

NCSX Work Approval Form (WAF)

WBS Number: 824
WBS Title: System Analysis and Technical Assurance
Job Number: 8204
Job Title: Systems Analysis and Technical Assurance
Job Manager: Art Brooks

Description:

Responsibilities include:

- Establishing structural and cryogenic design criteria. Completed
- Establishing dimensional accuracy requirements for coil systems based on field error considerations. Completed
- Analyzing field errors and managing field error budgets for as-designed conditions, out-of-tolerance conditions, eddy currents, and magnetic materials. Includes dispositioning nonconformance reports (NCRs).
- Providing analysis support to the metrology and dimensional control efforts for troubleshooting problems as well as production activities
- Analyzing options for optimally aligning modular coils based on physical and magnetic measurements
- Performing global analyses which are outside the scope of individual subsystems. Analyses include electromagnetic analyses to determine coil inductances, fields, forces; global structural modeling to determine overall structural behavior, mechanical interface loads, and operating limits. (Global seismic analyses will be performed as part of the base support structure design in WBS 15.)

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: 824
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Job	WBS	Function	Resource Requirements	Basis of Estimate
8204 - System Analysis and Technical Assurance (Brooks)				
824 - System Analysis and Technical Assurance				
		Field error analysis and management	680 hours for Brooks 340 hours EA/EM engineer through 1st Plasma	This LOE is consistent with project experience.
		Analysis and troubleshooting support for metrology and dimensional control	1700 hours for Brooks 680 hours EA/EM engineer through 1st Plasma	This LOE is consistent with recent experience. Substantial uncertainties exist for future demands as dimensional control plans have not yet been completed and metrology procedures developed and exercised.
		Modular coil alignment studies	680 hours for Brooks 340 hours for EA/EM engineer through final assembly	Initial studies have been completed. Optimal alignment studies not yet performed.
		Global modeling and analysis	320 hours for Fan through completion of coil structures and base support structure design (May-Sep 2007)	This LOE is consistent with recent experience and is expected to continue until the design of stellarator core components. Most of this work has already been completed but global structural models need to be updated as the design of the coil structures (WBS 15) and base support support structure (WBS 17) are completed.
		Technical assurance	1340 hours for Fan from the start of FY08 through 1st Plasma.	Tasks are authorized by the Engineering Manager to resolve critical issues when they arise. LOE is consistent with project experience.

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TABLE I - Materials and Subcontracts

WBS Number: 824								
WBS Title: System Analysis and Technical Assurance								
Job Number: 8204								
Job Title: Systems Analysis and Technical Assurance								
Job Manager: Art Brooks								
Description:	None							

NCSX June 2007 ETC
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		-15%/+25%	
Design Complexity		X			

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

Residual Impacts

<u>Job</u>	<u>Risk Description</u>	<u>Likelihood of Occurring</u>	<u>Mitigation Plan</u>	<u>Basis of estimate</u>	<u>Cost Impact</u>		<u>Schedule Impact</u>	
					<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
8204	Loss or prolonged unavailability of certain key personnel (Brooks) from the project could substantially impact the schedule.	VU	An EA/EM engineer has been budgeted to provide support to Brooks in Systems Analysis and Technical Assurance during peak demands and pick up the slack for Brooks should he became unavailable.	Estimated impact is <0.5 months on the critical path. No impact on FPA cost because impacted personnel would be assigned to other activities.	+\$0	+\$0	+ 0.00	+ 0.50

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	% cmlpt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 8204 - Systems Analysis-BROOKS																
8204FY07		Systems Analysis FY07 Analysis for structure dsn	106*	01MAY07	28SEP07		1,249	LOE	55,753.60	fan=320hrs						
8204FY08		Systems Analysis, studies and tech assurance	932*	01MAY07*	31JAN11		423	LOE	1,098,242.39	Brooks=3060 hrs Fan =1340 hrs EA/EM=1360						
Subtotal			932	01MAY07	31JAN11		423	LOE	1,153,995.99							