

## NCSX Fabrication Project Cost and Schedule Estimating Form

### WBS 132 PF Coils

#### Labor

Activity Title	Manhours	FY2003 \$\$	Labor Type	Start Date Month/Yr	End Date Month/Yr	Comments
<b>Preliminary Design (Title I)</b>						
( 50% of design schedule)	439		<i>EAEM</i>	Oct-03	Feb-04	PPPL Engineer
	732		<i>EADM</i>	Oct-03	Feb-04	PPPL Designer
	109		<i>ORNL Eng</i>	Oct-03	Feb-04	Composite of ORNL Engineer / Designer
	0		<i>ORNL Phys.</i>	Oct-03	Feb-04	Composite of ORNL Physics / scientific
	0		<i>PPPL Phys.</i>	Oct-03	Feb-04	PPPL Physics/scientific
<b>Final Design (Title II)</b>						
( 50% of design schedule)	439		<i>EAEM</i>	Feb-04	Jul-04	PPPL Engineer
	732		<i>EADM</i>	Feb-04	Jul-04	PPPL Designer
	109		<i>ORNL Eng</i>	Feb-04	Jul-04	Composite of ORNL Engineer / Designer
	0		<i>ORNL Phys.</i>	Feb-04	Jul-04	Composite of ORNL Physicist
	0		<i>PPPL Phys.</i>	Feb-04	Jul-04	PPPL Physics/scientific
<b>Lab R&amp;D labor</b>						
	0		<i>EAEM</i>	Oct-03	Feb-04	PPPL Engineer
	0		<i>EADM</i>	Oct-03	Feb-04	PPPL Designer
	0		<i>ORNL Eng</i>	Oct-03	Feb-04	Composite of ORNL Engineer / Designer
	0		<i>EASM</i>	Oct-03	Feb-04	PPPL monthly support
	0		<i>EMTB</i>	Oct-03	Feb-04	PPPL Technician
<b>Lab Fab/Assembly/Installation (Title III)</b>						
	704		<i>EAEM</i>	Jul-04	Jan-06	PPPL Engineer
	96		<i>EADM</i>	Jul-04	Jan-06	PPPL Designer
	62		<i>ORNL Eng</i>	Jul-04	Jan-06	Composite of ORNL Engineer / Designer
	0		<i>EASM</i>	Jul-04	Jan-06	PPPL monthly support
	0		<i>EMTB</i>	Jul-04	Jan-06	PPPL Technician

## NCSX Fabrication Project Cost and Schedule Estimating Form

### WBS 132 PF Coils

#### Labor

---

*Manhours per fiscal year by labor category*

Level of Effort		FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	TOTAL
PPPL Engineer	<i>EAEM</i>	0	993	471	119	0	0	1582
PPPL Designer	<i>EADM</i>	0	1480	64	16	0	0	1560
Composite of ORNL Engineer / Designer	<i>ORNL Eng</i>	0	229	42	11	0	0	281
PPPL monthly support	<i>EASM</i>	0	0	0	0	0	0	0
PPPL Technician	<i>EMTB</i>	0	0	0	0	0	0	0
Composite of ORNL Physics / scientific	<i>ORNL Phy</i>	0	0	0	0	0	0	0
PPPL Physics/scientific	<i>PPPL Phy</i>	0	0	0	0	0	0	0

## NCSX Fabrication Project Cost and Schedule Estimating Form

### WBS 132 PF Coils

#### M&S Costs

Activity Title	FY2003 \$\$	Comment
<b>Manufacturing Development (R&amp;D)</b>		
Purchased Design Services	\$0	
Procured Hardware/Material	\$0	
Profit	\$0	included in hardware estimate
<i>total, manf/dev (R&amp;D)</i>	\$0	w/o G&A
<b>Procured Hardware/Material</b>		
set of PF coils	\$852,103	
Profit	<u>\$85,210</u>	10% profit
<i>total, procured hdwe/matl.</i>	\$937,314	w/o G&A
<b>Purchased Design Services</b>	\$0	no purchased services anticipated
<b>Procured Installation/Assembly Costs</b>	\$0	All installation and assembly costs are included in WBS 7

#### Other Costs

Activity Title	FY2003 \$\$	Comment
Travel	\$4,000	two trips are anticipated for this WBS

## NCSX Fabrication Project Cost and Schedule Estimating Form

### WBS 132 PF Coils

#### Summary Costs

Activity Title	Manhours	FY2003 \$\$	Comment
<b>Labor</b>			
PPPL Effort	3,142	\$398,083	<i>Assumed rates:</i> <i>EAEM 153 \$/hr</i> <i>EADM 100 \$/hr</i> <i>ORNL Eng 130 \$/hr</i> <i>EASM 100 \$/hr</i> <i>EMTB 73 \$/hr</i> <i>PPPL Phys 141 \$/hr</i> <i>ORNL Phys 160 \$/hr</i>
ORNL effort	281	\$36,525	
subtotal, labor	3,423	\$434,608	
<b>M&amp;S, Other</b>			
Manufacturing Development (R&D)		\$0	
Procured Hardware/Material		\$937,314	
Purchased Design Services		\$0	
Procured Installation/Assembly Costs		\$0	
Travel		\$4,000	
subtotal, M&S		\$941,314	
<b>G&amp;A</b>		\$126,000	25% on all purchased materials, subcontracts, travel \$109,328 G&A adjustment on large procurement
<b>Subtotal without contingency</b>		\$1,501,921	
<b>Contingency</b>		\$360,461	24% Overall on this WBS
<b>Total cost</b>		\$1,862,382	



## NCSX Fabrication Project Cost and Schedule

### WBS 132 PF Coils

#### Engineering, Title I, II and III

**Description:**

This effort covers all Title I, II, and III engineering for the PF coils. All installation oversight will be performed as part of WBS 7.

	multiplier	unit	no.	hours	Labor category											
					total		EAEM		EADM		ORNL Eng		ORNL Physics		PPPL Physics	
					fraction	hrs	fract.	hrs	fract.	hrs	fract.	hrs	fract.	hrs	fract.	hrs
<b>Title I, II design</b>																
Pro-E models (avg)	16	hrs/model	33	528	1.00	0.25	132	0.50	264	0.25	132	0.00	0	0.00	0	
assy dwgs	40	hrs/dwg	9	360	1.00	0.00	0	1.00	360	0.00	0	0.00	0	0.00	0	
Detail drawings	16	hrs/dwg	30	480	1.00	0.00	0	1.00	480	0.00	0	0.00	0	0.00	0	
installation dwg	40	hrs/dwg	4	160	1.00	0.00	0	1.00	160	0.00	0	0.00	0	0.00	0	
cooling schematic	20	hrs/dwg	5	100	1.00	0.00	0	1.00	100	0.00	0	0.00	0	0.00	0	
electrical schematic	20	hrs/dwg	5	100	1.00	0.00	0	1.00	100	0.00	0	0.00	0	0.00	0	
I&C schematic	20	hrs/dwg	0	0	1.00	0.00	0	1.00	0	0.00	0	0.00	0	0.00	0	
stress analysis	40	hrs/calc	3	120	1.00	1.00	120	0.00	0	0.00	0	0.00	0	0.00	0	
thermal analysis	40	hrs/calc	2	80	1.00	1.00	80	0.00	0	0.00	0	0.00	0	0.00	0	
special analysis (electromagnetics)	80	hrs/calc	1	80	1.00	0.50	40	0.00	0	0.50	40	0.00	0	0.00	0	
procurement/fab specifications	80	hrs/spec	4	320	1.00	1.00	320	0.00	0	0.00	0	0.00	0	0.00	0	
preliminary and final design reviews	80	hrs/rev	0	0	1.00	0.80	0	0.00	0	0.20	0	0.00	0	0.00	0	
meetings/reporting/presentations	10%	% of tot	2328	233	1.00	0.80	186	0.00	0	0.20	47	0.00	0	0.00	0	
<i>subtotal</i>				2561			878		1464		219		0		0	
<b>Title III</b>																
vendor oversight, inspection	8	hrs/wk	52	416	1.00	1.00	416	0.00	0	0.00	0	0.00	0			
Disposition of deviation requests and non-conformances	4	hrs/wk	78	312	1.00	0.80	250	0.00	0	0.00	0	0.20	62			
As-built drawings	4	hrs/dwg	48	192	0.70	0.20	38	0.00	0	0.50	96	0.00	0			
<i>subtotal</i>				920			704		0		96		62			

# NCSX Fabrication Project Cost and Schedule

## WBS 132 PF Coils

### Engineering, Title I, II and III

Schedule assumptions	start	duration (weeks)	end
Title I Design	Oct-03	18	Feb-04
Title II Design	Feb-04	18	Jul-04
Procurement	Jul-04	52	Jul-05
In-house fab / sub-assy	Jul-05	0	Jul-05
Installation / final assembly	Jul-05	26	Jan-06

#### Notes and worksheets

#### Central solenoid assembly design

	total	integrated assembly	PF1,PF2, PF3 coils	PF4 coils	PF5 coils	PF6 coils	
Pro-E models	33	1	8	8	8	8	models of all parts
assy dwgs	9	1	2	2	2	2	double pancake, crossover/lead area, structure tube, c
Detail drawings	30	6	6	6	6	6	winding, lead blocks, crossover fillers, structure tube, :
installation dwg	4	1		1	1	1	
cooling schematic	5		2	1	1	1	
electrical schematic	5		2	1	1	1	
I&C schematic	0			0	0	0	covered in WBS 134
stress analysis	3	1	2	0	0	0	global and local analysis of winding pack and lead req
thermal analysis	2		2	0	0	0	global and local analysis of winding pack and lead req
special analysis	1	1		0	0	0	em analysis of lead area, general analysis in WBS 17
procurement specifications	4	1		1	1	1	one procurement specification for central solenoid ass
preliminary and final design reviews	0			0	0	0	standard reviews
meetings/reporting/presentations	10%						