NCSX Work Approval Form (WAF)

WBS Number: 163
WBS Title: Coil Protection Systems
Job Number: 1601-163
Job Title: Coil Protection Systems Interfaces
Job Manager: Paul Goranson

Description:

This WBS element consists of the interface design of the coil electrical leads inside the cryostat which then connect the coil protection systems outside the cryostat.

Schedule:

See Attached

Approvals:

Paul Goranson
Digitally signed by Paul Goranson
DN: cn=Paul Goranson, c=US
Date: 2007.07.03 14:05:12 -04'00'

Job Manager — Date

Brad Nelson
Digitally signed by Brad Nelson
DN: cn=Brad Nelson, c=US, o=ORNL, ou=FED, email=nelsonbe@ornl.gov
Date: 2007.07.10 08:27:31 -04'00'

Responsible Line Manager — Date

Hutch Neilson
Digitally signed by Hutch Neilson
DN: CN = Hutch Neilson, C = US, O = PPPL
Date: 2007.07.10 14:01:27 -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: 2007.07.10 14:12:49 -04'00'

Engineering Department Head — Date

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

WBS Number: 163
WBS Title: Coil Protection Systems
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Description:

This effort covers all Title I, II, and III engineering for the Coil Protection System. No hardware is anticipated for this job, only design interface with WBS 4 and 5.

Task ID	Multiplier	Unit	Number of Units	Hours	ORNL EM	ORNL DSN	ORNOL RM	EMEM	EMSM	EMSB	EMTB	EAEM	EASM	EEEM	EESM		EESB	EETB	ECEM	ECSB	ECTB	Basis of Estimate
Title I an II Design																						
Pro-E models (avg)	8	hrs/model	0	0	0																	See Worksheet below - based on recent experience at MDL
assy dwgs	24	hrs/dwg	0	0	0																	See Worksheet below - based on recent experience at MDL
Detail drawings	16	hrs/dwg	0	0	0																	See Worksheet below - based on recent experience at MDL
installation dwg	16	hrs/dwg	0	0	0																	See Worksheet below - based on recent experience at MDL
cooling schematic	0	hrs/dwg	0	0	0																	See Worksheet below - based on recent experience at MDL
electrical schematic	8	hrs/dwg	0	0	0																	See Worksheet below - based on recent experience at MDL
I&C schematic	20	hrs/dwg	4	80	0	80																See Worksheet below - based on recent experience at MDL
stress analysis	0	hrs/calc	0	0	0																	See Worksheet below - based on recent experience at MDL
thermal analysis	24	hrs/calc	0	0	0																	See Worksheet below - based on recent experience at MDL
special analysis (electromagnetics)	40	hrs/calc	2	80	40							40										See Worksheet below - based on recent experience at MDL
Procuremnt Specifications	16	hrs/spec	0	0	0																	See Worksheet below - based on recent experience at MDL
preliminary and final design reviews	40	hrs/rev	1	40	40																	See Worksheet below - based on recent experience at MDL
meetings/reporting/presentations	10%	% of tot hrs		20	20																	See Worksheet below - based on recent experience at MDL
Subtotal Title I & II Design				***220***	***100***	***80***	***0***	***0***	***0***	***0***	***0***	***40***	***0***	***0***	***0***		***0***	***0***	***0***	***0***	***0***	
Title III																						
vendor inspection & oversight	0	hrs per	1	0																		
Disposition of deviation requests and non-conformances	0	hrs/wk	20	0																		Based on recent experience on NCSX
In-House fab/assy oversight & inspection	0	hrs/wk	4	0																		
As-built drawings	0	hrs/dwg	0	0																		Based on recent experience on NCSX
Installation oversight & inspection	0	hrs/wk	4	0																		
Subtotal Title III Design				***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***		***0***	***0***	***0***	***0***	***0***	

Notes and worksheets

Pro-E models		
assy dwgs		
Detail drawings		
installation dwg		
cooling schematic		
electrical schematic		
I&C schematic	4	minimum of one schematic for each signal type
stress analysis		
thermal analysis		
special analysis	2	analysis of potential fault conditions based on reaction times of various systems specification of correct current, voltage, strain, and temperature waveforms to be compared with actual
procurement specifications		
preliminary and final design reviews	1	
meetings/reporting/presentations		

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Description:

No materials or subcontracts are anticipated for this WBS element

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Fabrication and Assembly

Description:

No local fab or assembly is anticipated for the Coil leads. Installation is part of WBS 7.

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 163
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Uncertainty of the Estimate

	High	Medium	Low	Uncertainty Range (%)	Comments/Other Considerations
Design Maturity	X			-5%/+10%	Design well established based on previous devices
Design Complexity			X		Standard Components
Other Comments:					

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%)