

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost																																																
1	1.2	Run 2b Level 1 Trigger	\$2,300,070.42	\$986,721.68	\$3,286,792.10																																																
	<u>Notes</u> WBS Definition- The Level 1 trigger upgrade is designed to allow us to maintain the peak output rate of 5 kHz at the higher luminosities of Run 2b. This will be accomplished by upgrades to three systems - the Level 1 calorimeter trigger, a calorimeter cluster track match at Level 1, and the Level 1 central track trigger. This summary WBS element includes all the effort required to develop, build, test, install, and initially commission these trigger elements.																																																				
2	1.2.1	Level 1 Calorimeter Trigger	\$1,343,925.01	\$645,203.30	\$1,989,128.31																																																
	<u>Notes</u> WBS Definition- This summary element covers the Level 1 calorimeter trigger modifications. It includes development and procurement of ADC/digital filter boards (ADF), development and procurement of trigger-algorithm boards (TAB), the provision of output signals to facilitate a match between calorimeter towers and tracks, and procurement and improvements in associated readout crates, power supplies, cabling, and controls hardware.																																																				
3	1.2.1.1	ADC/Digital Filter (ADF)	\$627,620.00	\$215,734.00	\$843,354.00																																																
	<u>Notes</u> WBS Definition- This summary element covers the design, fabrication and testing of the ADC+Digital filter cards which receive, digitize, and filter the calorimeter tower signals																																																				
4	1.2.1.1.1	Design prototype ADF	\$65,030.00	\$56,280.00	\$121,310.00																																																
	<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>EEU</td> <td>1</td> <td>\$56,280.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$56,280.00</td> <td>1,200 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>1,200 h</td> </tr> </tbody> </table>					ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	5	EEU	1	\$56,280.00	\$0.00	\$0.00	\$56,280.00	1,200 h	0 h	0 h	0 h	1,200 h																								
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	1	\$56,280.00	\$0.00	\$0.00	\$56,280.00	1,200 h	0 h	0 h	0 h	1,200 h																																										
	<u>Notes</u> WBS Definition- Design a 16- or 32-channel prototype ADC/digital filter card with all input, output and control connections Labor BOE- based on projection of progress so far																																																				
5	1.2.1.1.2	Layout prototype ADC	\$0.00	\$9,416.00	\$9,416.00																																																
	<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>ETU</td> <td>1</td> <td>\$9,416.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$9,416.00</td> <td>320 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>320 h</td> </tr> </tbody> </table>					ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h																								
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h																																										
	<u>Notes</u> WBS Definition- Layout prototype ADC boards Labor BOE- layout time for run2a muon MDC (similar complexity)																																																				
6	1.2.1.1.3	Fabricate/Assemble Prototype ADF	\$0.00	\$4,708.00	\$4,708.00																																																
	<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>ETU</td> <td>0.5</td> <td>\$4,708.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$4,708.00</td> <td>160 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>160 h</td> </tr> </tbody> </table>					ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h																								
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h																																										
	<u>Notes</u> WBS Definition- fabricate 5 prototype cards																																																				
7	1.2.1.1.4	Bench Test Prototype ADF	\$52,500.00	\$3,663.60	\$56,163.60																																																
	<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>EEU</td> <td>0.2</td> <td>\$2,251.20</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$2,251.20</td> <td>48 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>48 h</td> </tr> <tr> <td>11</td> <td>ETU</td> <td>0.2</td> <td>\$1,412.40</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$1,412.40</td> <td>48 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>48 h</td> </tr> <tr> <td>14</td> <td>PHYSU</td> <td>0.3</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>72 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>72 h</td> </tr> </tbody> </table>					ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	5	EEU	0.2	\$2,251.20	\$0.00	\$0.00	\$2,251.20	48 h	0 h	0 h	0 h	48 h	11	ETU	0.2	\$1,412.40	\$0.00	\$0.00	\$1,412.40	48 h	0 h	0 h	0 h	48 h	14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	72 h	0 h	0 h	0 h	72 h
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	0.2	\$2,251.20	\$0.00	\$0.00	\$2,251.20	48 h	0 h	0 h	0 h	48 h																																										
11	ETU	0.2	\$1,412.40	\$0.00	\$0.00	\$1,412.40	48 h	0 h	0 h	0 h	48 h																																										
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	72 h	0 h	0 h	0 h	72 h																																										
	<u>Notes</u> WBS Definition- test on test stand with simulated input signals																																																				

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost																																																
8	1.2.1.1.5	Prototype ADF Shipped To Fermilab	\$0.00	\$0.00	\$0.00																																																
	<u>Notes</u> WBS Definition- milestone: at least one prototype shipped to Fermilab for in-situ tests																																																				
9	1.2.1.1.6	Develop in-situ exercising/debugging software	\$65,030.00	\$18,760.00	\$83,790.00																																																
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ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	0.5	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h																																										
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	400 h	0 h	0 h	0 h	400 h																																										
	<u>Notes</u> WBS Definition- Develop special in situ test and diagnostic software that cycles the system at design speed and verifies that the hardware gets the right answer. Labor BOE- experience with similar software from existing L1cal																																																				
10	1.2.1.1.7	ADF Prototype in-situ tests	\$32,515.00	\$4,502.40	\$37,017.40																																																
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ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	0.2	\$4,502.40	\$0.00	\$0.00	\$4,502.40	96 h	0 h	0 h	0 h	96 h																																										
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	480 h	0 h	0 h	0 h	480 h																																										
	<u>Notes</u> WBS Definition- perform paratistic tests with split-off signals from the run2a calorimeter trigger. Test performance of digital filter on different trigger towers in the calorimeter.																																																				
11	1.2.1.1.8	Final ADF design	\$0.00	\$18,760.00	\$18,760.00																																																
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ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	1	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h																																										
	<u>Notes</u> WBS Definition- update prototype design to address any shortcomings found in testing																																																				
12	1.2.1.1.9	Procure ADF components	\$253,015.00	\$1,876.00	\$254,891.00																																																
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ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	0.1	\$1,876.00	\$0.00	\$0.00	\$1,876.00	40 h	0 h	0 h	0 h	40 h																																										
	<u>Notes</u> WBS Definition- procure all components for production version of ADF (ADC's, FPGA's, etc.) Labor BOE- run2a MDC procurements																																																				
13	1.2.1.1.10	Fabricate, Assemble 10% ADF	\$0.00	\$5,885.00	\$5,885.00																																																
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ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
11	ETU	0.5	\$5,885.00	\$0.00	\$0.00	\$5,885.00	200 h	0 h	0 h	0 h	200 h																																										
	<u>Notes</u> WBS Definition- preproduction run																																																				
14	1.2.1.1.11	Bench test 10% ADF	\$0.00	\$13,646.00	\$13,646.00																																																
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5	EEU	0.1	\$1,876.00	\$0.00	\$0.00	\$1,876.00	40 h	0 h	0 h	0 h	40 h																																										
11	ETU	1	\$11,770.00	\$0.00	\$0.00	\$11,770.00	400 h	0 h	0 h	0 h	400 h																																										
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	120 h	0 h	0 h	0 h	120 h																																										

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Bench test 10% ADF" continued											
<u>Notes</u>											
WBS Definition- test first 10% of boards before approving the full production run											
15	1.2.1.1.12	Fabricate production ADF	\$127,015.00	\$3,531.00	\$130,546.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.1	\$3,531.00	\$0.00	\$0.00	\$3,531.00	120 h	0 h	0 h	0 h	120 h
<u>Notes</u>											
WBS Definition- fabricate remaining 90% of production ADF boards											
16	1.2.1.1.13	Bench test production ADF	\$0.00	\$40,938.00	\$40,938.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$5,628.00	\$0.00	\$0.00	\$5,628.00	120 h	0 h	0 h	0 h	120 h
11	ETU	1	\$35,310.00	\$0.00	\$0.00	\$35,310.00	1,200 h	0 h	0 h	0 h	1,200 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	360 h	0 h	0 h	0 h	360 h
<u>Notes</u>											
WBS Definition- test stand verification of board functionality											
17	1.2.1.1.14	ADF Production Complete And Tested	\$0.00	\$0.00	\$0.00						
<u>Notes</u>											
WBS Definition- milestone: all ADF cards ready for installation and commissioning											
18	1.2.1.1.15	Digital filter FPGA programming	\$0.00	\$15,008.00	\$15,008.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$15,008.00	\$0.00	\$0.00	\$15,008.00	320 h	0 h	0 h	0 h	320 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	960 h	0 h	0 h	0 h	960 h
<u>Notes</u>											
WBS Definition- develop digital filter algorithms based on simulations and results of ADF prototype											
19	1.2.1.1.16	Other ADF online software (downloading, monitoring)	\$32,515.00	\$18,760.00	\$51,275.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h
14	PHYSU	0.25	\$0.00	\$0.00	\$0.00	\$0.00	1,000 h	0 h	0 h	0 h	1,000 h
<u>Notes</u>											
WBS Definition- write and test the code which handles the interface of the ADF with the Dzero online environment: downloading of filter parameters and other settings, extraction of raw samples, initiation of in situ diagnostics, etc.											
20	1.2.1.2	ADF Crates	\$115,250.00	\$44,021.30	\$159,271.30						
<u>Notes</u>											
WBS Definition- Design 6u VME crates with a (probably) custom J2 backplane											
21	1.2.1.2.1	Design prototype backplane	\$0.00	\$7,504.00	\$7,504.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	1	\$7,504.00	\$0.00	\$0.00	\$7,504.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- Design custom J2 backplane											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Design prototype backplane" continued											
<u>Notes</u>											
Labor BOE- estimate from lead engineer											
22	1.2.1.2.2	Layout and fabricate prototype backplane	\$0.00	\$9,416.00	\$9,416.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h
<u>Notes</u>											
WBS Definition- layout and fabricate one backplane to test backplane and ADF prototypes											
Labor BOE- estimate from lead engineer											
23	1.2.1.2.3	Fabricate/Assemble Prototype crate	\$0.00	\$4,708.00	\$4,708.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- assemble crate with standard J1 and custom J2 prototype											
Labor BOE- estimate from lead engineer											
24	1.2.1.2.4	Test prototype crate ADF in prototype crate	\$0.00	\$4,884.80	\$4,884.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.2	\$3,001.60	\$0.00	\$0.00	\$3,001.60	64 h	0 h	0 h	0 h	64 h
11	ETU	0.2	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	96 h	0 h	0 h	0 h	96 h
<u>Notes</u>											
WBS Definition- test prototype ADF cards in prototype crate											
Labor BOE- estimate from lead engineer											
25	1.2.1.2.5	ADF+Crate Prototype Complete	\$0.00	\$0.00	\$0.00						
<u>Notes</u>											
WBS Definition- milestone											
26	1.2.1.2.6	Final backplane design	\$0.00	\$7,504.00	\$7,504.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	1	\$7,504.00	\$0.00	\$0.00	\$7,504.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- update prototype design to address any shortcomings found in testing											
Labor BOE- estimate from lead engineer											

WBS Dictionary and Labor BOE as of 4/8/02
Level 1 Trigger
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ID	WBS	Name			M&S Cost	Labor Cost	Total Cost							
27	1.2.1.2.7	Procure crate components			\$97,700.00	\$588.50	\$98,288.50							
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>		
	10	ETF	0.1	\$588.50	\$0.00	\$0.00	\$588.50	20 h	0 h	0 h	0 h	20 h		
	<i>Notes</i>													
	WBS Definition- procure backplanes, power supplies, and mechanical parts													
	Labor BOE- estimate from lead engineer													
28	1.2.1.2.8	Assemble ADF crates			\$17,550.00	\$9,416.00	\$26,966.00							
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>		
	11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h		
	<i>Notes</i>													
	WBS Definition- assemble all production crates													
	Labor BOE- estimate from lead engineer													
29	1.2.1.3	Trigger Algorithm Board			\$296,075.00	\$120,127.80	\$416,202.80							
	<i>Notes</i>													
	WBS Definition- This summary element covers the algorithm board which receives the filtered tower transverse energies from the ADF boards, and finds jet and EM clusters													
30	1.2.1.3.1	Design and simulate trigger algorithms			\$0.00	\$0.00	\$0.00							
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>		
	14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	2,000 h	0 h	0 h	0 h	2,000 h		
	<i>Notes</i>													
	WBS Definition- Use Monte Carlo simulation to design and test algorithms for EM clustering, jet clustering, tau clusters, and global summing													
	Labor BOE- based on progress so far													
31	1.2.1.3.2	Choose Baseline Jet Algorithm			\$0.00	\$0.00	\$0.00							
	<i>Notes</i>													
	WBS Definition- milestone: establish a baseline cluster algorithm which will be used to specify the prototype TAB													
32	1.2.1.3.3	Design prototype Trigger Algorithm Board (TAB)			\$97,545.00	\$46,900.00	\$144,445.00							
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>		
	5	EEU	1	\$46,900.00	\$0.00	\$0.00	\$46,900.00	1,000 h	0 h	0 h	0 h	1,000 h		
	<i>Notes</i>													
	WBS Definition- design a full prototype first-tier algorithm board with all input, output and control connections													
	Labor BOE- estimated from progress so far													
33	1.2.1.3.4	Layout prototype TAB			\$0.00	\$9,416.00	\$9,416.00							
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>		
	11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h		

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Layout prototype TAB" continued											
<u>Notes</u>											
WBS Definition-											
Labor BOE-											
based on layout time for run 2a muon SRC board (similar complexity)											
34	1.2.1.3.5	Fabricate/Assemble Prototype TAB	\$60,000.00	\$4,708.00	\$64,708.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition-											
fabricate two proptotype cards											
35	1.2.1.3.6	Test prototype TAB	\$0.00	\$10,990.80	\$10,990.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.2	\$6,753.60	\$0.00	\$0.00	\$6,753.60	144 h	0 h	0 h	0 h	144 h
11	ETU	0.2	\$4,237.20	\$0.00	\$0.00	\$4,237.20	144 h	0 h	0 h	0 h	144 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	216 h	0 h	0 h	0 h	216 h
<u>Notes</u>											
WBS Definition-											
test in test stand with simulated inputs											
36	1.2.1.3.7	TAB Prototype Complete	\$0.00	\$0.00	\$0.00						
<u>Notes</u>											
WBS Definition-											
milestone: TAB prototype complete and passes bench tests											
37	1.2.1.3.8	Develop in-situ exercizing/debugging software	\$32,515.00	\$18,760.00	\$51,275.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.5	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	400 h	0 h	0 h	0 h	400 h
<u>Notes</u>											
WBS Definition-											
Develop special in situ test and diagnostic software that cycles the system at design speed and verifies that the hardware gets the right answer.											
Labor BOE-											
based on similar software development for existing L1 cal											
38	1.2.1.3.9	Final TAB design	\$32,515.00	\$18,760.00	\$51,275.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	1	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h
<u>Notes</u>											
WBS Definition-											
update prototype design to address any shortcomings found in testing											
39	1.2.1.3.10	Procure TAB parts	\$73,500.00	\$1,177.00	\$74,677.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
10	ETF	0.1	\$1,177.00	\$0.00	\$0.00	\$1,177.00	40 h	0 h	0 h	0 h	40 h
<u>Notes</u>											
WBS Definition-											
procure all parts for production of TAB cards											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
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ID	WBS	Name	M&S Cost			Labor Cost			Total Cost			
40	1.2.1.3.11	Layout final TAB	\$0.00			\$9,416.00			\$9,416.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h
	<i>Notes</i>											
	WBS Definition- lay out final design for TAB cards											
41	1.2.1.4	Global Algorithm Board (GAB)	\$191,425.00			\$139,586.80			\$331,011.80			
	<i>Notes</i>											
	WBS Definition- This summary element covers the Global algorithm board which receives cluster information from the TAB's, counts jets and EM clusters above specified thresholds, calculates global sum (HT and missing ET), and exports trigger decisions to the TFW											
42	1.2.1.4.1	Design prototype GAB	\$97,545.00			\$46,900.00			\$144,445.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	5	EEU	1	\$46,900.00	\$0.00	\$0.00	\$46,900.00	1,000 h	0 h	0 h	0 h	1,000 h
	<i>Notes</i>											
	WBS Definition- design a full prototype of the GAB											
43	1.2.1.4.2	Layout prototype GAB	\$0.00			\$9,416.00			\$9,416.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h
	<i>Notes</i>											
	WBS Definition- lay out desing for prototype GAB card											
44	1.2.1.4.3	Fabricate/Assemble Prototype GAB	\$12,000.00			\$5,885.00			\$17,885.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	0.5	\$5,885.00	\$0.00	\$0.00	\$5,885.00	200 h	0 h	0 h	0 h	200 h
	<i>Notes</i>											
	WBS Definition- fabricate one prototype card											
45	1.2.1.4.4	Test Prototype GAB	\$0.00			\$4,884.80			\$4,884.80			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	5	EEU	0.2	\$3,001.60	\$0.00	\$0.00	\$3,001.60	64 h	0 h	0 h	0 h	64 h
	11	ETU	0.2	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
	14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	96 h	0 h	0 h	0 h	96 h
	<i>Notes</i>											
	WBS Definition- test prototype GAB with inputs from prototype TAB cards											
46	1.2.1.4.5	Final GAB design	\$32,515.00			\$15,008.00			\$47,523.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	5	EEU	1	\$15,008.00	\$0.00	\$0.00	\$15,008.00	320 h	0 h	0 h	0 h	320 h
	<i>Notes</i>											
	WBS Definition- update prototype design to address any shortcomings found in testing											
47	1.2.1.4.6	Procure GAB parts	\$16,850.00			\$1,177.00			\$18,027.00			
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	10	ETF	0.1	\$1,177.00	\$0.00	\$0.00	\$1,177.00	40 h	0 h	0 h	0 h	40 h

WBS Dictionary and Labor BOE as of 4/8/02
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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Procure GAB parts" continued											
<i>Notes</i>											
WBS Definition- procure all parts needed for production of final GAB boards											
48	1.2.1.4.7	Layout final GAB	\$0.00	\$9,416.00	\$9,416.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
11	ETU	1	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h
<i>Notes</i>											
WBS Definition-											
49	1.2.1.4.8	TAB/GAB online software	\$32,515.00	\$46,900.00	\$79,415.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.5	\$46,900.00	\$0.00	\$0.00	\$46,900.00	1,000 h	0 h	0 h	0 h	1,000 h
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	1,000 h	0 h	0 h	0 h	1,000 h
<i>Notes</i>											
WBS Definition- Develop software for controls, downloading, online diagnostics of TAB/GAB system											
50	1.2.1.5	TAB/GAB Prototype Complete	\$0.00	\$0.00	\$0.00						
<i>Notes</i>											
WBS Definition- milestone											
51	1.2.1.6	Fabricate production TAB and GAB	\$48,525.00	\$2,354.00	\$50,879.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
11	ETU	0.1	\$2,354.00	\$0.00	\$0.00	\$2,354.00	80 h	0 h	0 h	0 h	80 h
<i>Notes</i>											
WBS Definition- Fabricate 100% of prduction TAB and GAB cards											
52	1.2.1.7	Bench test production TAB and GAB	\$0.00	\$27,292.00	\$27,292.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.1	\$3,752.00	\$0.00	\$0.00	\$3,752.00	80 h	0 h	0 h	0 h	80 h
11	ETU	1	\$23,540.00	\$0.00	\$0.00	\$23,540.00	800 h	0 h	0 h	0 h	800 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	240 h	0 h	0 h	0 h	240 h
<i>Notes</i>											
WBS Definition- Test production TAB and GAB cards at Nevis											
53	1.2.1.8	TAB/GAB Production Complete And Tested	\$0.00	\$0.00	\$0.00						
<i>Notes</i>											
WBS Definition- milestone: TAB/GAB system complete aside from installation and commissioning											
54	1.2.1.9	Integration	\$0.00	\$14,654.40	\$14,654.40						
<i>Notes</i>											
WBS Definition- This summary task describes the series of test which combine different boards and eventually the DZero trigger framework (TFW) in ensure that they all work together properly.											
55	1.2.1.9.1	Prototype integration test ADF+TAB	\$0.00	\$4,884.80	\$4,884.80						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.2	\$3,001.60	\$0.00	\$0.00	\$3,001.60	64 h	0 h	0 h	0 h	64 h

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Prototype integration test ADF+TAB" continued											
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
11	ETU	0.2	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	96 h	0 h	0 h	0 h	96 h
<i>Notes</i>											
WBS Definition- test prototype TAB in test stand with input signals from prototype ADF											
56	1.2.1.9.2	Prototype integration test ADF+TAB+GAB+TFW	\$0.00	\$4,884.80	\$4,884.80						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.2	\$3,001.60	\$0.00	\$0.00	\$3,001.60	64 h	0 h	0 h	0 h	64 h
10	ETF	0.2	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	96 h	0 h	0 h	0 h	96 h
<i>Notes</i>											
WBS Definition- test prototype TAB, GAB and ADF with control signals from the real Dzero trigger framework											
57	1.2.1.9.3	pre-Production integration test ADF+TAB+TFW	\$0.00	\$4,884.80	\$4,884.80						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.2	\$3,001.60	\$0.00	\$0.00	\$3,001.60	64 h	0 h	0 h	0 h	64 h
10	ETF	0.2	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
14	PHYSU	0.3	\$0.00	\$0.00	\$0.00	\$0.00	96 h	0 h	0 h	0 h	96 h
<i>Notes</i>											
WBS Definition- repeat framework integration test with production versions of ADF, TAB, GAB. Enough ADF's should be available from the pre-production run to populate a full crate.											
58	1.2.1.10	TAB FPGA programming	\$0.00	\$11,256.00	\$11,256.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.2	\$11,256.00	\$0.00	\$0.00	\$11,256.00	240 h	0 h	0 h	0 h	240 h
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	600 h	0 h	0 h	0 h	600 h
<i>Notes</i>											
WBS Definition- design FPGA equations to implement the clustering and summing alorithms on the TAB's											
59	1.2.1.11	TAB other online software (downloading, monitoring)	\$0.00	\$0.00	\$0.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	600 h	0 h	0 h	0 h	600 h
<i>Notes</i>											
WBS Definition- write and test the code which handles the interface of the TAB with the Dzero online environment: downloading of FPGA parameters and other settings, initiation of in situ diagnostics, etc.											
60	1.2.1.12	L1 Cal Production And Testing Complete	\$0.00	\$0.00	\$0.00						
<i>Notes</i>											
WBS Definition- milestone: All L1 calorimeter trigger components complete aside from installation and commissioning.											
61	1.2.1.13	Installation	\$0.00	\$51,417.00	\$51,417.00						
<i>Notes</i>											
WBS Definition- This summary task describes the installation of the new calorimeter trigger in the DZero moveable counting house.											
62	1.2.1.13.1	Run2a L1 Cal Trigger Decommissioned	\$0.00	\$0.00	\$0.00						
<i>Notes</i>											
WBS Definition-											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Run2a L1 Cal Trigger Decommissioned" continued											
<i>Notes</i>											
external milestone: This corresponds to the beginning of the shutdown between runs 2A and 2B											
63	1.2.1.13.2	Remove old racks	\$0.00	\$5,273.00	\$5,273.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
4	EEF	1	\$1,876.00	\$0.00	\$0.00	\$1,876.00	40 h	0 h	0 h	0 h	40 h
7	MTF	2	\$2,220.00	\$0.00	\$0.00	\$2,220.00	80 h	0 h	0 h	0 h	80 h
10	ETF	1	\$1,177.00	\$0.00	\$0.00	\$1,177.00	40 h	0 h	0 h	0 h	40 h
<i>Notes</i>											
WBS Definition- remove the 10 electronics racks in the Movable Counting House (MCH) which contain the old L1 calorimeter trigger											
Labor BOE- estimated by people who built and installed existing cal L1											
64	1.2.1.13.3	Redress cables	\$0.00	\$37,130.00	\$37,130.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
4	EEF	1	\$9,380.00	\$0.00	\$0.00	\$9,380.00	200 h	0 h	0 h	0 h	200 h
7	MTF	5	\$27,750.00	\$0.00	\$0.00	\$27,750.00	1,000 h	0 h	0 h	0 h	1,000 h
<i>Notes</i>											
WBS Definition- redress the BLS cables to be in the correct sequence to plug into the new ADF cards											
Labor BOE- estimated by people who built and installed existing cal L1											
65	1.2.1.13.4	Install new racks	\$0.00	\$4,440.00	\$4,440.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
7	MTF	2	\$4,440.00	\$0.00	\$0.00	\$4,440.00	160 h	0 h	0 h	0 h	160 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	80 h	0 h	0 h	0 h	80 h
<i>Notes</i>											
WBS Definition- install standard racks in MCH to house ADF crates and TAB crates											
Labor BOE- estimated by people who built and installed existing cal L1											
66	1.2.1.13.5	Connect new services	\$0.00	\$4,574.00	\$4,574.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
7	MTF	1	\$2,220.00	\$0.00	\$0.00	\$2,220.00	80 h	0 h	0 h	0 h	80 h
10	ETF	1	\$2,354.00	\$0.00	\$0.00	\$2,354.00	80 h	0 h	0 h	0 h	80 h
<i>Notes</i>											
WBS Definition- connect power, cooling, rack monitoring, safety systems											
Labor BOE- estimated by people who built and installed existing cal L1											
67	1.2.1.13.6	Install ADFs and TABs	\$0.00	\$0.00	\$0.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	120 h	0 h	0 h	0 h	120 h
<i>Notes</i>											
WBS Definition- install cards into crates and cable inputs and outputs											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost							
"Install ADFs and TABs" continued												
<u>Notes</u>												
Labor BOE- estimated by people who built and installed existing cal L1												
68	1.2.1.13.7	Installation Complete	\$0.00	\$0.00	\$0.00							
<u>Notes</u>												
WBS Definition- milestone: all L1 calorimeter trigger components installed and ready for commissioning												
69	1.2.1.14	Commissioning	\$65,030.00	\$18,760.00	\$83,790.00							
<u>Notes</u>												
WBS Definition- milestone: all L1 calorimeter trigger components installed and ready for commissioning												
70	1.2.1.14.1	Technical commissioning	\$65,030.00	\$18,760.00	\$83,790.00							
	<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
	5	EEU	0.5	\$18,760.00	\$0.00	\$0.00	\$18,760.00	400 h	0 h	0 h	0 h	400 h
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	800 h	0 h	0 h	0 h	800 h
<u>Notes</u>												
WBS Definition- verify the proper functioning (timing, verification of outputs and decisions) in the itegrated trigger system with pulser runs, cosmic rays, etc.												
Labor BOE- estimated by people who built existing cal L1												
71	1.2.2	Level 1 Calorimeter Track Matching	\$176,245.40	\$88,407.28	\$264,652.68							
<u>Notes</u>												
WBS Definition- This summary element provides for improvements in the Run2a track-matching trigger. It includes development and procurement of slightly modified versions of existing Level 1 muon cards, and procurement of related cabling, connectors, readout crates, processors, and power supplies.												
72	1.2.2.1	Format Of Data To Cal-track Match Specified	\$0.00	\$0.00	\$0.00							
<u>Notes</u>												
WBS Definition- milestone: the specification of the data format is needed for determining the capacity needed in the links.												
73	1.2.2.2	Preliminary Latency Calculation Complete	\$0.00	\$0.00	\$0.00							
<u>Notes</u>												
WBS Definition- milestone												
74	1.2.2.3	D0 Internal Design Review Complete	\$0.00	\$0.00	\$0.00							
<u>Notes</u>												
WBS Definition- milestone: a review by D0 electronics experts (inside and outside of the project) ensures that the design is sound and meets all of the specifications for operation in the D0 trigger and data acquisition systems.												
75	1.2.2.4	SLDB	\$45,080.00	\$16,700.00	\$61,780.00							
<u>Notes</u>												
WBS Definition- This summary task covers the fabrication of the Serial Link Daughter Boards that are needed for this subsystem to receive TFW signals over the Serial Command Link												

WBS Dictionary and Labor BOE as of 4/8/02
Level 1 Trigger
Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name			M&S Cost	Labor Cost	Total Cost					
76	1.2.2.4.1	Procure SLDB parts			\$22,264.00	\$941.60	\$23,205.60					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	0.1	\$941.60	\$0.00	\$0.00	\$941.60	32 h	0 h	0 h	0 h	32 h
	<i>Notes</i>											
	WBS Definition- Procure the parts needed for all of the serial link daughter boards											
	Labor BOE- run2a muon Level 1 experience											
77	1.2.2.4.2	Fabricate and assemble SLDBs			\$22,816.00	\$15,758.40	\$38,574.40					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	5	EEU	0.7	\$15,758.40	\$0.00	\$0.00	\$15,758.40	336 h	0 h	0 h	0 h	336 h
	<i>Notes</i>											
	WBS Definition- fabricate the serial link daughter boards that are needed for the cal-track matching system											
	Labor BOE- run2a muon Level 1 experience											
78	1.2.2.4.3	Test SLDBs			\$0.00	\$0.00	\$0.00					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
	<i>Notes</i>											
	WBS Definition- bench test the serial link daughter boards											
	Labor BOE- run2a muon Level 1 experience											
79	1.2.2.5	MTCxx			\$46,335.00	\$16,420.40	\$62,755.40					
	<i>Notes</i>											
	WBS Definition- This summary task describes the design, fabrication, and testing of the MTCxx cards which receive inputs from the level 1 tracking and calorimeter systems and determine matches.											
80	1.2.2.5.1	(Small) design changes to MCTxx			\$10,920.00	\$11,256.00	\$22,176.00					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	5	EEU	0.5	\$11,256.00	\$0.00	\$0.00	\$11,256.00	240 h	0 h	0 h	0 h	240 h
	<i>Notes</i>											
	WBS Definition- modify existing MTCxx design (which does muon-track matching in run 2a) for cal matching application.											
	Labor BOE- run2a muon Level 1 experience											
81	1.2.2.5.2	Procure MTCxx parts			\$27,825.00	\$1,412.40	\$29,237.40					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	0.1	\$1,412.40	\$0.00	\$0.00	\$1,412.40	48 h	0 h	0 h	0 h	48 h
	<i>Notes</i>											
	WBS Definition- procure the parts to build all MTCxx cards needed by the cal-track matching system											
	Labor BOE- run2a muon Level 1 experience											

WBS Dictionary and Labor BOE as of 4/8/02
Level 1 Trigger
Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
82	1.2.2.5.3	Fabricate and assemble MTCxx's	\$7,590.00	\$2,251.20	\$9,841.20						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.1	\$2,251.20	\$0.00	\$0.00	\$2,251.20	48 h	0 h	0 h	0 h	48 h
<i>Notes</i>											
WBS Definition- fabricate 11 boards, including 3 spares											
Labor BOE- run2a muon Level 1 experience											
83	1.2.2.5.4	Test MTCxx's	\$0.00	\$1,500.80	\$1,500.80						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.1	\$1,500.80	\$0.00	\$0.00	\$1,500.80	32 h	0 h	0 h	0 h	32 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	320 h	0 h	0 h	0 h	320 h
<i>Notes</i>											
WBS Definition- bench test MTCxx cards at Arizona											
Labor BOE- run2a muon Level 1 experience											
84	1.2.2.6	MTCM	\$18,380.00	\$11,631.20	\$30,011.20						
<i>Notes</i>											
WBS Definition- This summary task describes the design, fabrication and testing of the Muon Trigger Crate Manager. One manager is needed for the crate of MTCxx cards. This card is already used in the run2a muon level 1 muon system.											
85	1.2.2.6.1	(Small) design changes to MTCM	\$7,280.00	\$5,628.00	\$12,908.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.5	\$5,628.00	\$0.00	\$0.00	\$5,628.00	120 h	0 h	0 h	0 h	120 h
<i>Notes</i>											
WBS Definition- modify existing MTCM design for cal matching application											
Labor BOE- run2a muon Level 1 experience											
86	1.2.2.6.2	Procure MTCM parts	\$7,770.00	\$2,251.20	\$10,021.20						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.1	\$2,251.20	\$0.00	\$0.00	\$2,251.20	48 h	0 h	0 h	0 h	48 h
<i>Notes</i>											
WBS Definition- procure all parts needed for fabricating production MTCM cards											
Labor BOE- run2a muon Level 1 experience											
87	1.2.2.6.3	Fabricate and assemble MTCMs	\$3,330.00	\$2,251.20	\$5,581.20						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.1	\$2,251.20	\$0.00	\$0.00	\$2,251.20	48 h	0 h	0 h	0 h	48 h
<i>Notes</i>											
WBS Definition- fabricate 3 boards, including 2 spares											
Labor BOE-											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Fabricate and assemble MTCMs" continued											
<u>Notes</u> run2a muon Level 1 experience											
88	1.2.2.6.4	Test MTCMs	\$0.00	\$1,500.80	\$1,500.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$1,500.80	\$0.00	\$0.00	\$1,500.80	32 h	0 h	0 h	0 h	32 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	320 h	0 h	0 h	0 h	320 h
<u>Notes</u> WBS Definition- bench test MTCMs at Arizona Labor BOE- run2a muon Level 1 experience											
89	1.2.2.7	MT Flavor Board	\$22,840.00	\$9,946.40	\$32,786.40						
<u>Notes</u> WBS Definition- This summary task describes the design, production, and testing of the "muon trigger flavor board" which mounts on the MTCxx and does the actual matching algorithm.											
90	1.2.2.7.1	Design prototype MTFB	\$3,640.00	\$3,752.00	\$7,392.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.5	\$3,752.00	\$0.00	\$0.00	\$3,752.00	80 h	0 h	0 h	0 h	80 h
<u>Notes</u> WBS Definition- design new flavor board for cal-track matching Labor BOE- run2a muon Level 1 experience											
91	1.2.2.7.2	Procure prototype MTFB parts	\$4,320.00	\$470.80	\$4,790.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.1	\$470.80	\$0.00	\$0.00	\$470.80	16 h	0 h	0 h	0 h	16 h
<u>Notes</u> WBS Definition- procure the parts needed for prototypes Labor BOE- run2a muon Level 1 experience											
92	1.2.2.7.3	Fabricate and assemble prototype MTFB	\$3,000.00	\$1,500.80	\$4,500.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$1,500.80	\$0.00	\$0.00	\$1,500.80	32 h	0 h	0 h	0 h	32 h
<u>Notes</u> WBS Definition- fabricate n prototype flavor boards Labor BOE- run2a muon Level 1 experience											
93	1.2.2.7.4	Test prototype MTFB	\$0.00	\$750.40	\$750.40						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$750.40	\$0.00	\$0.00	\$750.40	16 h	0 h	0 h	0 h	16 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h

WBS Dictionary and Labor BOE as of 4/8/02
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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Test prototype MTFB" continued											
<u>Notes</u> WBS Definition- bench test prototype boards at Arizona Labor BOE- run2a muon Level 1 experience											
94	1.2.2.7.5	Procure MTFB parts	\$7,920.00	\$470.80	\$8,390.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.1	\$470.80	\$0.00	\$0.00	\$470.80	16 h	0 h	0 h	0 h	16 h
<u>Notes</u> WBS Definition- procure parts needed for production flavor boards Labor BOE- run2a muon Level 1 experience											
95	1.2.2.7.6	Fabricate and assemble MTFB	\$3,960.00	\$1,500.80	\$5,460.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$1,500.80	\$0.00	\$0.00	\$1,500.80	32 h	0 h	0 h	0 h	32 h
<u>Notes</u> WBS Definition- fabricate 11 boards, including 3 spares Labor BOE- run2a muon Level 1 experience											
96	1.2.2.7.7	Test MTFB	\$0.00	\$1,500.80	\$1,500.80						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.1	\$1,500.80	\$0.00	\$0.00	\$1,500.80	32 h	0 h	0 h	0 h	32 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	320 h	0 h	0 h	0 h	320 h
<u>Notes</u> WBS Definition- test production flavor boards at Arizona Labor BOE- run2a muon Level 1 experience											
97	1.2.2.8	Infrastructure	\$43,610.40	\$31,355.28	\$74,965.68						
<u>Notes</u> WBS Definition-											
98	1.2.2.8.1	Procure cables and connectors	\$22,010.40	\$1,883.20	\$23,893.60						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
11	ETU	0.1	\$1,883.20	\$0.00	\$0.00	\$1,883.20	64 h	0 h	0 h	0 h	64 h
<u>Notes</u> WBS Definition- Labor BOE- run2a muon Level 1 experience											

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ID	WBS	Name			M&S Cost	Labor Cost	Total Cost					
99	1.2.2.8.2	Assemble cables			\$0.00	\$18,832.00	\$18,832.00					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	10	ETF	2	\$18,832.00	\$0.00	\$0.00	\$18,832.00	640 h	0 h	0 h	0 h	640 h
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	320 h	0 h	0 h	0 h	320 h
	<u>Notes</u>											
	WBS Definition- assemble cables at Fermilab											
	Labor BOE- run2a muon Level 1 experience											
100	1.2.2.8.3	Procure processors and VME crate			\$14,200.00	\$612.04	\$14,812.04					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	0.02	\$612.04	\$0.00	\$0.00	\$612.04	20.8 h	0 h	0 h	0 h	20.8 h
	<u>Notes</u>											
	WBS Definition- procure commercial 6u embedded processors for VME masters in MTCxx crate											
	Labor BOE- mostly waiting for order to be filled; about one day of getting quotes and placing order											
101	1.2.2.8.4	Procure power supplies			\$7,400.00	\$612.04	\$8,012.04					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	11	ETU	0.02	\$612.04	\$0.00	\$0.00	\$612.04	20.8 h	0 h	0 h	0 h	20.8 h
	<u>Notes</u>											
	WBS Definition- procure power supplies for MTCxx crate											
	Labor BOE- mostly waiting for order to be filled; about one day of getting quotes and placing order											
102	1.2.2.8.5	Assemble and test power supplies			\$0.00	\$9,416.00	\$9,416.00					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	10	ETF	0.5	\$9,416.00	\$0.00	\$0.00	\$9,416.00	320 h	0 h	0 h	0 h	320 h
	14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	320 h	0 h	0 h	0 h	320 h
	<u>Notes</u>											
	WBS Definition- assemble and test power supplies for MTCxx crates											
	Labor BOE- run2a muon Level 1 experience											
103	1.2.2.9	Production and Testing Completed			\$0.00	\$0.00	\$0.00					
	<u>Notes</u>											
	WBS Definition- milestone: track matching system complete except for intallation and commissioning											
104	1.2.2.10	Installation			\$0.00	\$2,354.00	\$2,354.00					
	<u>Notes</u>											
	WBS Definition- This summary tasks describes the installation of the complete cal-track matching system in the experiment.											
105	1.2.2.10.1	Install VME crates and power supplies			\$0.00	\$0.00	\$0.00					
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	40 h	0 h	0 h	0 h	40 h

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Install VME crates and power supplies" continued											
<u>Notes</u>											
WBS Definition- Install cal-trk crate and power supplies in moveable counting house											
Labor BOE- run2a muon Level 1 experience											
106	1.2.2.10.2	Install rack services	\$0.00	\$2,354.00	\$2,354.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
10	ETF	1	\$2,354.00	\$0.00	\$0.00	\$2,354.00	80 h	0 h	0 h	0 h	80 h
<u>Notes</u>											
WBS Definition- hook up cooling, monitoring, etc.											
Labor BOE- run2a muon Level 1 experience											
107	1.2.2.10.3	Install cables	\$0.00	\$0.00	\$0.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- run cables between the CTT and the cal-track match, and between cal L1 and cal-track match											
Labor BOE- run2a muon Level 1 experience											
108	1.2.2.10.4	Hook up electronics	\$0.00	\$0.00	\$0.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- install MTCxx and MTCM in crate and connect cables											
Labor BOE- run2a muon Level 1 experience											
109	1.2.2.11	Commissioning	\$0.00	\$0.00	\$0.00						
<u>Notes</u>											
WBS Definition- run cables between the CTT and the cal-track match, and between cal L1 and cal-track match											
110	1.2.2.11.1	Debug input from all sources	\$0.00	\$0.00	\$0.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
<u>Notes</u>											
WBS Definition- verify inputs from CTT, cal-L1, TFW											
Labor BOE- run2a muon Level 1 experience											

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost		Labor Cost		Total Cost					
111	1.2.2.11.2	Debug MTM decision to TFW		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00				
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	80 h	0 h	0 h	0 h	80 h
	<u>Notes</u>											
	WBS Definition- verify decisions of cal-track match are correct at the trigger framework											
	Labor BOE- run2a muon Level 1 experience											
112	1.2.2.11.3	Debug L2, L3 readout		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
	<u>Notes</u>											
	WBS Definition- record data sent to L2 and L3 and verify format											
	Labor BOE- run2a muon Level 1 experience											
113	1.2.2.11.4	System tests		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	1,040 h	0 h	0 h	0 h	1,040 h
	<u>Notes</u>											
	WBS Definition-											
	Labor BOE- run2a muon Level 1 experience											
114	1.2.3	Level 1 Tracking		\$779,900.00	\$253,111.10	\$1,033,011.10						
	<u>Notes</u>											
	WBS Definition- This summary element provides for improvements in the existing track trigger. It includes design and development of algorithms that utilize larger FPGAs, and development and procurement of new Digital Front-End (DFE) boards that utilize these FPGAs.											
	Labor BOE- starting march 1st											
115	1.2.3.1	Run 2a L1 CTT Decommissioned		\$0.00	\$0.00	\$0.00						
	<u>Notes</u>											
	WBS Definition- Take out the current DFEA cards from the MBs. Time determined externally from the beginning of the shutdown between Run2a and Run2b.											
116	1.2.3.2	Develop prototype CTT algorithm		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
	14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	780 h	0 h	0 h	0 h	780 h
	<u>Notes</u>											
	WBS Definition- use Monte Carlo simulations and run 2a data to develop optimal equations for track finding and momentum binning											
	Labor BOE- based on Run2a L1CTTsimulation experience											

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost
117	1.2.3.3	Prototype Algorithm Coded And Simulated With FPGA Simulation Tools	\$0.00	\$0.00	\$0.00
	<p><i>Notes</i></p> <p>WBS Definition- milestone: once this is done, FPGAs can be chosen</p> <p>Labor BOE- based on Run2a STC card implementaion. This has similar complexity</p>				
118	1.2.3.4	Develop target CTT algorithm	\$63,150.00	\$61,908.00	\$125,058.00
	<p><i>Notes</i></p> <p>WBS Definition- develop VHDL code for the FPGA's to implement the track finding equations and othe board functions</p> <p>Labor BOE- based on Run2a STC card implementaion. This has similar complexity</p>				
119	1.2.3.5	Target Algorithm Coded And Simulated With FPGA Simulation Tools	\$0.00	\$0.00	\$0.00
	<p><i>Notes</i></p> <p>WBS Definition- milestone</p> <p>Labor BOE- based on Run2a STC card implementaion. This has similar complexity</p>				
120	1.2.3.6	Develop test procedures	\$0.00	\$1,125.60	\$1,125.60
	<p><i>Notes</i></p> <p>WBS Definition- develop test procedure code, based on Run2a</p>				
121	1.2.3.7	DFEA Prototype I	\$78,150.00	\$59,148.00	\$137,298.00
	<p><i>Notes</i></p> <p>WBS Definition- design an build complete functional prototypes for the Digital Front-End Axial daughter boards</p>				
122	1.2.3.7.1	Layout	\$21,050.00	\$19,716.00	\$40,766.00
	<p><i>Notes</i></p> <p>WBS Definition- lay out prototype 1 of DFEA</p> <p>Labor BOE- Run2a STC card layout experience</p>				
123	1.2.3.7.2	Assemble and test	\$57,100.00	\$39,432.00	\$96,532.00
	<p><i>Notes</i></p>				

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Assemble and test" continued											
<i>Notes</i>											
WBS Definition- assemble 3 prototype boards and test on test stands											
Labor BOE- 2 weeks PCB manufacturing, 2 wks stuffing and 12weeks testing of functionality											
124	1.2.3.8	DFEA Prototype II	\$21,050.00	\$35,937.00	\$56,987.00						
<i>Notes</i>											
WBS Definition- design an build complete functional prototypes for the Digital Front-End Axial daughter boards											
125	1.2.3.8.1	Layout	\$21,050.00	\$19,716.00	\$40,766.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	1	\$15,008.00	\$0.00	\$0.00	\$15,008.00	320 h	0 h	0 h	0 h	320 h
11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h
<i>Notes</i>											
WBS Definition- modifications to the first layout, uncovered while testing											
Labor BOE- Run2a STC card layout experience											
126	1.2.3.8.2	Assemble and test	\$0.00	\$7,062.00	\$7,062.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
11	ETU	0.5	\$7,062.00	\$0.00	\$0.00	\$7,062.00	240 h	0 h	0 h	0 h	240 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	480 h	0 h	0 h	0 h	480 h
<i>Notes</i>											
WBS Definition- assemble 3 prototype boards and test on test stands											
Labor BOE- 2 weeks PCB manufacturing, 2 wks stuffing and 8weeks re-testing of functionality											
127	1.2.3.8.3	Test at Fermilab	\$0.00	\$9,159.00	\$9,159.00						
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>	<i>Work</i>	<i>Ovt. Work</i>	<i>Baseline Work</i>	<i>Act. Work</i>	<i>Rem. Work</i>
5	EEU	0.5	\$5,628.00	\$0.00	\$0.00	\$5,628.00	120 h	0 h	0 h	0 h	120 h
10	ETF	0.5	\$3,531.00	\$0.00	\$0.00	\$3,531.00	120 h	0 h	0 h	0 h	120 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	240 h	0 h	0 h	0 h	240 h
<i>Notes</i>											
WBS Definition- test prototypes in special runs in the real Dzero trigger											
Labor BOE- 2 weeks PCB manufacturing, 2 wks stuffing and 8weeks re-testing of functionality											
128	1.2.3.8.4	DFEA Prototype Tested At Fermilab	\$0.00	\$0.00	\$0.00						
<i>Notes</i>											
WBS Definition- milestone											
Labor BOE- 2 weeks PCB manufacturing, 2 wks stuffing and 8weeks re-testing of functionality											

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ID	WBS	Name	M&S Cost	Labor Cost	Total Cost																																																
129	1.2.3.9	DFEA Production	\$617,550.00	\$76,674.50	\$694,224.50																																																
<p><i>Notes</i></p> <p>WBS Definition- This summary task covers the production of the final version of the DFEA's</p>																																																					
130	1.2.3.9.1	Procure FPGAs	\$510,400.00	\$2,354.00	\$512,754.00																																																
<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>ETU</td> <td>0.1</td> <td>\$2,354.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$2,354.00</td> <td>80 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>80 h</td> </tr> </tbody> </table> <p><i>Notes</i></p> <p>WBS Definition- procure the FPGAs needed for implementing the target algorithm. This is delayed until needed in order to take advantage of price reductions with time.</p> <p>Labor BOE- Purchase of parts at the production level, manufacture and stuff 80 PCB, run2a STC experience</p>						ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	11	ETU	0.1	\$2,354.00	\$0.00	\$0.00	\$2,354.00	80 h	0 h	0 h	0 h	80 h																								
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
11	ETU	0.1	\$2,354.00	\$0.00	\$0.00	\$2,354.00	80 h	0 h	0 h	0 h	80 h																																										
131	1.2.3.9.2	Design, layout	\$0.00	\$12,322.50	\$12,322.50																																																
<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>EEU</td> <td>1</td> <td>\$9,380.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$9,380.00</td> <td>200 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>200 h</td> </tr> <tr> <td>11</td> <td>ETU</td> <td>0.5</td> <td>\$2,942.50</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$2,942.50</td> <td>100 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>100 h</td> </tr> </tbody> </table> <p><i>Notes</i></p> <p>WBS Definition- make any necessary modifications to prototype II design</p> <p>Labor BOE- Purchase of parts at the production level, manufacture and stuff 80 PCB, run2a STC experience</p>						ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	5	EEU	1	\$9,380.00	\$0.00	\$0.00	\$9,380.00	200 h	0 h	0 h	0 h	200 h	11	ETU	0.5	\$2,942.50	\$0.00	\$0.00	\$2,942.50	100 h	0 h	0 h	0 h	100 h												
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	1	\$9,380.00	\$0.00	\$0.00	\$9,380.00	200 h	0 h	0 h	0 h	200 h																																										
11	ETU	0.5	\$2,942.50	\$0.00	\$0.00	\$2,942.50	100 h	0 h	0 h	0 h	100 h																																										
132	1.2.3.9.3	Fabricate	\$44,000.00	\$4,119.50	\$48,119.50																																																
<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>ETU</td> <td>0.5</td> <td>\$4,119.50</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$4,119.50</td> <td>140 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>140 h</td> </tr> </tbody> </table> <p><i>Notes</i></p> <p>WBS Definition- fabricate and assemble all production DFEA boards</p> <p>Labor BOE- Test 10 boards a week</p>						ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	11	ETU	0.5	\$4,119.50	\$0.00	\$0.00	\$4,119.50	140 h	0 h	0 h	0 h	140 h																								
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
11	ETU	0.5	\$4,119.50	\$0.00	\$0.00	\$4,119.50	140 h	0 h	0 h	0 h	140 h																																										
133	1.2.3.9.4	Bench test	\$21,050.00	\$19,716.00	\$40,766.00																																																
<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>EEU</td> <td>1</td> <td>\$15,008.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$15,008.00</td> <td>320 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>320 h</td> </tr> <tr> <td>11</td> <td>ETU</td> <td>0.5</td> <td>\$4,708.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$4,708.00</td> <td>160 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>160 h</td> </tr> <tr> <td>14</td> <td>PHYSU</td> <td>0.5</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>160 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>160 h</td> </tr> </tbody> </table> <p><i>Notes</i></p> <p>WBS Definition- test each production board on the test stand before intallation</p> <p>Labor BOE- Test 10 boards a week</p>						ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	5	EEU	1	\$15,008.00	\$0.00	\$0.00	\$15,008.00	320 h	0 h	0 h	0 h	320 h	11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h	14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	1	\$15,008.00	\$0.00	\$0.00	\$15,008.00	320 h	0 h	0 h	0 h	320 h																																										
11	ETU	0.5	\$4,708.00	\$0.00	\$0.00	\$4,708.00	160 h	0 h	0 h	0 h	160 h																																										
14	PHYSU	0.5	\$0.00	\$0.00	\$0.00	\$0.00	160 h	0 h	0 h	0 h	160 h																																										
134	1.2.3.9.5	Test at Fermilab	\$42,100.00	\$38,162.50	\$80,262.50																																																
<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> <th>Work</th> <th>Ovt. Work</th> <th>Baseline Work</th> <th>Act. Work</th> <th>Rem. Work</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>EEU</td> <td>0.5</td> <td>\$23,450.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$23,450.00</td> <td>500 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>500 h</td> </tr> <tr> <td>10</td> <td>ETF</td> <td>0.5</td> <td>\$14,712.50</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$14,712.50</td> <td>500 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>500 h</td> </tr> <tr> <td>14</td> <td>PHYSU</td> <td>1</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>1,000 h</td> <td>0 h</td> <td>0 h</td> <td>0 h</td> <td>1,000 h</td> </tr> </tbody> </table> <p><i>Notes</i></p> <p>WBS Definition-</p>						ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work	5	EEU	0.5	\$23,450.00	\$0.00	\$0.00	\$23,450.00	500 h	0 h	0 h	0 h	500 h	10	ETF	0.5	\$14,712.50	\$0.00	\$0.00	\$14,712.50	500 h	0 h	0 h	0 h	500 h	14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	1,000 h	0 h	0 h	0 h	1,000 h
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work																																										
5	EEU	0.5	\$23,450.00	\$0.00	\$0.00	\$23,450.00	500 h	0 h	0 h	0 h	500 h																																										
10	ETF	0.5	\$14,712.50	\$0.00	\$0.00	\$14,712.50	500 h	0 h	0 h	0 h	500 h																																										
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	1,000 h	0 h	0 h	0 h	1,000 h																																										

WBS Dictionary and Labor BOE as of 4/8/02
 Level 1 Trigger
 Run2b_Trigger_Schedule_4-7-02

ID	WBS	Name	M&S Cost	Labor Cost	Total Cost						
"Test at Fermilab" continued											
<u>Notes</u>											
re-test each board after delivery to Fermilab											
Labor BOE- Test 10 boards a week											
135	1.2.3.9.6	DFEA Production And Testing Complete	\$0.00	\$0.00	\$0.00						
<u>Notes</u>											
WBS Definition- milestone: track trigger complete except for installation and commissioning											
Labor BOE- Test 10 boards a week											
136	1.2.3.10	Install	\$0.00	\$12,690.00	\$12,690.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.5	\$5,628.00	\$0.00	\$0.00	\$5,628.00	120 h	0 h	0 h	0 h	120 h
10	ETF	1	\$7,062.00	\$0.00	\$0.00	\$7,062.00	240 h	0 h	0 h	0 h	240 h
<u>Notes</u>											
WBS Definition- install new DFEA boards on the run 2a DFE motherboards											
Labor BOE- Install 2weeks, tests insitu 4w											
137	1.2.3.11	Technical commissioning	\$0.00	\$5,628.00	\$5,628.00						
<u>ID</u>	<u>Resource Name</u>	<u>Units</u>	<u>Cost</u>	<u>Baseline Cost</u>	<u>Act. Cost</u>	<u>Rem. Cost</u>	<u>Work</u>	<u>Ovt. Work</u>	<u>Baseline Work</u>	<u>Act. Work</u>	<u>Rem. Work</u>
5	EEU	0.5	\$5,628.00	\$0.00	\$0.00	\$5,628.00	120 h	0 h	0 h	0 h	120 h
14	PHYSU	1	\$0.00	\$0.00	\$0.00	\$0.00	240 h	0 h	0 h	0 h	240 h
<u>Notes</u>											
WBS Definition- fully exercise new L1CTT in D0 trigger system with cosmic rays and beam											
Labor BOE- Install 2weeks, tests insitu 4w											