

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:

Job Manager

Date

Responsible Line Manager

Date

Project Manager

Date

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									
Task Description	Activity	K\$			Labor Hours				Basis of Estimate (See Basis of Estimate Notes Below)
		M&S	Travel	EASM	ECEM	EEEM	EESM	EETB	
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 assessments 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									
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Materials and Subcontracts (M&S)									Basis of Estimate
		Material			Labor				
Description - included in Table I									

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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

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Uncertainty of the Estimate

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

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

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	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 responsible 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							
										FY07	FY08	FY09	FY10	FY11	FY12	
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	EA/SB =06hr ; EE//EM =02hr ; EE//SM =02hr ; 41=05\$k ; EA//SB =05hr ; EE//EM =08hr ; EE//SM =13hr ; EE//TB =21hr ;						
411-2-2		Grounding-Dsn	65	02JAN09*	02APR09		87		32,604.96	EA/SB =160hr ; EE//EM =72hr ;						
411-2-4		Grounding-Procure	107	18AUG09*	28JAN10		70		14,218.60	41=10\$k ;						
411-2-6		Grounding-Install	43	29JAN10*	30MAR10		70		46,659.48	41=18\$k ; EE//EM =28hr ; EA//SB =56hr ; EE//TB =112hr ; EE//EM =24hr ; EA//SB =40hr ; EE//TB =80hr ;						
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(pnl&xfrms)**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	EA/SB =16hr ; EE//EM =16hr ;						
412-1-4		C-site Pulsed AC Power Distr-Procure	94*	18AUG09	11JAN10		37		7,102.29	41=05\$k ;						
412-1-6		C-site Pulsed AC Power Distr-Install	40	12JAN10	08MAR10		37		11,553.36	EE//EM =08hr ; EE//SM =16hr ; EE//TB =80hr ; EA//SB =08hr ;						
412-1-8		C-site Pulsed AC Power Distr-Commission	78	09MAR10	25JUN10		37		11,384.00	EE//EM =24hr ; EE//SM =24hr ; EE//TB =40hr ;						
4101ACPWR		Prior ac pwr work reclassified as gpp	356	01MAY07A	31MAY07A				-104,100.00							
Subtotal			0		25JUN10		37		54,464.64							