

NCSX Work Approval Form (WAF)

WBS Number: 131

WBS Title: Toroidal Field coils

Job Number: 1361

Job Title: TF Coil Fabrication

Job Manager: Mike Kalish

Description:

This WBS element consists of the manufacturing design, procurement, and fabrication of the TF conductor and assembly of the TF winding packs including interface elements for connections to power and cooling supply at the coils.

Schedule:

See Attached

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: 131																							
WBS Title: Toroidal Field coils																							
Job Number: 1361																							
Job Title: TF Coil Fabrication																							
Job Manager: Mike Kalish																							
Description:																							
Title I and II Engineering for PF Coils and Title III Support of Fabrication Effort.																							
Task ID	41MS	48MS	37STK	35TRVL	31OT	ORNL EM	ORNL DSN	EMEM	EMSM	EMSB	EMTB	EAEM	EASB	EEEM	EESM	EESB	EETB	ECEM	ECSB	ECTB	RM2	RM3	Basis of Estimate
In Table II Estimate																							

NCSX June 2007 ETC
TABLE II - Materials and Supplies

WBS Number: 131																							
WBS Title: Toroidal Field coils																							
Job Number: 1361																							
Job Title: TF Coil Fabrication																							
Job Manager: Mike Kalish																							
Materials and Subcontracts (M&S)																							
Description:																							
41MS		FY07\$K																					
48MS																							
37STK																							
35TRV																							
L																							
31OT																							
ORNL EM																							
ORNL DSN																							
EMEM																							
EMSM																							
EMSB																							
EMTB																							
EAEM																							
EASB																							
EEEM																							
EESM																							
EESB																							
EETB																							
ECEM																							
ECSB																							
ECTB																							
RM2																							
RM3																							
Procurement & Fabrication	Basis of Estimate																						
Title III /Engrg	5.00																						
In House Inspection											68	48											
Support of Assembly operations and metrology												84.4											
Contract Costs Remaining													965										
Additional Materials as Required													8.00										
TOTAL														13	965								

Based on 50% Oversight / coverage of fabrication of first 9 coils at Everson-Tesla then 25% last 9 coils. This is the level of coverage that has been required up until this point
 Cover inspection for 18 coils, two engs - three days for the first coil, .5 day for one technician for subsequent coils
 .25% coverage during 35days FP#1 assembly of TFs + 10% coverage for 18days of FP#2 TF assembly
 Actual purchases (\$4K for glass insulation) => expect one more time

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TABLE III - Fabrication/Assembly Installation

WBS Number: 131															
WBS Title: Toroidal Field coils															
Job Number: 1361															
Job Title: TF Coil Fabrication															
Job Manager: Mike Kalish															
In-house Fabrication and Assembly and Installation															
Description: Incl in M&S Table II															

NCSX June 2007 ETC
TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 131
WBS Title: Toroidal Field coils
Job Number: 1361
Job Title: TF Coil Fabrication
Job Manager: Mike Kalish

Uncertainty of the Estimate

	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Design Maturity	X				Coils in fabrication - design is complete
Design Complexity		X		-10%/+15%	While conventional cross-section with solid Cu, some potential difficulty in maintain precise geometry and tolerances

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

Residual Impacts

<u>Job</u>	<u>Risk Description</u>	<u>Likelihood of Occurring</u>	<u>Mitigation Plan</u>	<u>Basis of estimate</u>	<u>Cost Impact</u>		<u>Schedule Impact</u>	
					<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
1361 TF vendor produces a non-compliant coil requiring fabrication of an additional coil		VU	Conductor for extra coil already procured. Ample float in schedule to avoid critical path impact.	Increase PPPL Title III by ~1 man-month	+ \$15	+ \$35	+ 0.00	+ 0.00

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=Unlikely (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

Activity ID	MILEstones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
13 - Conventional Coils																
Job: 1361 - TF Fabrication-KALISH																
TF Title III and Fabrication Oversight																
131-033		Title III engr	348*	01MAY07	18SEP08		332	LOE	212,758.02	EA/EM =1060hr ; 35=05\$K ; 41=8 em//tb=68						
TF Fabrication Contract																
1361C-101		Fab, Test & Deliver Coil #1	38*	29MAY07*	20JUL07		356		27,210.00	48=27 ;						
1361C-102		Fab, Test & Deliver Coil #2	45*	01JUN07*	03AUG07		391		43,590.00	48=44 ;						
1361C-103		Fab, Test & Deliver Coil #3	65*	01JUN07*	31AUG07		379		47,210.00	48=47 ;						
1361C-104		Fab, Test & Deliver Coil #4	1	28SEP07*	28SEP07		360		47,210.00	48=47 ;						
1361C-104M	2	** DELIVER TF COILS FOR FPA #1 ASSY **	0		28SEP07		360		0.00	***** LEVEL II MILESTONE DATE DECEMBER 2007 *****						
1361C-105		Fab, Test & Deliver Coil #5	1	26OCT07*	26OCT07		422		47,210.00	48=47 ;						
1361C-106	3	Fab, Test & Deliver Coil #6	1	23NOV07*	23NOV07		402		47,210.00	48=47 ;						
1361C-107		Fab, Test & Deliver Coil #7	1	21DEC07*	21DEC07		393		47,210.00	48=47 ;						
1361C-108		Fab, Test & Deliver Coil #8	1	18JAN08*	18JAN08		380		47,210.00	48=47 ;						
1361C-109		Fab, Test & Deliver Coil #9	1	12FEB08*	12FEB08		374		47,210.00	48=47 ;						
1361C-110		Fab, Test & Deliver Coil #10	1	06MAR08*	06MAR08		357		47,210.00	48=47 ;						
1361C-111		Fab, Test & Deliver Coil #11	1	31MAR08*	31MAR08		348		47,210.00	48=47 ;						
1361C-112		Fab, Test & Deliver Coil #12	1	23APR08*	23APR08		331		47,210.00	48=47 ;						
1361C-113		Fab, Test & Deliver Coil #13	1	16MAY08*	16MAY08		418		47,210.00	48=47 ;						
1361C-114		Fab, Test & Deliver Coil #14	1	10JUN08*	10JUN08		402		47,210.00	48=47 ;						
1361C-115		Fab, Test & Deliver Coil #15	1	03JUL08*	03JUL08		385		47,220.00	48=47 ;						
1361C-116		Fab, Test & Deliver Coil #16	1	28JUL08*	28JUL08		369		47,220.00	48=47 ;						
1361C-117		Fab, Test & Deliver Coil #17	1	20AUG08*	20AUG08		352		47,220.00	48=47 ;						
1361C-118		Fab, Test & Deliver Coil #18	1	12SEP08*	12SEP08		336		47,220.00	48=47 ;						
1351-195X	3	ALL TF COILS DELIVERED	0		18SEP08		332		0.00	▼						
FY07 Rebaseline Exercise																
ECP53RBX03		FY07 Rebaseline exercise	22*	01MAY07A	31MAY07A				1,393.84	EA/EM =08hr ;						
99.07X		Retroactive MHX exclusion	22*	01MAY07A	31MAY07A				-38,281.20	▼						
Subtotal			0		18SEP08		332		1,002,070.66	▼						