

NCSX Work Approval Form (WAF)

WBS Number: 81

WBS Title: Project Management and Control

Job Numbers: 8101, 8102, and 8998

Job Title: Project Management and Control - PPPL (8101)

Job Title: Project Management and Control - ORNL (8102)

Job Title: Project Allocations (8998)

Job Managers: Hutch Neilson (8101), Jim Lyon (8102), & Ron Strykowski (8998)

Description:

This WBS element includes the efforts of the Laboratory Project Manager, the ORNL Deputy Project Manager, and administrative staff. Also includes the efforts of the Project Control Manager. PPPL collects direct allocation costs in charged to the NCSX Project and Program in Job 8998. The direct allocation charges are to cover the allocated charges for the Computer Division's support and maintenance of the Laboratory computer systems and desktop computer support at PPPL and the diagnostic and rf development activities at PPPL.

Schedule:

See Attached

Approvals:

_____	_____
Job Manager	Date
_____	_____
Responsible Line Manager	Date
_____	_____
Project Manager	Date
_____	_____
Engineering Department Head	Date

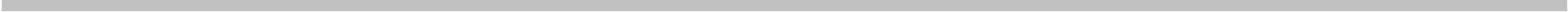
**NCSX June 2007 ETC
TABLE I - Design Labor**

WBS Number: 81
WBS Title: Project Management and Control
Job Numbers: 8101, 8102, and 8998
Job Title: Project Management and Control - ORNL (8201)
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			Annualized FTE's , M&S ,Travel						
FY-07 ETC Update			Avg. last 24 months	FY07	FY08	FY09	FY10	FY11	
81	R//RM3	Neilson	0.85	0.85	0.50	0.50	0.25	0.25	
81	EM//EM	Project Mgr.			0.75	1.00	1.00	1.00	
81	EM//EM	Const Mgr			0.50	0.50	0.50		
81	FC//AM	Strykowski	0.94	0.85	0.85	0.85	0.85	0.85	
81	FC//AM	P&C Officer		0.25	0.50	0.50	0.50	0.50	
81	B//CB	Hampton	0.29	0.40	0.80	0.80	0.80	0.50	
81	41	M&S	\$6.0K	\$12K	\$10K	\$10K	\$6K	\$3K	\$41
81	35	Travel	\$9.7K	\$10K	\$10K	\$10K	\$8K	\$4K	\$42
Job 8102			Annualized FTE's , M&S ,Travel						
81	ORNL	Lyon,Akers,	\$140.0K	\$145K	\$120K	\$120K	\$60K	\$60K	budget based on actual plus 3.5%/yr - includes travel and M&S Converted to \$
	ORNL	Dep Proj. Cntl		0.00	\$39K	\$40K	\$41K	0.00	
81	ORNL	Akers					\$0K		
81	ORNL 41	M&S					\$0K		
81	ORNL 35	Travel					\$0K		
Job 8998				\$145	\$159	\$160	\$101	\$60	
			Annualized FTE's , M&S ,Travel					0.24	
89 Direct allocations (PPPL applied "overhead")			n/a	\$218K	\$224K	\$232K	\$240K	\$120/yr	Estimated (as calculated by approx. PPPL based on RM's and \$12k/mo. EA analysts plus hp techs)

Basis of Estimate:
Level of Effort for Project Manager, Deputy Project Manager, and Project Control Manager for the balance of the project are estimated based on the actuals for the last two years, with adjustments. A Construction Manager is being added and Project Control support and Admin staffing is increased to strengthen management of the Project. Most of the remaining work, and all of the high-risk work, is in in-house activities carried out by an experienced PPPL Engineering Department staff. A Construction Manager is being added to ensure schedule management in the construction & integration of the facility. Project control staff is also being augmented to strengthen cost and schedule and risk management. As part of the "standing army" costs, project management is budgeted at the FY 09 LOE rate throughout the schedule contingency period.

NCSX June 2007 ETC
TABLE I - Design Labor



	FY07					FY08					FY09					FY10																					
hours	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	
R//RM: Neilsor hours	122.258	122.258	122.258	122.258	122.258	122.258	122.26	122.26	122.3	122.26	122	122	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	36	36	36	36	36	36	36	36	36	
FC//AM Strykov hours	122.258	122.258	122.258	122.258	122.258	122.26	122.26	122.3	122.26	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122		
B//CB Hampt hours	57.5333	57.5333	57.5333	57.5333	57.5333	57.5333	57.533	57.533	57.53	57.533	58	57.5	58	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115			

CD-4

\$k

	FY07					FY08					FY09					FY10																		
ORNL Lyon,A \$k	\$12	\$12	\$12	\$12	\$12	\$12	\$12	\$12	\$12	\$12	\$10	\$10	\$10	\$10	\$10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5

	FY07					FY08					FY09					FY10				
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TABLE II - Materials and Subcontracts

Description:

Included in Table I

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 TABLE III - Fabrication and Assembly

Job Managers: Hutch Neilson (8101), Jim Lyon (8102), & Ron Strykowsky (8998)												
Fabrication and Assembly	NONE											

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Uncertainty of the Estimate for Jobs 8101, 8202, and 8998

	<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.

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High
8101	Funding profile may not match assumptions which in turn could impact cost and schedule	U		Cost impact derived from stretchout	+\$0	+\$0	(2.00)	+ 2.00
	Overhead rates may change significantly which in turn could impact cost and schedule	U		Calculated on basis of \$45M ETC	(\$900)	+\$900	(1.00)	+ 1.00
	Escalation of Copper higher than base escalation rates	VL	Funding limits preclude early procurements to avoid escalation impacts	See separate sheet (Table VI) assume 5% to 20% higher per year escalation rate	+\$11	+\$81	+ 0.00	+ 0.00
	Escalation of Stainless Sheet and Inconel higher than base escalation rates	VL	Funding limits preclude early procurements to avoid escalation impacts	See separate sheet (Table VI) assume 5% to 20% higher per year escalation rate	+\$0	+\$0	+ 0.00	+ 0.00
	GPP projects not completed in time to support project needs	NC	Crane/HVAC Lab/DOE oversight Ample float					
	Labor rates may be significantly lower/higher than projected	L		Escalation rate may be anywhere in the range of 2-5% instead of the nominal rate of 3.4% for labor. Schedule impact is due to annual fundign constraints.	(\$500)	+\$500	(0.50)	+ 0.50

8102 - NONE

8998 - 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 man-hours (by demographic) and M&S direct cost under basis of estimate.
Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact
Project control is responsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
- [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%)

**NCSX June 2007 ETC
TABLE V - Basis of Estimate**

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E-mail dated June 7, 2007

Folks,

Based on the two P.U. Reviews in May and June and new P.U./PPPL reporting and review requirements, I have updated the estimate for Project Management. A basis of estimate description is attached. The estimate changes (relative to a month ago) were provided to Bob and Ron in a handwritten markup, but to summarize the changes:

PM increased from 0.75 to 0.85 fte (maintaining the present level, rather than dropping off as previously planned)
Project Control Mgr. increased from 0.80 to 0.85 fte. (ditto)
Deputy PM (ORNL) held at present level.
Added Construction Mgr. at 1.0 fte
Added Project Control staff at 1.5 fte (1.0 at PPPL, 0.5 at ORNL)
Admin increased from 0.3 to 0.8 fte.

The increases are a response to the review findings that day-to-day project management needs to be strengthened, including more disciplined risk management, daily and weekly meetings, semi-annual ETC updates, and more rigorous cost and schedule control. Also, the management team will need to support the planned increase in frequency and depth of reviews by PPPL upper management, P.U., and DOE.

Historically, we have overrun our estimates in this work package. I believe this new estimate is "realistic" with some potential for coming in at a lower cost: If the new CM proves to be very effective, the PM and Deputy PM may be able to shift some of their time to other activities, e.g. NCSX program. And we might be able to pare back the project control increases once we get over the learning curve of managing these new requirements.

Hutch

WBS 81. Project Management and Control

1. Project management

Laboratory Project Manager (J. L. Anderson, PPPL)

The Project Manager (PM) is responsible for the day-to-day execution of the NCSX project in a cost-effective manner, in accordance with requirements, procedures and standards, as set forth in the PPPL contract with DOE. This includes executing the technical, cost, schedule, project control, risk management, ES&H, and quality assurance aspects of the project within approved cost, schedule, and scope baselines, as defined in the Project Execution Plan and the contract. The PM is responsible for meeting the project's requirements for reporting to, and reviews by, the Laboratory, Princeton University, and the Department of Energy. He is the project's primary point of contact with DOE and with the Program Advisory Committee. He reports to the PPPL Director. Hutch Neilson will support the Project Manager as a deputy in the NCSX project office at PPPL.

Deputy Project Manager (J. F. Lyon, ORNL)

Responsible for execution of project work scope assigned to ORNL. A critical function is providing the necessary engineering resources, either via ORNL staff assignments or subcontracts, to support the critical design activities of the project. Reports to the Project Manager.

2. Construction Management

Construction Manager (T.B.D., PPPL)

The construction manager (CM) is responsible for completing remaining NCSX component fabrication activities, assembly of the NCSX stellarator device, installation, and integration with ancillary systems. The CM is responsible for safety performance, cost and schedule performance, and risk management for the assigned work scope. The CM chairs construction management meetings focused on integration and schedule on a daily and weekly basis. The CM reports to the NCSX project manager and supports the project in meeting requirements for reporting to, and reviews by, the Laboratory, Princeton University, and the Department of Energy.

NCSX June 2007 ETC TABLE V - Basis of Estimate

3. Project Control

Project Control (R. L. Strykowski, PPPL, Manager)

Responsible for all project control functions necessary to support NCSX Project activities.

- Work planning and administration of the central project control system;
- Risk management support, including tracking of risks and mitigation activities using the risk registry.
- Maintaining up-to-date NCSX cost and schedule estimates, including semi-annual project-wide updates of estimates-to-complete and following up with necessary adjustments.
- Project financial management and reporting, including cost-performance data for the PARS system, variance analysis, management reserves, cash flow, and staffing requirements.
- Performing administrative functions such as facility maintenance coordination, travel approvals and vouchers, and overall staff planning.

4. Administrative Support

Project Administrator (P. Hampton, PPPL)

Supports the PPPL project office (PM, CM, Project Control Staff) by providing administrative support such as conference arrangements, web site maintenance, travel arrangements, and document handling.

Basis of Estimate

The total level of effort for the Project Manager and deputies are increased compared to recent history. The PM continues as a full time position, but with a new incumbent, Jim Anderson. Anderson will be supported by the previous PM, Hutch Neilson, in the management of technical issues specific to stellarators. The ORNL Deputy PM, Jim Lyon, is about 1/3 time, commensurate with the scope of work being managed at ORNL.

A construction manager is being added to strengthen management of day-to-day project execution via daily and weekly meetings focused on schedule and integration, tracking of costs and schedules on a weekly basis, etc.

The Project Control manager continues at historical levels (essentially full time), but project control staff is now being added at both PPPL and ORNL to strengthen cost and schedule management, risk management, resource planning, maintenance of estimates, and to support expanded reporting and review requirements.

Administrative staff is being augmented to support the expanded project office staff.

WBS 89. Direct Allocations

The direct allocation charges (direct allocation of PPPL indirect costs) are to cover the allocated charges for the Computer Division's support and maintenance of the Laboratory computer systems, desktop computer support at PPPL, diagnostic and rf development activities at PPPL, and health physics sampling, data analysis and maintenance of the REML facility. The portion of the direct allocation budget applied to the NCSX project is calculated and controlled by the PPPL budget office as a function of the research, analyst, and health physics personnel budgeted to the project.

Allocation of indirect costs to final cost objectives (a.k.a. the NCSX MIE Project) is in reasonable proportion to the beneficial or causal relationship of the costs to the final cost objective. The Office of Resource Management provides guidance for categorizing activities as direct or indirect and is responsible for developing and documenting the methodologies and rates for distributing indirect costs to final cost objectives.

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TABLE VI - Special Material Escalation

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Special Materials

Delivery cost estimate (includes raw material cost, and vendor fabrication)

as spent \$K

		<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>TOTAL</u>
C - copper							
1352 - Job: 1352 - PF Coil Procurement-KALISH	141-038.1 PF Conductor Delivery		\$95				\$95
1354 - Job: 1354 - Trim Coil Design &Procurement-KALISH	184-037 External Trim Coil Procurement			\$34			\$34
1601 - Job: 1601 - Coil Services Design-GORANSON	132-038 Deliver Lead hardware and cables			\$65	\$18		\$83
4101 - Job: 4101 - AC Power-RAMAKRISHNAN	411-2-4 Grounding-Procure			\$10			\$10
4301 - Job: 4301 - DC Systems-RAMAKRISHNAN	431-265 Fabricate bus components			\$45			\$45
4301 - Job: 4301 - DC Systems-RAMAKRISHNAN	431-275 Power cabling & Installation			\$140			\$140
		\$0	\$95	\$293	\$18	\$0	\$407
S - Stainless Steel/Inconel							
1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	124-130 VV NB port cover Fabrication			\$59			\$59
1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	INTRF-001PPPL buy SS plate for welc	\$30					\$30
1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	1421-3060 Deliver Stud Kit (PE00733C	\$78					\$78
1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	1429-3060 Deliver Shim Stock	\$57	\$4				\$61
1752 - Job: 1752 - Base Support Proc-DAHLGREN	161-036.9 Deliver base support materials		\$30				\$30
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-037 Fabricate TF/MCWF mounting Compo	\$371					\$460
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-038 Fabricate PF Mounting components			\$480	\$109		\$589
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-039 Fabricate Final TF Assy components Component:			\$84			\$84
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-040 Fabricate Machine/base support interface			\$85			\$85
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-053 Deliver Inconel hardware		\$98				\$98
1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	162-057 Deliver Belleville Washers		\$14				\$14
		\$165	\$516	\$795	\$109	\$0	\$1,585

Estimate Raw material cost (delivery cost estimate x 50%)

C - copper - base estimate (assumes 2.5%/year escalation)		\$0	\$48	\$147	\$9	\$0	\$203
Additional Copper Escalation - Low End of Range	3% additional per year	0.000	0.030	0.061	0.093	0.126	
		\$0	\$1	\$9	\$1	\$0	\$11
Additional Copper Escalation - High End of Range	20% additional per year	0.000	0.200	0.440	0.728	1.074	
		\$0	\$10	\$65	\$6	\$0	\$81
S - Stainless Steel/Inconel (assumes 2.5%/year escalation)							
Additional Copper Escalation - Low End of Range	3% additional per year	0.000	0.030	0.061	0.093	0.126	
		\$0	\$8	\$24	\$5	\$0	\$37
Additional Stainless Steel/Inconel Escalation - High End of Range	20% additional per year	0.000	0.200	0.440	0.728	1.074	
		\$0	\$52	\$175	\$40	\$0	\$266