

**NCSX June 2007 ETC
TABLE I - DESIGN LABOR**

WBS Number: 44									
WBS Title: Control and Protection Systems									
Job Number: 4401									
Job Title: Control and Protection Systems									
Job Manager: Raki Ramkrishnan									
Description: This is a LOE effort for design intergration, interface definition, and oversight of diagnostic systems design, fabrication, and installation									
Task Description	Activity	K\$			Labor Hours				Basis of Estimate (See Notes on Basis of Estimate Below)
		M&S	Travel	EASM	ECEM	EEEM	EESM	EETB	
WBS 441 Electrical Interlocks									
Design Interlock sys	441-095			40		80	80		
Install Interlock sys	441-097					80	80		Needed prior to coil energization
PLC Specification	441-100					24	56		
Prep Block diagrams	441-105					24	80		
<i>PLC CWD's & Cabling</i>	<i>441-110</i>					16	240	320	
deliver PLC	441-115	\$70K							
Program PLC Logic	441-120					64	240		Needed prior to coil energization
Program Control pages	441-125				40	32	120		Needed prior to coil energization
Pre-commissioning tests	441-130	\$1K				40	120		Needed prior to coil energization
Install I/O Cabling	441-135	\$38K		160		40	80	400	Needed prior to coil energization
WBS 442 Kirk Key Interlocks									
Kirk Keys-Dsn	442-1-2			80		40	40		
Kirk Keys-Procure	442-1-4	\$10K				8	24		
Kirk Keys-Install	442-1-6	\$15K				16	24	80	
Kirk Keys-Commission	442-1-8					16	20	20	Needed prior to coil energization
WBS 443 Real Time Control Systems									
Develop Control Algorithms-Dsn	443-1-2					80			Needed prior to coil energization
WBS 444 Instrument Systems									
DC Potential Transducers (DCPTs)-Dsn	444-2-2			40		24			
DC Potential Transducers (DCPTs)-Procure	444-2-4	\$6K		16					
DC Potential Transducers (DCPTs)-Install	444-2-6			16		16	24	160	
DC Potential Transducers (DCPTs)-Commission	444-2-8					24	24	60	Needed prior to coil energization
DC Shunts-Dsn	444-3-2			32		24			
DC Shunts-Procure**N/R**	444-3-4								
DC Shunts-Install**N/R**	444-3-6								
DC Shunts-Commission**N/R**	444-3-8								
Signal Conditioning & Cabling-Dsn	444-4-2			24		480			
Signal Conditioning & Cabling-Procure	444-4-4	\$12K				16			
Signal Conditioning & Cabling-Install	444-4-6					24		280	
Signal Conditioning & Cabling-Commission	444-4-8					48	40	40	Needed prior to coil energization

