

**NCSX Work Approval Form (WAF)**

**WBS Number: 821/822**

**WBS Title: Engineering Management and Systems Engineering**

**Job Number: 8202**

**Job Title: Engineering Management and Systems Engineering Support**

**Job Manager: Wayne Reiersen**

**Description:**

**Engineering Management**

The Engineering Manager is responsible for the successful execution of the engineering design, fabrication, and assembly efforts. Specific responsibilities include:

- Risk management
  - Project planning, including implementing the PPPL Work Planning (WP) program
  - Safety, including implementing the PPPL Integrated Safety Management (ISM) program
- Responsible Line Managers (RLMs) are responsible for managing the on-site fabrication and assembly work and the design, fabrication, and assembly of ancillary, facility, and electrical systems. Line management of the ORNL scope is part of WBS 19.

**Systems Engineering Support**

Responsibilities include:

- Requirements management
- Design verification, including a program for systematic design reviews
- Configuration management and change control, including processing of Requests for Deviations (RFDs), Engineering Change Proposals (ECPs), and Engineering Change Notices (ECNs), and interface control
- Document control, including maintaining a Web-based system for finding and retrieving project data and utilizing the PPPL Ops Center

**Schedule:** See Attachment

**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: 821/822  
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Job	WBS	Function	Resource Requirements	Basis of Estimate	
<b>8202 - Engineering Management and Systems Engineering Support (Reiersen)</b>					
		Travel	\$5K /year through 1st Plasma		
<b>821 - Engineering Management</b>					
		Engineering management	50% LOE for Reiersen through FY2007. Then 40% of Heitzenroeder starting in FY08 through first plasma.	This LOE is consistent with project experience and appropriate for balance of project.	Reiersen/Heitzenroeder
			50% LOE for Heitzenroeder for balance of FY07 to expedite resolution of key design issues.		
		Responsible line management	60% LOE for Dudek through final assembly. An additional 15% for Dudek from the start of FY08 through the completion of scope in WBS 2, 3, and 6 for which he has line management responsibility.		Dudek
		Responsible line management	15% LOE for Reiersen for WBS 13, 15, and 17 scope for which he has line management responsibility though FY2007. Then 10% of Heitzenroeder starting in FY08 through completion of these WBS elements.		Reiersen/Heitzenroeder
		Responsible line management	15% LOE for von Halle from the start of FY08 through the completion of WBS 4 and 5 scope for which he has line management responsibility.		vonHalle

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<b>822 - Systems Engineering</b>			
Requirements management	340 hours split between Reiersen and Simmons through first plasma.	This LOE effort includes the review and approval of product and assembly specifications and assembly procedures plus the effort to develop and maintain a DBMS for tracking the flowdown and verification of requirements. It is consistent with project experience and appropriate through 1st Plasma.	Reiersen/Simmons
Design verification	80 hours for Reiersen through FY07. Remaining 430 hours split between Reiersen and Simmons starting in FY08 through first plasma	Design reviews are conducted systematically in the development of subsystem, assembly, and major component designs; in the design of tooling; and at junctures where critical decisions are made. The effort includes chartering the reviews and posting the review documentation and chits. This LOE effort is consistent with project experience and appropriate through 1st Plasma.	Reiersen/Simmons
Configuration management and interface control	850 hours for Simmons through 1st Plasma	This LOE is consistent with project experience, primarily for processing changes, and appropriate through 1st Plasma.	Simmons
Document control	10% LOE for Simmons through 1st Plasma  10% LOE for Such through 1st Plasma	This LOE is consistent with project experience and appropriate through 1st Plasma.	Simmons
Training	5% LOE for Simmons through 1st Plasma	Training modules have been developed and training largely accomplished. Additional work will be on implementing changes and training new project personnel.	Such Simmons

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**TABLE I - Materials and Subcontracts**

Description:	None										

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**TABLE III - Fabrication and Assembly**

<b>Fabrication and Assembly</b>	None										

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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**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				LOE effort dependent on length of schedule
Design Complexity			X	-5%/+10%	LOE effort dependent on length of schedule

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

**Risks and Residual Impacts**

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High
8202	None							

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 loaded costs  
 Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact
- [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%)

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
<b>82 - Project Engineering</b>																
<b>Job: 8202 - Engr Mgmt &amp; Sys Eng Support-REIERSEN</b>																
<b>FY07 Rebaseline Exercise</b>																
ECP53RBX19		FY07 Rebaseline exercise	39*	01MAY07*	25JUN07		1,316	LOE	29,619.10	EA/EM =170hr ;						
820.04X		Engr Management FY07 (LOE)	103*	01MAY07	25SEP07		1,252	LOE	143,565.52	reiersen=50% loe ; heitzenroeder=50% loe						
820.04Y		Engr management (SA LOE)	827*	01OCT07*	01FEB11		422	LOE	531,578.18	reiersen=50% loe ; heitzenroeder=40% loe travel=\$5k/yr						
820.04Z		RLM (WBS 13,15,17) (SA LOE)	106*	01MAY07*	28SEP07		1,249	LOE	154,562.92	reiersen=15% loe						
820.0004Z		RLM (WBS 13,15,17) (SA LOE)	747*	01OCT07*	30SEP10		502	LOE	114,466.70	reiersen=15% loe ; heitzenroeder = 10% loe						
820.004Z		Reqmnts mgt & design verification	106*	01MAY07*	28SEP07		1,249	LOE	13,938.40	reiersen=80 hours						
820.0004Z		Reqmnts mgt & design verification	827*	01OCT07*	01FEB11		422	LOE	148,448.71	reiersen=555 hours; sir						
820-004Y		RLM (WBS 2,3 &6 ) (SA LOE)	747*	01OCT07*	30SEP10		502	LOE	148,616.69	Dudek=15% loe						
820.004X		RLM (fabrication) (SA LOE)	933*	01MAY07*	01FEB11		422	LOE	739,152.77	Dudek=60% loe						
820.005		RLM (WBS 4 & 5) (SA LOE)	826*	02OCT07*	01FEB11		422	LOE	178,479.64	vonhalle=.15% loe						
8205FY07		Systems Engineering Support document control	933*	01MAY07*	01FEB11		422	LOE	162,079.56	simmons=.850hrs						
8205FY08		Systems Engineering Support (SA LOE)	933*	01MAY07*	01FEB11		422	LOE	284,086.30	simmons=15% loe such=10% loe						
Subtotal			933	01MAY07	01FEB11		422	LOE	2,648,594.49							