The Run IIb CDF Detector Project

Contingency Reduction Discussion

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CDF's Run IIb Projects

- Closeout of the Silicon Detector upgrade (WBS 1.1)
- Calorimeter upgrades (WBS 1.2)
  - Preshower replacement
  - Electromagnetic timing
- Data Acquisition and Trigger upgrades (WBS 1.3)
  - Upgrade of drift chamber TDCs
  - Upgrade of Level 2 trigger infrastructure
  - Upgrade of track trigger
  - Upgrade of the event builder
  - Replacement of Level 3 trigger processors
  - Upgrade of the silicon vertex trigger

CPR for April 2005

Cost Performance Report - Work Breakdown Structure														
Contractor:					Contract Type/No:			Project Name/No:		Report Period:				
Location:								CDF RIIb Mstr Equ - D		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]			Actual					Actual						
WBS[3]	Budgeted Cost		Cost	Variance		Budgeted Cost		Cost	Variance			Latest		
	Work	Work	Work			Work	Work	Work				Revised		
Item	Scheduled	Performed	Performed	Schedule	Cost	Scheduled	Performed	Performed	Schedule	Cost	Budgeted	Estimate	Variance	
EQU Equipment														
1.2 Calorimeter Upgrades														
1.2.1 Central Preshower and Crack Detectors	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	
WBS[2]Totals:	26,344	3,993	0	-22,351	3,993	467,908	467,908	446,331	0	21,577	467,908	467,908	0	
1.3 Run 2b DAQ and Trigger Project														
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	
WBS[2]Totals:	476,928	357,640	147,954	-119,288	209,686	2,940,131	2,396,631	2,088,683	-543,501	307,948	4,732,369	4,732,369	0	
1.4 Administration														
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	
WBS[2]Totals:	-44,245	-130,437	14,154	-86,192	-144,591	513,209	513,209	493,555	0	19,654	744,322	744,322	0	
Funding Type-CATotals:	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	
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	

Obligations Report for 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					

Completed Subprojects

- Silicon codes were closed at the end of FY04
  - Remaining BAC was returned to contingency in Feb 05
- Calorimeter work is now complete
  - Codes are closed now.
  - One last P.O. (with MSU) was placed to close out the optical fiber work.
- Our baseline calorimeter cost was recently readjusted to cover all remaining closeout costs.

Status of Remaining Subprojects

- Status of the DAQ subprojects as measured by costs:

Subproject	% Complete	SPI	CPI
TDCs	0.75	0.95	0.96
XFT	0.42	0.59	1.31
Level 2	0.84	1.01	1.03
Event Builder	0.83	0.98	1.74
Level 3/DAQ Comp.	0.16	1.00	0.76
SVT	0.69	0.93	1.28
Total DAQ SubProject	0.51	0.81	1.15

$$\%Com. = \frac{BCWP}{BAC} \qquad SPI = \frac{BCWP}{BCWS} \qquad CPI = \frac{BCWP}{ACWP}$$

Adjustments in Cost

- Recently, we made the following corrections to our baseline:

	AY $K
Calorimeter Closeout	$54
TDC	($86)
Level 2	$34
Event Builder	($81)
Level 3	$622
Administration	($215)

- These changes were made after reevaluating the needs of each subproject.
- No additional use of contingency is planned at this time.
- Our budgeted cost represents our current understanding of the needs of the project.

Project Costs, Funding

	Total Obligations in Current Year $K					
	FY02	FY03	FY04	FY05	FY06	Total
Silicon	$ 1,670	$ 1,525	$ 1,110	$ 713	$ 55	$ 5,073
Calorimeter	$ 42	$ 597	$ 617	$ 62	$ 49	$ 1,367
DAQ	$ 22	$ 539	$ 1,289	$ 4,463	$ 36	$ 6,348
Administration	$ -	$ 213	$ 422	$ 433	$ 240	$ 1,309
Total	$ 1,733	$ 2,874	$ 3,438	$ 5,671	$ 380	$ 14,097

	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
Total	$ 5,193	$ 4,732	$ 2,010	$ 2,162	$ 14,097

- All costs are in AY $K, and include G&A
- Additional contributed labor is required (but not included)
  - Physicists are not considered part of the project cost.

Other tracking quantities

	ACWP		BCWP		BAC		Cont.	EAC	ETC	Complete
	Silicon	Nonsil.	Silicon	Nonsil.	Silicon	Nonsil.				
FY 2003-04	1342	1842	1342	2002	1673	5734	2967	7247	7030	45%
October	1342	1957	1342	2125	1673	5254	3448	6759	6908	50%
November	1357	2081	1357	2366	1673	5254	3448	6642	6652	54%
December	1341	2199	1341	2673	1673	5254	3448	6453	6361	58%
January	1341	2277	1341	2909	1673	5254	3448	6295	6125	61%
February	1341	2396	1341	3095	1341	5531	3503	6173	5939	65%
March	1341	2866	1341	3361	1341	5531	3503	6377	5673	68%
April	1341	3029	1341	3378	1341	5897	3137	6889	5656	65%

- We use the financial information available from the CPR and obligations reports to calculate other high level tracking quantities.
  - BAC – estimate of the total cost of the project at completion
  - EAC = BAC – BCWP +ACWP
  - ETC = EAC – ACWP + Contingency

Cost Contingency

- Our cost contingency is calculated for the lowest level tasks in the schedules.
- Guidelines are as follows:

Description	Level
Item is Complete	0%
Purchase order has been placed	10%
Engineering estimate, based on vendor information	30%
Physicist estimate, based on conceptual design	50%
Estimate based on experience	100%

Contingency Estimates

- We have recalculated our contingency needs at the task level. Guidelines are unchanged from our PMP.
- Today's contingency estimate reflects the fraction of work done
  - Total is scaled by the percent complete, at the task level.
  - Details can be seen here:
    - http://www-cdf.fnal.gov/upgrades/run2b/PMG_Apr05/PMG_Apr05.html
- In total, we then have three kinds of costs
  - Baseline
  - Adjustment to cost – anticipated uses of contingency
    - None at this time
  - Contingency – calculated on remaining work

Forecast cost

WBS	Items	Project's Cost Estimate (Fully Loaded At Year) $K							
		Baseline BAC (w/o cont.)	Anticipated Adjustments	ACWP	BCWP	ETC (w/o cont.)	Contingency	% Contingency for Remaining Work	Total (BAC+Cont.)
1.1	Run IIb Silicon Project	1341	0	1341	1341	0	0	0%	1341
1.2	Calorimeter Upgrades								
1.2.1	Central Preshower and Crack Detectors	445	0	423	445	-1	0	0%	445
1.2.2	Electromagnetic timing	23	0	23	23	0	0	0%	23
1.3	Run IIb DAQ and Trigger Project								
1.3.1	Run IIb TDC Project	656	0	516	493	163	72	44%	728
1.3.2	Run IIb Level 2 Project	474	0	387	398	76	49	64%	523
1.3.4	Event-Builder Upgrade	435	0	208	362	73	19	26%	454
1.3.5	Computer for Level 3 PC Farm / DAQ	1102	0	237	179	923	235	25%	1337
1.3.6	SVT upgrade	362	0	196	252	110	67	61%	429
1.3.11	Revised XFTII Project	1703	0	545	718	985	439	45%	2142
1.4	Administration								
1.4.3	Construction Phase	744	0	493	513	231	30	13%	774
	Project Totals	7,286	0	4,369	4,724	2,562	911	36%	8196

Cost Changes by Subproject

		Current($K)			After Change($K)		Change
	Base Cost	Cont.	Total	Base Cost	Cont.	Total	
Silicon	1643	0	1643	1341	0	1341	-302
Calorimeter	395	344	739	468	0	468	-271
Data Acquisition	4640	2074	6714	4732	881	5613	-1101
Administration	964	315	1279	744	30	774	-505
Total	7642	2733	10375	7285	911	8196	-2179

- Here are the cost estimates, comparing our new estimates with the baseline.

Summary

- The calorimeter and Level 2 projects are in their closeout phase or near completion.
- Completion of some tasks and experience has given us better estimates for future costs, and reduced need for contingency.
- Contingency on remaining work has been recalculated in a “bottoms up” way.
- The project can be completed for a total cost of $8196K.