

**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														Basis of Estimate		
					ORNLE	EM	ORNLE	DSN	ORNOL	RM	EMEM	EMSM	EMSB	EMTB	EAEM	EASM	EEEM	EESM		EESB	EETB
Title I and 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
Procurement 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	0	40	0	0	0	0	0	0	0	
Title III																					
vendor inspection & oversight	0	hrs per	1	0	0																
Disposition of deviation requests and non-conformances	0	hrs/wk	20	0	0																Based on recent experience on NCSX
In-House fab/assy oversight & inspection	0	hrs/wk	4	0	0																
As-built drawings	0	hrs/dwg	0	0	0																Based on recent experience on NCSX
Installation oversight & inspection	0	hrs/wk	4	0	0																
Subtotal Title III Design				0	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																					