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: 2007.07.18 12:00:16 -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: 2007.07.31 13:43:17 -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: 2007.08.01 11:41:35 -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: 2007.08.01 14:44:22 -04'00'

Engineering Department Head _____ Date _____

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

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

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	HOURS: ORNL EM	ORNL DSN	ORNL 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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TABLE II- Materials and Subcontracts

WBS Number: 163
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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				Design well established based on previous devices	
Design Complexity			X	-5%/+10%	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%)

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted
16 - Coil Services									
Job: 1601 - Coil Services Design-GORANSON									
FY07 Rebaseline Exercise									
ECP53RBX08		FY07 Rebaseline exercise	22*	01MAY07*	31MAY07		1,333	LOE	6,228.80
161 - LN2 Distribution									
191-001		Title I design WBS 161 LN2 manifolds&piping	65	02JAN08*	01APR08		99		84,115.20
191-002	3	PDR WBS 161 LN2 manifolds&piping	1	02APR08	02APR08		99		1,294.08
191-011		Title II design WBS 161 LN2 manifolds&piping	65	03APR08	03JUL08		99		84,115.20
191-012		FDR WBS 161 LN2 manifolds&piping	1	07JUL08	07JUL08		99		1,294.08
191-037		Prep Req,Bid,Award-manifolds,hoses,valves etc	25	08JUL08	11AUG08		99		0.00
191-038		Fab and deliver-manifold assy,hoses,valves etc	90	12AUG08*	18DEC08		99		140,101.51
191-031		Title III engr WBS 161	118	08JUL08	23DEC08		941	LOE	27,796.89
162 - Electrical Leads									
132-001		Title I design WBS 162 Coil leads	155	02JUN08*	19JAN09		49		152,991.50
132-002		PDR WBS 162 Coil leads	1	20JAN09	20JAN09		49		1,387.28
132-011		Title II design WBS 162 Coil leads	155	21JAN09	27AUG09		150		158,843.56
132-012		FDR WBS 162 Coil leads	1	28AUG09	28AUG09		150		1,387.28
132-015		Title III design WBS 162 Coil leads	99	31AUG09	29JAN10		222	LOE	19,579.88
132-037		Prep Req,Bid,Award Lead hardware and cables	25	31AUG09	05OCT09		150		0.00
132-038		Deliver Lead hardware and cables	65	06OCT09	18JAN10		150		114,187.68
132-047		Prep Req,Bid,Award Material for transition box	25	31AUG09	05OCT09		216		0.00
132-048		Deliver Material for Transition Boxes	40	06OCT09	02DEC09		216		9,909.44
132-049		Assemble Transition boxes (6)	40	03DEC09	08FEB10		216		20,462.40
163 - Coil Protection System									
163.001		Design Coil protection(input to WBS 4 & 5)	65	01OCT08*	12JAN09		80		38,150.20
Subtotal			688	01MAY07	08FEB10		667		861,844.98