

	A	B	C	D	E	F	I	J	K
1	<b>WBS 25 OPTION B</b>		FY07 Rates						Operations
2		TechMhrs	EngMhrs	M&S\$K	Total 2 BL cost			OPTION B Baseline	Upgrade
3									
4	<b>Table 1.1. Total Activity Definition for Power Systems</b>								
6	1) Switch Yard transformer Maintainence [M&S=\$94.5K]			94.5	\$ 127,764				done
7	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
8	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
9	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
10	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
11	6) Drafting o 52 MWks x 40 Mhrs/Mwk	2,080.0			\$ 214,448		50%	\$ 107,224	
12					\$ -				
13	Table 1.1. Subtotal Cost								
15	<b>Table 1.2. Total Activity Definition for Beamline Subsystems</b>				\$ -				
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 Cryopanel. [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] Services\$26.3K		480.0		\$ 81,456		100%	\$ 81,456	
31					\$ -			\$ -	
32	Subtotal Tech MhrsSubtotal Eng MhrsSubtotal M&S (2002)Total Services (2002)								
35	<b>Activity Definition 2 Reinstalled Beamline</b>				\$ -				
36	<b>Systems Engineering</b>				\$ -				
37	31)Work Planning Procedures [2.5 MM]		800.0		\$ 135,760		50%	\$ 67,880	
38					\$ -			\$ -	
39	<b>Preparation Tasks</b>				\$ -			\$ -	
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.	200.0	80.0	1.2	\$ 35,818		50%	\$ 17,909	
42	[M&S = \$0.6K, 0.4 MWk]			14.2	\$ 19,198		50%	\$ 9,599	
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	<b>Beamline Instalaltion Tasks</b>				\$ -			\$ -	
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	

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2		TechMhrs	EngMhrs	M&S\$K	Total 2 BL cost			OPTION B Baseline	Upgrade
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	<b>Power Control System Tasks</b>	-	-	-	\$ -			\$ -	
54	<b>ASSUMPTIONS</b>	-	-	-	\$ -			\$ -	
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	<b>Cost Estimate per Beamline to Reinstall Cables from Arc Room to New Beamline Junction Boxes Using Present Design</b>	-	-	-	\$ -			\$ -	
59		-	-	-	\$ -			\$ -	
60	<b>Engineering Labor</b>	-	-	-	\$ -			\$ -	
61	4 MWks Design & WP Procedures	-	320.0	-	\$ 54,304		50%	\$ 27,152	
62	[4 MWk]	-	-	-	\$ -			\$ -	
63	<b>Tech Labor</b>	-	-	-	\$ -			\$ -	
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	[\$ 6K (2002)]	-	-	-	\$ -			\$ -	
78		-	-	-	\$ -			\$ -	
79	M&S for special HV cables, fixtures, and hardware	-	-	-	\$ -			\$ -	
80	[\$15.8K /Beamline (2002)]	-	-	-	\$ -			\$ -	
81		-	-	-	\$ -			\$ -	
82	<b>Activity Definition 2 Relocated Beamline (cont.)</b>	-	-	-	\$ -			\$ -	
83	<b>Beamline Connection Tasks</b>	-	-	-	\$ -			\$ -	
84	<b>Power Systems</b>	-	-	-	\$ -			\$ -	
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	<b>Vacuum System Tasks</b>	-	-	-	\$ -			\$ -	
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	<b>Vacuum System Controls</b>	-	-	-	\$ -			\$ -	
90	1) New PLC. Test system after installation.	-	-	-	\$ -			\$ -	
91	[0.8 MWks]	64.0	-	-	\$ 6,598		50%	\$ 3,299	
92	<b>Cryogenic System</b>	-	-	-	\$ -			\$ -	
93	1) Connect beamline to new manifold. Test system after relocation.	64.0	-	-	\$ 6,598		50%	\$ 3,299	
94	[0.8 MWks]	-	-	-	\$ -			\$ -	
95	<b>Cryogenic System Controls</b>	-	-	-	\$ -			\$ -	
96	1) Connect beamline to new manifold. Test system after relocation. [0.8 MWks]	64.0	-	-	\$ 6,598		50%	\$ 3,299	
97	<b>Pneumatic Air System</b>	-	-	-	\$ -			\$ -	
98	1) Connect beamline to new manifold and test	32.0	-	-	\$ 3,299		50%	\$ 1,650	
99	[0.4 MWks]	-	-	-	\$ -			\$ -	
100	<b>Water System</b>	-	-	-	\$ -			\$ -	
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	<b>Water System Control</b>	-	-	-	\$ -			\$ -	
108	1) New PLC; same functions. Test new water system controls.	32.0	-	-	\$ 3,299		50%	\$ 1,650	
109	[0.4 MWk]	-	-	-	\$ -			\$ -	
110		-	-	-	\$ -			\$ -	
111	<b>NB Diagnostic Control System</b>	-	-	-	\$ -			\$ -	
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	<b>Neutral Beam Integrated Systems Testing</b>	-	-	-	\$ -			\$ -	
116	1) After relocation completed, perform operational tests of integrated Neutral Beam systems.	-	-	-	\$ -			\$ -	
117	[8 MWks]	640.0	-	-	\$ 65,984		50%	\$ 32,992	
118	<b>Drafting Labor [12 MWk]</b>	960.0	-	-	\$ 98,976		50%	\$ 49,488	
119		-	-	-	\$ -			\$ -	
120					\$ -			\$ -	
121					\$ -			\$ -	
122		13,688	3,800	454	\$ 2,670,171			\$ 936,255	\$ 516,552