NCSX Work Approval Form (WAF)

WBS Number: 41
WBS Title: AC Power
Job Number: 4101
Job Title: AC Power
Job Manager: Raki Ramkrishnan

Description:

This WBS element consists of the effort to design and reconfigure existing auxiliary and experimental AC power systems. The existing AC power infrastructure at C-site will be re-used to the maximum practical extent. A new AC distribution system, up to and including power panels, is provided in the NCSX test cell. Activities associated with the reactivation of AC power systems at C-site are included. Grounding in the NCSX test cell is provided. For initial operation, the C-Site Rectifiers will be used to power the NCSX PF and modular coils.

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: 2007.08.01 14:40:32 -04'00'

Job Manager _____ Date _____

Al von Halle
Digitally signed by Al von Halle
DN: CN = Al von Halle, C = US
Date: 2007.08.02 08:04:27 -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
Reason: I am approving this document
Date: 2007.08.02 08:22:48 -04'00'

Project Manager _____ Date _____

Mike Williams
Digitally signed by Mike Williams
DN: cn=Mike Williams, o=PPPL, ou=Engineering Department, email=williams@pppl.gov, c=US
Date: 2007.08.02 10:23:48 -04'00'

Engineering Department Head _____ Date _____

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

WBS Number: 41

WBS Title: AC Power

Job Number: 4101

Job Title: AC Power

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 Basis of Estimate Notes Below)**
WBS 411 - Auxiliary AC Power									
Prepare Preliminary One line diagram	4101-100.1			6		2	2	0	
Ex-Test cell AC pwr-Reactivate& new instl	411-1-100	$5.0K		5		8	13	21	
Grounding-Dsn - minimum required for first plasma	411-2-2			160		72			
Grounding-Procure	411-2-4	$10.0K							
Grounding-Install	411-2-6	$17.5K		56		28		112	
Grounding-Commission	411-2-8			40		24		80	**Needed prior to testing coils**
Test Cell AC Power Distr-Dsn	*411-3-2*			***16***		***8***			**Covered by PPPL Facilities as an Infrastructure cost - NOT PART OF MIE PROJECT**
Test Cell AC Power Distr-Procure(equipment/materials	*411-3-4*	***$10.0K***							**Covered by PPPL Facilities as an Infrastructure cost - NOT PART OF MIE PROJECT**
Test Cell AC Power Distr-Install	*411-3-6*	***$35.0K***		***64***		***16***	***16***	***24***	**Covered by PPPL Facilities as an Infrastructure cost - NOT PART OF MIE PROJECT**
Test Cell AC Power Distr-Commission	*411-3-8*					***16***	***16***	***16***	**Covered by PPPL Facilities as an Infrastructure cost - NOT PART OF MIE PROJECT**
Standby Power for Cryo Sys -Dsn	411-4-2								**Not Applicable - not funded at this time**
Standby Power for Cryo Sys -Procure	411-4-4								**Not Applicable - not funded at this time**
Standby Power for Cryo Sys -Install	411-4-6								**Not Applicable - not funded at this time**
WBS 412 - Experimental AC Power									
C-site Pulsed AC Power Distr-Dsn	412-1-2			16		16			
C-site Pulsed AC Power Distr-Procure	412-1-4	$5.0K							
C-site Pulsed AC Power Distr-Install	412-1-6			8		8	16	80	
C-site Pulsed AC Power Distr-Commission	412-1-8					24	24	40	**Needed prior to testing coils**
Totals		$82.5K	$0	371	0	222	87	373	

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: 41									
WBS Title: AC Power									
Job Number: 4101									
Job Title: AC Power									
Job Manager: Raki Ramkrishnan									
Materials and Subcontracts (M&S)									**Basis of Estimate**
		Material		**Labor**					
Description - inlcuded in Table I									

NCSX June 2007 ETC
TABLE III - Fabrication/Assembly Installation

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: 41
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Uncertainty of the Estimate

	High	Medium	Low	Uncertainty of Estimate (%)	Comments/Other Considerations
Design Maturity	X			-5%/+10%	Requirements still evolving, but do not expect major perturbations
Design Complexity			X		Standard electrical systems design and fabrication

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%)

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted
41 - AC Power									
Job: 4101 - AC Power-RAMAKRISHNAN									
411 - Auxiliary AC Power Systems									
4101-100.1		Prepare Preliminary One line diagram	173	01OCT08*	12JUN09		37		1,390.80
411-1-100		Ex-Test cell AC pwr-Reactiv.&new instl	210	02JAN09*	27OCT09		114		12,652.35
411-2-2		Grounding-Dsn	65	02JAN09*	02APR09		87		32,604.96
411-2-4		Grounding-Procure	107	18AUG09*	28JAN10		70		14,218.60
411-2-6		Grounding-Install	43	29JAN10*	30MAR10		70		46,659.48
411-2-8		Grounding-Commission	29	31MAR10*	10MAY10		70		16,166.80
411-3-2		Test Cell AC Power Distr-Dsn**GPP**	90	02JAN09*	07MAY09		104		0.00
411-3-4		TC AC Pwr Distr-Procure(pnls&xfrmrs)**GPP**	65	08MAY09	10AUG09		104		0.00
411-3-6		Test Cell AC Power Distr-Install**GPP**	65	11AUG09	10NOV09		104		0.00
411-3-8		Test Cell AC Power Distr-Commission**GPP**	45	11NOV09*	26JAN10		104		0.00
412 - Experimental AC Power Systems									
412-1-2		C-site Pulsed AC Power Distr-Dsn	65	02MAR09*	01JUN09		46		4,832.00
412-1-4		C-site Pulsed AC Power Distr-Procure	94*	18AUG09	11JAN10		37		7,102.29
412-1-6		C-site Pulsed AC Power Distr-Install	40	12JAN10	08MAR10		37		11,553.36
412-1-8		C-site Pulsed AC Power Distr-Commission	78	09MAR10	25JUN10		37		11,384.00
4101ACPWR		Prior ac pwr work reclassified as gpp	356	01MAY07A	31MAY07A				-104,100.00
Subtotal			0		25JUN10		37		54,464.64