## **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 co	ils														
Job Number: 1361															
Job Title: TF Coil Fabricatio	n														
Job Manager: Mike Kalish															
Description:															
Title I and II Engineering for PF Coils and Title	e III Suppo		tion Effort.												
		FY07\$K	1	2	: [	Т		<u>]</u>	HOURS	Г		ΙΤ	ПП	T	
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Task ID	41MS	48MS	35TR	ORNL	EMEM	EMSM	EMSB	EMTB	EAEM	EASB	EESM	EETB	ECSB	RM2	© 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																			
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Materials and Subcontracts (M&S)																			
Description:		FY0	<del>-</del>							НО	URS								
	1MS	8MS	37STK 35TRV	. Ē	N N	ORNL	MEM	MSM	EMSB	MTB	AEM	EEM	ESM	ESB	ETB	CSB	ECTB	M2 M3	Basis of Estimate
Procrurement & Fabrication	4	4	ന ന.		, Ош	ОЦ	ш	ш	ш	ш	ш ш	ш	ш	ш	ш	ш	ш		24010 01 201111410
Title III /Engrg	5.00									10	60								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
In House Inspection										68	48								Cover inspection for 18 coils, two engs - three days for the first coil, .5 day for one technician for subsequent coils
Support of Assembly operations and metrology										84	.4								.25% coverage during 35days FP#1 assembly of TFs + 10% coverage for 18days of FP#2 TF assembly
Contract Costs Remaining		965																	·
Additional Materials as Required	8.00																		Actual purchases (\$4K for glass insulation) => expect one more time
TOTAL	13	965								68 11	92								
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# NCSX June 2007 ETC TABLE III - Fabrication/Assembly Installation

WBS Number: 131						
WBS Title: Toroidal Field co	ils					
Job Number: 1361						
Job Title: TF Coil Fabrication	n					
Job Manager: Mike Kalish						
In-house Fabrication and Assen	nbly and Installation					
	nbly and Installation					
In-house Fabrication and Assen  Description: Incl in M&S Table II	nbly and Installation					
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### 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>	<b>Medium</b>	Low	Range (%)	Comments/Other Cionsiderations
Design Maturity	Х				Coils in fabrication - design is complete
				-10%/+15%	
Design Complexity		Х			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 AACEI recommended practice 18R-97 as amended for NCSX.

Uncertainty

Residual Impacts					Cost In	npact	Schedule I	mpact
Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Low	High	Low	High
•	duces a non-compliant coil requiring 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

  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%)