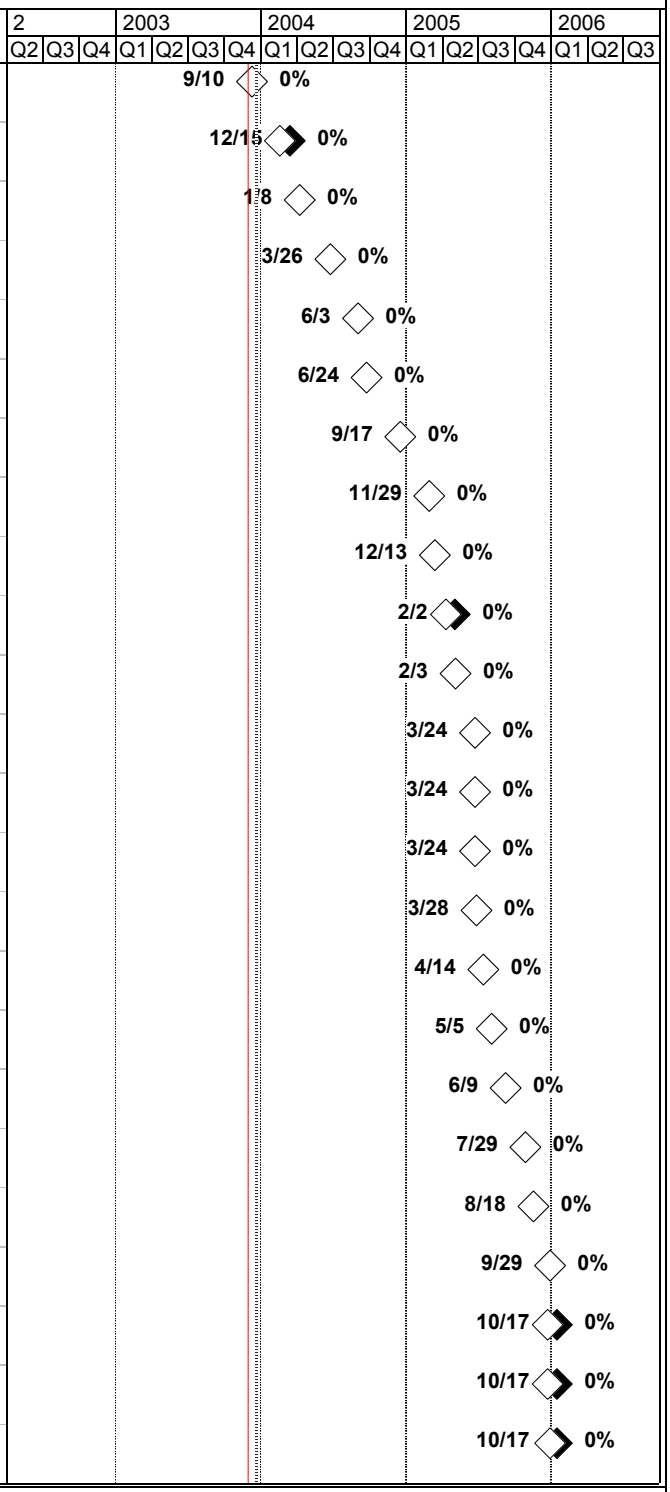


Project: CDF RunIIb Calorim
Date: Sep 19 '03

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
390	1.3.1.6.6	First Prototype TDC available for testing
280	1.3.3.2.3.4	Fabrication of Prototype XFT Finder 1/3 board
245	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
219	1.3.3.10.3.3	Begin Preproduction XFT Stereo Association Modules
11	1.3.6.5	SVT ready for installation
426	1.3.1.12	Beginning of TDC Production
78	1.3.4.5.4.4	Arrival of the Event Builder hardware
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
255	1.3.3.8.3.3	Begin Production XFT Linker Modules
319	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
445	1.3.1.14.16	TDC Data Concentrator Production complete
230	1.3.3.10.4.6	XFT Production Stereo Association Modules complete
326	1.3.3.23	XFT Ready for Installation at CDF
467	1.3.1.13.10	TDC Production Board testing complete
468	1.3.1.16	Run 2b TDC Ready for Installation
469	1.3.8	Finish Run 2b Trigger DAQ project



Project: CDF Run 2B Data A
Date: Sep 19 '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 silicon hybrid work was approved, then stalled with the cancellation of the silicon project. It will go ahead as part of the plan to complete the preproduction work on the silicon detector. Cancellation of the silicon sensor order with Hamamatsu is currently in negotiation.

V. PROJECT HIGHLIGHTS

1.1 – Silicon Detector

1.1.1 Administration – Brenna Flaugher, Nicola Bacchetta

Work continued 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 continued on the 2nd prototype chip. All the results are good and there is high confidence that no changes would be needed for a production chip. Plans for irradiation of the chips were discussed at the workshop and subsequently scheduled for September 8th. Setup for production chip testing is almost complete. Some of the preproduction wafers have been fully tested using this system. It can test 2 wafers/day (as scheduled), but with some modifications it should be possible to speed it up.

During August, the assembly of the transceivers onto the preproduction Mini Port Cards was successfully accomplished. We have also completed assembly of four Hybrid prototypes at LBL. These were successfully tested and are all working as expected.

A second L0 module was assembled using the cables from Dyconnex. A decision was made to go with the overlapping cable design (used by Dyconex) since those cables were the best quality and also had the lowest capacitance.

Cables from the MPC to the JPC and from the JPC to the crates have been specified and ordered. Some have been delivered and subsequently sent out for assembly (attach connectors). Progress was made on the SRC design and a document of the specifications is in preparation.

1.1.3 Sensors – Brenna Flaugher, Nicola Bacchetta

The first batch of production sensors was delivered and tested. The sensors we have seen so far are all good quality and meet the performance specifications. More tests will be conducted to verify proper operation but the results to date have been very encouraging.

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 first steps in preproduction module assembly were successfully completed. Two sensor pairs were glued together and are ready for hybrids. A preproduction electrical stave core has been built and is ready for modules.

1.1.6 Support Mechanics – Brenna Flaugher, Nicola Bacchetta

The prototype barrel structure was used for stave installation tests and for tests of the bulkhead alignment. The stave installation fixtures are complete and only slight modifications will be needed for production.

1.2 – Calorimeter

1.2.1 Central Preshower and Crack Detector – Steve Kuhlmann

The Central Preshower/Crack Upgrade continued to make progress in August. The main focus, at this time, has shifted to the fibers needed for the 2nd full-scale Preshower prototype, and the fibers for the 1st full-scale Crack prototype. In addition to this, tiles for the first Crack prototype were delivered from Fermilab's Village Lab 8. Optimization tests continue at INFN, Rockefeller, and Argonne. One example of these tests is the comparison between a Tyvek tile wrap and a wrap using a relatively new 3M product called Radiant Mirror. The new wrap gave 43% more light output than Tyvek, hence we will use this for production modules.

1.2.2 Electromagnetic Timing – Dave Toback

August 2003 saw the continued success of the EM Timing project with more Level 2 milestones met. The production quality prototypes are installed on the detector and are still functioning better than expected. The rest of the components are in production, on or well ahead of schedule, or are already completed. The PEM harnesses are complete, tested and ready to be installed. The CEM splitter harnesses are complete, tested and ready to be installed. The long cables from ASD->TDC cables are complete, tested and ready to be installed. The TDC crate is fully functional and running. We now have 60% of the TDC's in hand and it is expected the others will be available before the scheduled arrival date. The ASD's and TB printed circuit boards (PCBs) have arrived in Italy and are being stuffed. Their expected arrival date at Fermilab is well ahead of schedule. Our test stand room is fully functional with production quality components for final testing when the boards arrive. It is believed that all components are on schedule to 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

We are continuing on the board schematic for the TDC. At the same time, we are working on fixing some minor problems that still exist in the FPGA. The crucial problem is that we are failing in the transfer of the level 2 small buffers to the one large memory that communicates with the VME bus. We suspect that the settling time is insufficient in the current design and we are currently engaged in trying to prove that this is the problem.

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 ready for Pulsar hardware preproduction, roughly six months ahead of schedule. The mezzanine card production has been finished and all testing has been completed. Preproduction of the Back of crate transition modules have begun. One of the prototype Pulsar motherboards together with four Hotlink mezzanine cards have been configured as a Level 2 Muon interface board and has been successfully running in the system and taking beam data for over one week.

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 has been done and it performed as expected.

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 – Bruce Knuteson

We have converged on a Cisco Catalyst 6509 gigabit ethernet switch, and on a VMIC 7805 single board computer to read out CDF's VRB crates into the switch. Purchase orders for the Cisco switch and two VMIC 7805 boards have been generated. We considered both fiber and copper links from the VRB crates on the 1st floor of the CDF Assembly Building to the switch on the 3rd floor, and have saved the project roughly $25,000 by reversing our initial penchant for fiber, going instead with copper. Space has been allocated on the 3rd floor of the Assembly Hall for the prototype system. We will begin to construct the prototype system during the upcoming September shutdown.

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 Obligations Report - This report provides a summary, at Level 2, of the outstanding requisitions and purchase orders where money has been committed but for which the Project has not been invoiced. This does not include requisitions in the system that have not had a Fermilab Purchase Order number assigned as of the date of the report.

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 Variance Analysis Report

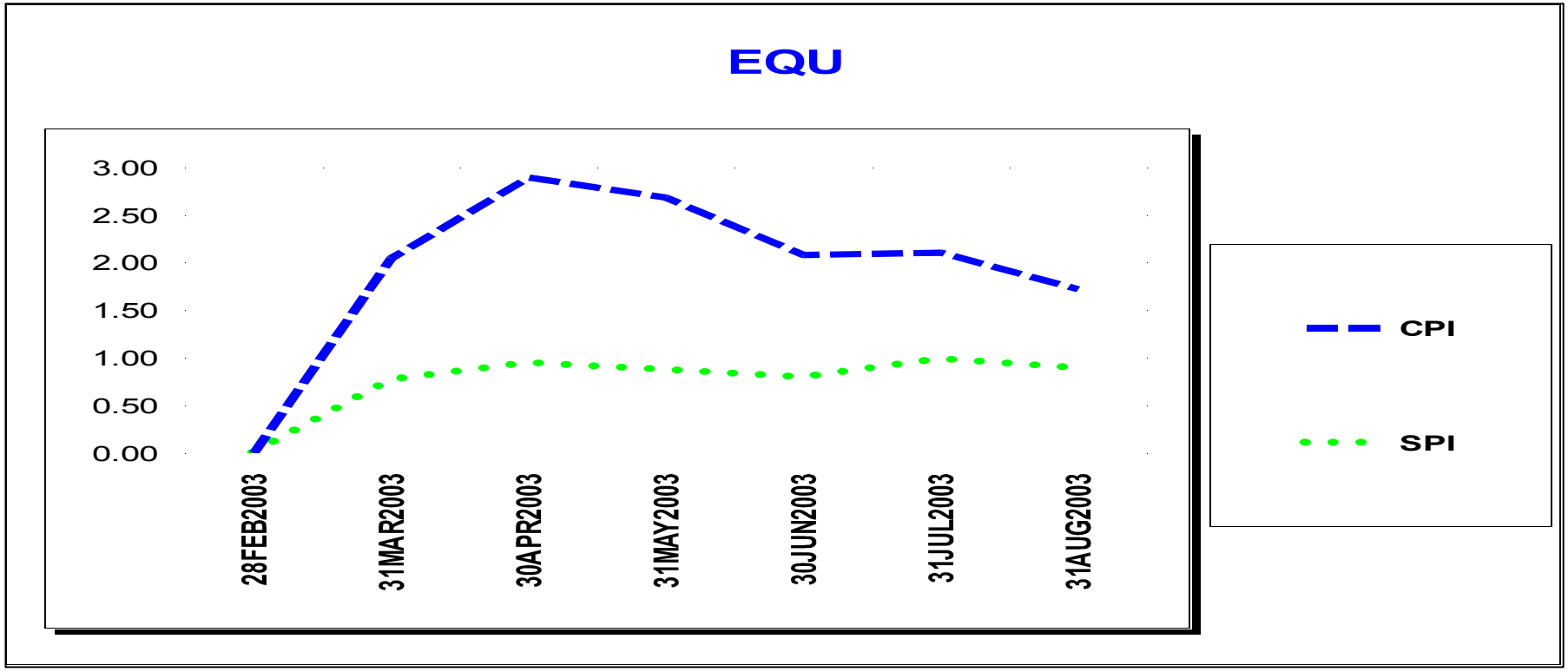
Reporting Period: 7/31/2003 to 8/31/2003

	BCWS	BCWP	ACWP	SV in $	SV in %	CV in $	CV %	SPI	CPI
Current:	391,634	230,905	260,315	-160,729	-41%	-29,410	-13%	0.59	0.89
Cumulative:	1,597,872	1,419,883	825,194	-177,989	-11%	594,689	42%	0.89	1.72
	BAC	**EAC**	**VAC in $**	**VAC in %**	**CPI to BAC**	**CPI to EAC**			
At Complete:	17,422,423	16,947,311	475,112	3%	0.96	0.99			

CDF Project EQU Cost Performance Report at WBS Level 3

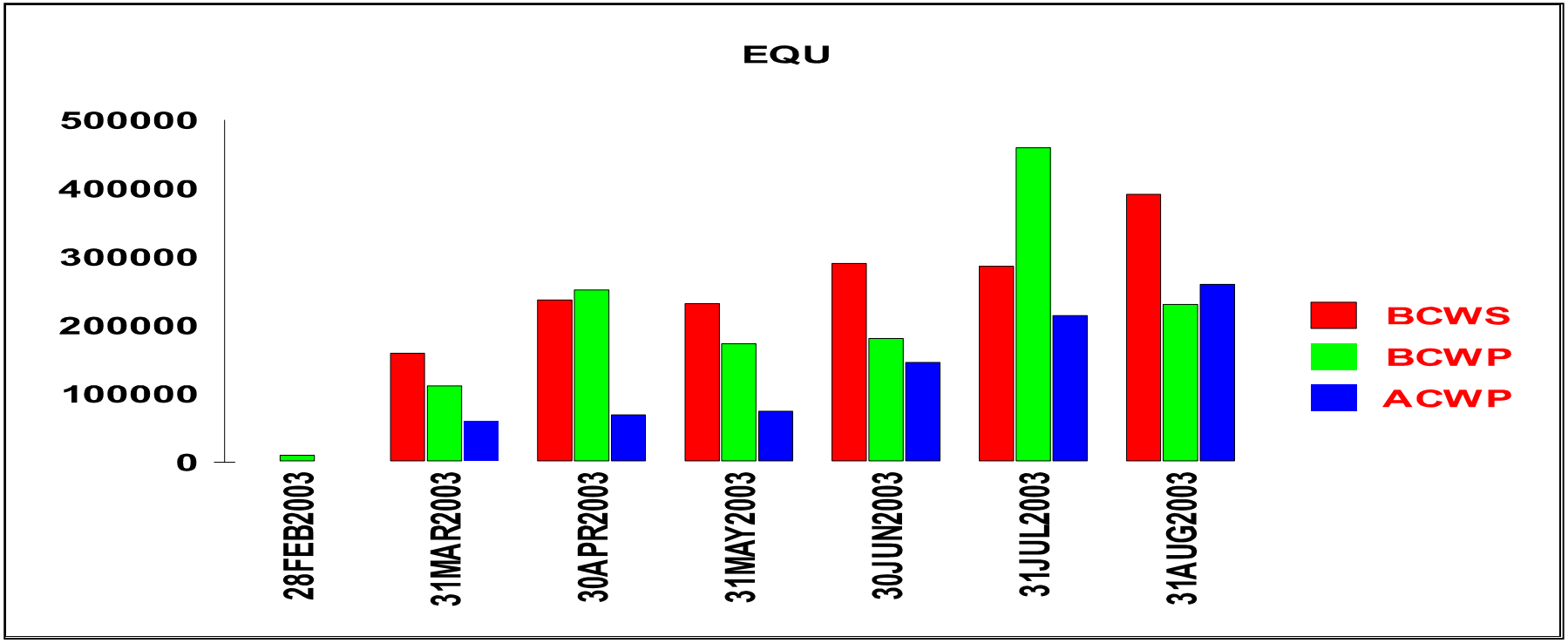
Cost Performance Report - Work Breakdown Structure											
Contractor:					Contract Type/No:			Project Name/No:		Report Period:	
Location:								CDF RIIb Master EQU		7/31/2003	8/31/2003
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling
1	24,987,050		0		0	0	24,987,050	0		0	0
Funding Type-CA	Current Period					Cumulative to Date					At Completion
WBS[2] WBS[3]	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	10,965	11,045	0	80	11,045	67,294	67,617	0	323	67,617	461,456
1.1.2 DAQ	120,650	69,535	115,157	-51,115	-45,622	431,341	386,598	272,237	-44,743	114,361	5,114,383
1.1.3 Sensors	6,344	1,392	35	-4,952	1,357	27,804	201,434	35	173,629	201,399	945,613
1.1.4 Cooling and Monitoring	15,121	0	22,746	-15,121	-22,746	111,465	15,732	22,746	-95,733	-7,014	486,199
1.1.5 Construction of Modules, Staves and L0	39,064	14,689	46,745	-24,375	-32,056	41,215	38,553	113,296	-2,662	-74,742	2,141,524
1.1.6 Support Mechanics	91,612	45,788	48,899	-45,824	-3,111	389,278	337,165	236,041	-52,114	101,124	2,858,484
WBS[2]Totals:	283,755	142,448	233,582	-141,308	-91,134	1,068,398	1,047,100	644,355	-21,299	402,745	12,007,658
1.2 Calorimeter Upgrades											
1.2.1 Central Preshower and Crack Detectors	39,853	23,693	105	-16,160	23,588	68,217	41,665	3,180	-26,552	38,485	306,093
1.2.2 Electromagnetic timing	7,478	0	0	-7,478	0	35,630	35,630	23,385	0	12,245	35,630
WBS[2]Totals:	47,331	23,693	105	-23,638	23,588	103,847	77,295	26,565	-26,552	50,730	341,723
1.3 Run 2b DAQ and Trigger Project											
1.3.1 Run 2b TDC Project	8,897	15,991	0	7,093	15,991	92,158	55,710	0	-36,448	55,710	1,105,744
1.3.2 Run 2b Level 2 Project	0	12,692	3,184	12,692	9,508	0	20,535	3,358	20,535	17,178	366,655
1.3.3 Run 2b XFTII Project	10,949	0	0	-10,949	0	96,233	138	0	-96,095	138	1,146,971
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	5,255	0	0	-5,255	0	17,808	0	0	-17,808	0	478,410
1.3.6 SVT upgrade	0	0	0	0	0	0	0	0	0	0	174,441
WBS[2]Totals:	25,101	28,682	3,184	3,581	25,499	206,199	76,383	3,358	-129,816	73,026	3,787,693
1.4 Administration											
1.4.3 Construction Phase	35,446	36,081	23,444	635	12,637	219,428	219,106	150,917	-322	68,189	1,285,349
WBS[2]Totals:	35,446	36,081	23,444	635	12,637	219,428	219,106	150,917	-322	68,189	1,285,349
Funding Type-CATotals:	391,634	230,905	260,315	-160,729	-29,410	1,597,872	1,419,883	825,194	-177,989	594,689	17,422,423
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0
Sub Total	391,634	230,905	260,315	-160,729	-29,410	1,597,872	1,419,883	825,194	-177,989	594,689	17,422,423
Management Resrv.											7,564,627
Total	391,634	230,905	260,315	-160,729	-29,410	1,597,872	1,419,883	825,194	-177,989	594,689	24,987,050

CDF Project Performance Indicator Plot - 1 September 2003



	28FEB2003	31MAR2003	30APR2003	31MAY2003	30JUN2003	31JUL2003	31AUG2003
CPI	N/A	204.59%	289.49%	268.27%	208.12%	210.48%	172.07%
SPI	N/A	76.67%	94.4%	87.15%	79.28%	98.57%	88.86%

CDF Project Financial Plot - 1 September 2003

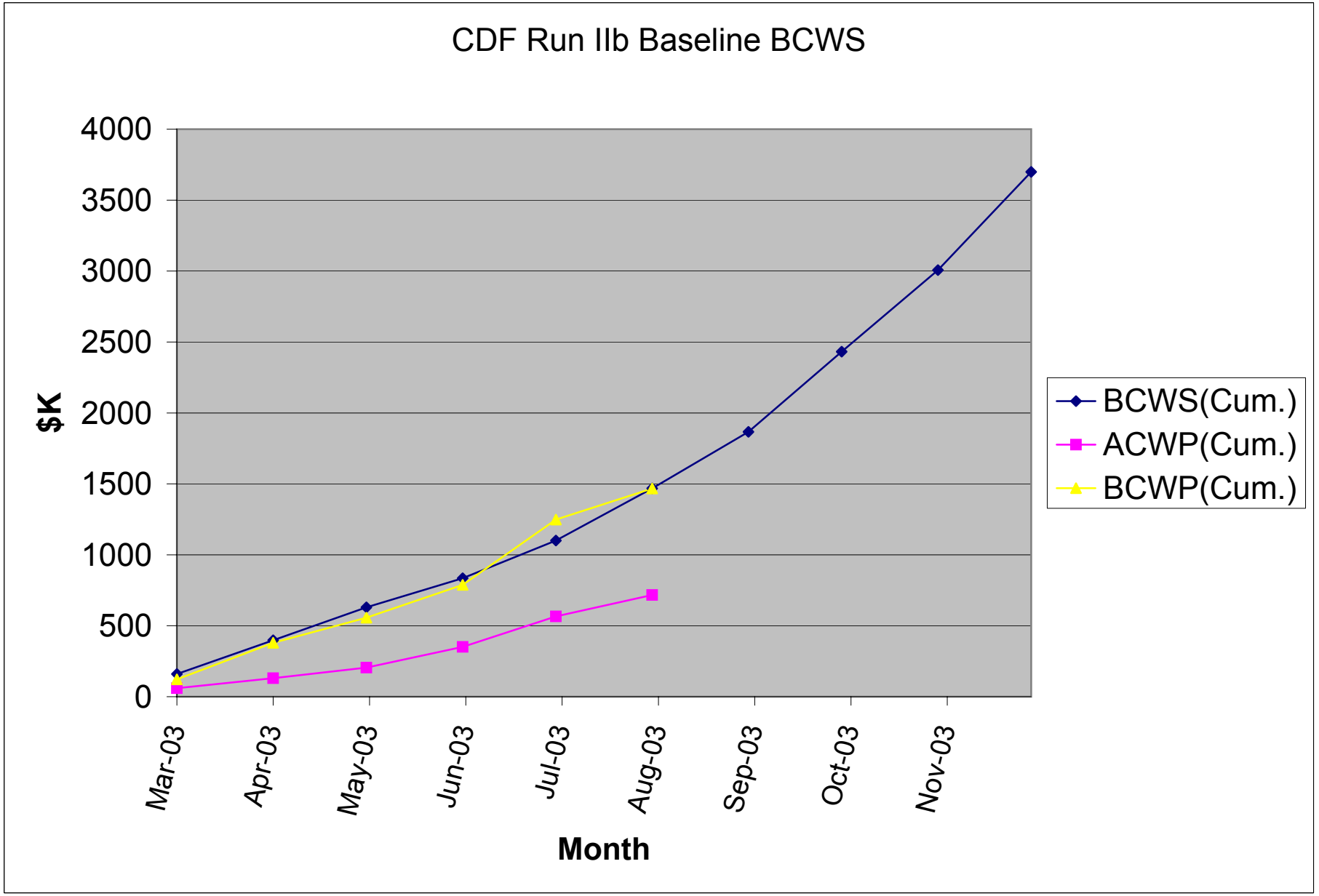


	28FEB2003	31MAR2003	30APR2003	31MAY2003	30JUN2003	31JUL2003	31AUG2003
BCWS	0	159,317	237,301	232,032	290,891	286,696	391,634
BCWP	10,272	111,870	252,273	173,438	181,160	459,965	230,905
ACWP	0	59,700	69,635	74,882	146,077	214,586	260,315

CDF Run2b Project Obligations Report - August 2003

CDF RIIb EQU - AUG FYO3 IN $K									
Task Number	Expenditure Category	YTD Obligations Budget	Current Obligations Budget Balance	Current Mth Total Cost	Current Mth Obligation	YTD Total Cost	YTD OBLIGATIONS W/INDIRECT	Current PO Open Comm	Current Reqs In Process
	M&S	576.2	245.8	52.0	34.8	162.6	822.0	659.4	141.3
	SWF	523.4	176.2	132.6	132.6	347.3	347.3	0.0	0.0
	OH	220.9	0.0	49.0	0.0	134.5	134.5	0.0	0.0
	Total Silcon 1.1	1320.6	69.6	233.6	167.3	644.4	1303.8	659.4	141.3
	M&S	66.9	66.9	0.0	0.0	0.0	0.0	0.0	35.6
	SWF	64.0	43.4	0.3	0.3	20.6	20.6	0.0	0.0
	OH	20.4	0.0	0.1	0.0	6.3	6.3	0.0	0.0
	Total Calorimeter 1.2	151.4	110.3	0.4	0.3	26.9	26.9	0.0	35.6
	M&S	134.4	98.3	2.7	33.4	2.9	36.1	33.2	106.3
	SWF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	OH	4.3	0.0	0.4	0.0	0.5	0.5	0.0	0.0
	Total Trigger/DAQ 1.3	138.8	98.3	3.2	33.4	3.4	36.6	33.2	106.3
	M&S	4169.5	4160.8	2.5	2.5	8.7	8.7	0.0	0.0
	SWF	118.4	10.1	15.8	15.8	108.3	108.3	0.0	0.0
	OH	1070.4	0.0	5.1	0.0	33.8	33.8	0.0	0.0
	Total Administrative 1.4	5358.3	4170.8	23.4	18.3	150.9	150.9	0.0	0.0
Total Project	M&S	4947.0	4080.2	57.2	70.7	174.2	866.9	692.7	283.2
	SWF	705.9	229.6	148.7	148.7	476.3	476.3	0.0	0.0
	OH	1316.1	1141.0	54.7	0.0	175.1	175.1	0.0	0.0
Grand Total		6969.0	5450.8	260.6	219.4	825.5	1518.2	692.7	283.2

CDF Run2b Baseline BCWS



VII. VARIANCE ANALYSIS – P. Lukens

The Cost Performance Index (CPI) has a value of 1.72 this month. The small quantity of work performed to date makes the CPI susceptible to "start-up" effects, as described in May 2003. We expect this to reduce towards 1.0 as the project matures.

The Schedule Performance Index (SPI) declined slightly this month to 0.89, due to the decline in activity related to the silicon detector subproject.

VIII. BASELINE CHANGES

No baseline changes were made in August.

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 July 2003	31 August 2003
Estimate to Completion	$24,421 K	$23,568 K
Percent Complete	6.8 %	8.1 %