

	A	B	C	D	E	F	I	J	K
1	WBS 25 OPTION B		FY07 Rates						Operations
2		TechMhrs	EngMhrs	M&S\$K	Total 2 BL cost			OPTION B Baseline	Upgrade
3									
4	Table 1.1. Total Activity Definition for Power Systems								
5	1) Switch Yard transformer Maintenance [M&S=\$94.5K]				94.5	\$	127,764		done
6	2) Clean, hi-pot and test Accel rectifier (Ignitron & Firing Board Maint.) o 2 Techs x 4 Wks = 8 MWks x 40 Mhrs/Wk = 320 Mhrs o M&S=\$2.1K. (The accel rect water system was removed - it has to be replaced. One of the switchyard transformers is in need of repair - see AC Power people for details. We had started a firing board upgrade on the firing boards with a Stan Schweitzer design. That should be continued.)	320.0			2.1	\$	35,831		done
7	3) AC Power maintenance of Pole Transformers o 2 Techs x 2 Wks = 4 MWks x 40 Mhrs/MWk = 160 Mhrs o M&S=\$1.05K	160.0			1.1	\$	17,916		done
8	4) Accel Rectifier Electronics startup o 2 Techs x 8 Wks = 16 MWks x 40 Mhrs/MWk = 640 Mhrs o M&S=\$1.05K	640.0			1.1	\$	67,404		done
9	5) Rehab Modulators, Crowbars, Fault Detectors o 2 Techs x 2.5 Wks = 5 MWks x 40 Mhrs/MWk = 200 Mhrs o Eng Labor = 8 MWks x 40 Mhrs/MWk = 320 Mhrs o M&S=\$2.1K(One of the modulator tubes was removed and used by the RF group. It has been returned but not replaced. We assume it is in working condition.)	200.0	320.0		2.1	\$	77,763		done
10	6) Drafting o 52 MWks x 40 Mhrs/Mwk	2,080.0				\$	214,448	50%	\$ 107,224
11						\$	-		\$ -
12									
13	Table 1.1. Subtotal Cost								
14									
15	Table 1.2. Total Activity Definition for Beamline Subsystems					\$	-		
16	7) Refurbish sources as needed to attain two operable units [M&S=\$0, 40 Mhrs]	40.0				\$	4,124	100%	\$ 4,124
17	8) Fabricate and install new filaments.[M&S=\$2.1K, 40 Mhrs]	40.0			2.1	\$	6,963	100%	\$ 6,963
18	9) Refurbish calorimeters as needed.[M&S=\$2.1K, 160 Mhrs] (Source and a machine isolation valves were in need of repair during our last session.)	160.0			2.1	\$	19,335	100%	\$ 19,335
19	10) Perform maintenance and repair of cryogenic transfer system.[M&S=\$3.15K, 80 Mhrs] (This task requires trouble shooting and disassemble and repair. May take longer and cost more than specified.)	80.0			3.2	\$	12,507	100%	\$ 12,507
20	11) Fill LN2 supply tank. [M&S=\$2.1K, 0 Mhrs]				2.1	\$	2,839	100%	\$ 2,839
21	12) Design, fabricate, and install NBI vacuum system with turbomolecular pumps, vacuum vessel crossover interfaces, and valves to rough beams and vessel. regen. and back turbomolecular pumps.	140.0	40.0		54.2	\$	94,500	80%	\$ 75,600
22	13) Perform water system maintenance and calibration.[M&S=\$2.1K, 80 Mhrs]	80.0			2.1	\$	11,087	100%	\$ 11,087
23	14) Perform maintenance and calibration of auxiliary power supplies.[M&S=\$2.1K, 40 Mhrs]	40.0			2.1	\$	6,963	100%	\$ 6,963
24	15) Perform upgrade, maintenance, and calibration of telemetry, optical links & cntrls, and fault detection. [M&S=\$25K.]	260.0	40.0		25.0	\$	67,394	100%	\$ 67,394
25	16) Install new PLC and perform operational test and calibration of PLC.[M&S=\$115.5K, 1280 Mhrs]	1,280.0			115.5	\$	288,124	80%	\$ 230,499
26	17) Fabricate, install, and test new Main and Front Box Nitrogen Cryopanels. [Tech labor =1280 Mhrs, Drafting = 80 Mhrs, Eng Labor = 80 Mhrs, M&S=\$33.6K] (NB-SW and NB-NW LHe panels leak and need to be repaired.)	1,360.0	80.0		33.6	\$	199,219	50%	\$ 99,610
27	18) Subsystem integrated testing.[320 Mhrs]	320.0				\$	32,992	75%	\$ 24,744
28	19) NBI Computer Systems: Port Algorithm to a new Platform. Complete initial hardware checkout[Computer Eng. 4MM = 640 Mhrs], [M&S = 15.25K for new computer]		640.0		15.3	\$	129,226	90%	\$ 116,303
29	20) NBI Computer SystemsTune, debug and qualify algorithm before auto operationComputer Eng. = 6MM		960.0			\$	162,912	50%	\$ 81,456
30	21) Systems Engineering & Work Planning Procedures[3 MM]		480.0			\$	81,456	100%	\$ 81,456
31	Services\$26.3K					\$	-		\$ -
32	Subtotal Tech MhrsSubtotal Eng MhrsSubtotal M&S (2002)Total Services (2002)								
33									
34									
35	Activity Definition 2 Reinstalled Beamline					\$	-		
36	Systems Engineering					\$	-		
37	31)Work Planning Procedures [2.5 MM]		800.0			\$	135,760	50%	\$ 67,880
38						\$	-		\$ -
39	Preparation Tasks					\$	-		\$ -
40	32) EAD analysis of platform support capability (0.5 MWk).		40.0			\$	6,788	50%	\$ 3,394
41	33) Fabricate one beamline alignment measurement fixture, and obtain 2 beamline base support blocks. [M&S = \$0.6K, 0.4 MWk]	200.0	80.0		1.2	\$	35,818	50%	\$ 17,909
42						\$	-		\$ -
43						\$	-		\$ -
44	34) Fabricate new bellows and electrical break section of transition duct. [M&S = \$2.1K, 2MWk]	320.0				\$	32,992	50%	\$ 16,496
45						\$	-		\$ -
46	Beamline Instalation Tasks					\$	-		\$ -
47	35) Perform alignment measurements (0.2 MWk).	16.0				\$	1,650	50%	\$ 825
48	36) Prepare platform for base plate (0.4 MWk).	32.0				\$	3,299	50%	\$ 1,650
49	37) Relocate base plate to NCSX location (1.6 MWk).	128.0				\$	13,197	50%	\$ 6,598
50	38) Lift NB from Refurbishing location to NCSX location (1.2 MWk).	496.0				\$	51,138	50%	\$ 25,569
51						\$	-		\$ -
52	39) Enclose platform around base plate (0.8 MWk).	64.0				\$	6,598	50%	\$ 3,299
53	Power Control System Tasks					\$	-		\$ -
54	ASSUMPTIONS					\$	-		\$ -
55	1. All existing NB cable and hardware on the Test Cell walls will remain and survive Test Cell Cleanup.					\$	-		\$ -
56	2. The high voltage and other cable runs from the Arc Room to the Beamlines will be replaced.					\$	-		\$ -
57						\$	-		\$ -
58	Cost Estimate per Beamline to Reinstall Cables from Arc Room to New Beamline Junction Boxes Using Present Design					\$	-		\$ -
59						\$	-		\$ -
60	Engineering Labor					\$	-		\$ -
61	4 MWks Design & WP Procedures [4 MWk]		320.0			\$	54,304	50%	\$ 27,152
62						\$	-		\$ -
63	Tech Labor					\$	-		\$ -

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64	2 Men x 2 Wk Fabricate and Install new Junction Box	320.0	-	-	\$ 32,992		50%	\$ 16,496	
65	[8 MWk]	-	-	-	\$ -			\$ -	
66		-	-	-	\$ -			\$ -	
67	2 Men x 1 Wk Hi-potting cable run and fixing problems	160.0	-	-	\$ 16,496		50%	\$ 8,248	
68	[2 MWk]	-	-	-	\$ -			\$ -	
69		-	-	-	\$ -			\$ -	
70	Install Cable Trays	640.0	-	-	\$ 65,984		50%	\$ 32,992	
71	[4 Men x 2Wks =8MWks]	-	-	-	\$ -			\$ -	
72		-	-	-	\$ -			\$ -	
73	Pulling 8-10 heavy cables from Arc Room to New PVC Junction Boxes	1,280.0	-	12.0	\$ 148,192		50%	\$ 74,096	
74	[4 Men x 4 Wks = 16MWks]	-	-	-	\$ -			\$ -	
75		-	-	-	\$ -			\$ -	
76	M&S for trays, fixtures, materials per beamline	-	-	51.6	\$ 69,763		50%	\$ 34,882	
77	[S 6K (2002)]	-	-	-	\$ -			\$ -	
78		-	-	-	\$ -			\$ -	
79	M&S for special HV cables, fixtures, and hardware	-	-	-	\$ -			\$ -	
80	[S15.8K /Beamline (2002)]	-	-	-	\$ -			\$ -	
81		-	-	-	\$ -			\$ -	
82	Activity Definition 2 Relocated Beamline (cont.)	-	-	-	\$ -			\$ -	
83	Beamline Connection Tasks	-	-	-	\$ -			\$ -	
84	Power Systems	-	-	-	\$ -			\$ -	
85	1) Install new welding cables from Junction Box under Beamline to Ion Source. M&S=\$0.6K, 2 MWks]	160.0	-	1.2	\$ 18,118		50%	\$ 9,059	
86	Vacuum System Tasks	-	-	-	\$ -			\$ -	
87	1) Connect beamline to new foreline and exhaust manifold.	-	-	-	\$ -			\$ -	
88	[M&S= \$0.6K, 0.8 MWks]	64.0	-	1.2	\$ 8,221		50%	\$ 4,110	
89	Vacuum System Controls	-	-	-	\$ -			\$ -	
90	1) New PLC. Test system after installation.	-	-	-	\$ -			\$ -	
91	[0.8 MWks]	64.0	-	-	\$ 6,598		50%	\$ 3,299	
92	Cryogenic System	-	-	-	\$ -			\$ -	
93	1) Connect beamline to new manifold. Test system after relocation.	64.0	-	-	\$ 6,598		50%	\$ 3,299	
94	[0.8 MWks]	-	-	-	\$ -			\$ -	
95	Cryogenic System Controls	-	-	-	\$ -			\$ -	
96	1) Connect beamline to new manifold. Test system after relocation. [0.8 MWks]	64.0	-	-	\$ 6,598		50%	\$ 3,299	
97	Pneumatic Air System	-	-	-	\$ -			\$ -	
98	1) Connect beamline to new manifold and test	32.0	-	-	\$ 3,299		50%	\$ 1,650	
99	[0.4 MWks]	-	-	-	\$ -			\$ -	
100	Water System	-	-	-	\$ -			\$ -	
101	• Install flexible water lines to beamlines.	-	-	-	\$ -			\$ -	
102	• Install new water valves.	-	-	-	\$ -			\$ -	
103	• Install new recirculation pump	-	-	-	\$ -			\$ -	
104	[M&S Subtotal = \$2.1K, Subtotal 6 MWks]	480.0	-	4.2	\$ 55,166		50%	\$ 27,583	
105	Fab & Install Water Cooled Aperture at exit of Front Beam Box	-	-	-	\$ -			\$ -	
106	[M&S= \$5.3K, 1MWk Fab+ 2MWks Install]	240.0	-	10.6	\$ 39,075		50%	\$ 19,538	
107	Water System Control	-	-	-	\$ -			\$ -	
108	1) New PLC; same functions. Test new water system controls.	32.0	-	-	\$ 3,299		50%	\$ 1,650	
109	[0.4 MWk]	-	-	-	\$ -			\$ -	
110		-	-	-	\$ -			\$ -	
111	NB Diagnostic Control System	-	-	-	\$ -			\$ -	
112	1) Label, document, and store existing cables.	-	-	-	\$ -			\$ -	
113	2) Fabricate and install new cables or extensions if required.	-	-	-	\$ -			\$ -	
114	[Total = 0.4 MWk]	32.0	-	-	\$ 3,299		50%	\$ 1,650	
115	Neutral Beam Integrated Systems Testing	-	-	-	\$ -			\$ -	
116	1) After relocation completed, perform operational tests of integrated Neutral Beam systems.	-	-	-	\$ -			\$ -	
117	[8 MWks]	640.0	-	-	\$ 65,984		50%	\$ 32,992	
118	Drafting Labor [12 MWk]	960.0	-	-	\$ 98,976		50%	\$ 49,488	
119		-	-	-	\$ -			\$ -	
120					\$ -			\$ -	
121					\$ -			\$ -	
122		13,688	3,800	454	\$ 2,670,171			\$ 936,255	\$ 516,552