NCSX Work Approval Form (WAF)

WBS Number: 43
WBS Title: DC Systems
Job Number: 4301
Job Title: DC Systems
Job Manager: Raki Ramkrishnan

Description:

This WBS element consists of refurbishment, as needed, of cabling and other DC components required to feed the NCSX machine from the existing C Site rectifiers.

Schedule:

Approvals:

S. Ramakrishnan
Digitally signed by S. Ramakrishnan
DN: cn=S. Ramakrishnan, c=US, o=Princeton Plasma Physics Laboratory, ou=National Compact Stellerator Experiment, email=sramakri@pppl.gov
Date: 2007.07.18 13:24:38 -04'00'

Job Manager _____ Date _____

Al von Halle
Digitally signed by Al von Halle
DN: CN = Al von Halle, C = US
Date: 2007.07.18 13:38:24 -04'00'

Responsible Line Manager _____ Date _____

James L Anderson
Digitally signed by James L Anderson
DN: cn=James L Anderson, c=US, o=PPPL, ou=NCSX, email=jlanders@pppl.gov
Date: 2007.07.18 17:15:17 -04'00'

Project Manager _____ Date _____

Mike Williams
Digitally signed by Mike Williams
DN: cn=Mike Williams, o=PPPL, ou=Engineering, email=williams@pppl.gov, c=US
Date: 2007.07.18 17:19:51 -04'00'

Engineering Department Head _____ Date _____

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

WBS Number: 43

WBS Title: DC Systems

Job Number: 4301

Job Title: DC Systems

Job Manager: Raki Ramkrishnan

Description: This is a LOE effort for design intergration, interface definition, and oversight of diagnostic systems design, fabrication, and installation

		K$		Labor Hours					Basis of Estimate
Task Description	**Activity**	**M&S**	**Travel**	**EASM**	**ECEM**	**EEEM**	**EESM**	**EETB**	**(See Notes on Basis of Estimate Below)**
Condition/spare parts inventory	431-200					8	6		
Organize & verify documentation	431-210			10		16	3		
Document status	431-215					16			
Reactivate DF & PEI units	431-225	$8K				40	8	40	
Dummy Load test	431-230	$1K				32	8	40	
Simulate each of 6 pwr loops in PSCAD	431-240					104			
c-site dc sys dsn documentation	431-250			240		180			
Redo power loop design	431-261			240		128			
Fabricate bus components	431-265	$45K		40		16	40	120	
Power cabling & Installation	431-275	$140K		240		40	240	520	
Maint of C-site rectifiers	431-276	$5K					40	120	
Totals		**$199K**	**$0K**	**770**	**0**	**580**	**345**	**840**	

Notes on the Basis of Estimate

(1) Design and Fabrication/Installation

Estimate based on estensive experience of engineer performing similar tasks at PPPL and EBASCO - e.g. recent experience on NSTX. This is basically a job modifying existing PPPL systems and re-installing for NCSX. Design and engineering estimates developed based on assessements of the number of drawings needed (new or modified), the effort to reconfigure existing designs, interfaces with other systems, supervision of on-site contractors, and all necessary re-activation and pre-operational testing needed.

(2) M&S

M&S estimated based on similar recent procurements and needed interfaces with installation contractors - this will be Davis-Bacon covered, except tor those activities within the Test Cell.

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TABLE II - Materials and Subcontracts

WBS Number: 43									
WBS Title: DC Systems									
Job Number: 4301									
Job Title: DC Systems									
Job Manager: Raki Ramkrishnan									
Materials and Subcontracts (M&S)									**Basis of Estimate**
		Material		**Labor**					
Description - inlcuded in Table I									

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TABLE III - Fabrication/Assembly Installation

WBS Number: 43

WBS Title: DC Systems

Job Number: 4301

Job Title: DC Systems

Job Manager: Raki Ramkrishnan

In-house Fabrication and Assembly and Installation

Included in Table I

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 43
WBS Title: DC Systems
Job Number: 4301
Job Title: DC Systems
Job Manager: Raki Ramkrishnan

Uncertainty of the Estimate

	High	Medium	Low	Uncertainty of Estimate (%)	Comments/Other Considerations
Design Maturity	X			-5%/+10%	Existing PPPL infrastructure and standard electrical design (requirements near final)
Design Complexity			X		Standard electrical design and fabrication
Other comments:					Robicon is okay, but PEI supply has not been used for a long time - could experience issues as we re-activate

Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on AACEI recommended practice 18R-97 as amended for NCSX.

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact Low	Cost Impact High	Schedule Impact Low	Schedule Impact High
NONE								

Notes:
[1] Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur.
High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
[2] Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate.
Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact
Project control is reponsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
[3] The schedule impacts should be entered as the min and max impacts on the critical path.
If there is no critical path impact then the schedule entries should be zero.
[4] Likelihood of occurrence should be entered consistent with our risk classification methodology, i.e.
VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikley (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

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Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted
43 - DC Systems									
Job: 4301 - DC Systems-RAMAKRISHNAN									
431 - C-Site DC Systems									
431-200		Condition/spare parts inventory	20	01OCT08*	28OCT08		387		2,308.00
431-210		Organize & verify documentation	20	29OCT08*	25NOV08		387		4,531.16
431-215		Document status	10	26NOV08*	11DEC08		387		2,857.28
431-225		Reactivate DF & PEI units	15	12DEC08*	12JAN09		387		22,697.68
431-230		Duumy Load test of DF & PEI units	15	13JAN09*	02FEB09		387		11,490.04
431-240		Simulate each of 6 pwr loops in PSCAD	90	01OCT08*	16FEB09		260		18,572.32
431-250		c-site dc sys DGS dsn documentation	90	01OCT08*	16FEB09		260		61,765.20
431-261		Redo power loop design	90	01OCT08*	16FEB09		260		52,479.04
431-265		Fabricate bus components	20	29JUL09*	25AUG09		146		86,139.48
431-275		Power cabling & Installation	97	02NOV09*	30MAR10		99		317,964.40
431-276		Maint of C-site rectifiers	501	01OCT07*	02OCT09		216	LOE	22,026.38
Subtotal			618	01OCT07	30MAR10		99		602,830.98