

QUARTERLY REPORT FORM

Report Date: June, 2004	U. S. DOE Project Manager's Progress Report	Office of Science
Project Number: MIE-02	Title: National Compact Stellarator Experiment	Program: FE
Report Period: 3rd Quarter FY2004	Location: Princeton Plasma Physics Laboratory	Project Office: CH

SUMMARY ASSESSMENT

	<u>Current Quarter</u>	<u>Previous Quarter</u>
Cost:	Satisfactory	Satisfactory
Schedule:	Satisfactory	Satisfactory
Technical:	Satisfactory	Satisfactory
Overall:	Satisfactory	Satisfactory

PROJECT MANAGEMENT

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COST/FUNDING (\$K)

	<u>Baseline</u>	<u>Current Estimate</u>	<u>Funding Received</u>
DOE TEC:	86,300	86,300	23,800
DOE TPC:	N/A	N/A	N/A
NON DOE:	0	0	0

CRITICAL DECISIONS

	<u>Number</u>	<u>Baseline</u>	<u>Actual/Forecast</u>
	1	Aug, 2002	Nov, 2002 (A)
	2	Jan, 2004	Feb, 2004 (A)
	3	Oct, 2004	Sep, 2004 (F)
	4	May, 2008	May, 2008 (F)

FUNDING PROFILE (KS)

Per Latest Approved Budget in \$M (as-spent)

	<u>FY03</u>	<u>FY04</u>	<u>FY05</u>	<u>FY06</u>	<u>FY07</u>	<u>FY08</u>	<u>Total</u>
TEC:	7.9	15.9	15.9	22.1	19.4	5.1	86.3
OPC:	N/A						
TPC:	N/A						
	N/A						

Cumulative Costing through end of **June, 2004**

	<u>TEC (\$K)</u>	<u>TPC (\$K)</u>
Costs Accrued:	\$ 16,647	N/A
Uncosted Commitments:	\$ 758	N/A
Remaining Uncommitted	\$68,895	

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SCHEDULE SUMMARY

	Start Date		Completion Date		Percent Complete	
	<u>Baseline</u>	<u>Forecast/Actual</u>	<u>Baseline</u>	<u>Forecast/Actual</u>	<u>Baseline</u>	<u>Actual</u>
Title I & II Design:	10/02	04/03 (A)	04/06 ⁽²⁾		54.0%	50.9%
Procurement:	08/03 ⁽³⁾	08/03 (A)	09/06 ⁽⁴⁾		16.0%	13.1%
Fab & Assembly	01/05 ⁽⁵⁾		12/07 ⁽⁶⁾		1.0%	0.9%
Start-up & Operation	04/07 ⁽⁷⁾		05/08 ⁽⁸⁾		0%	0%

(2) Last WBS 1 FDR

(3) VV Prototype Fabrication Release

(4) Delivery of Cryostat

(5) Begin MC winding effort

(6) Complete Installation of Cryostat

(7) Begin Startup testing WBS 85

(8) First Plasma

<u>Key Milestones</u> (LEVEL)	<u>Completed Since Last Report</u>	<u>Baseline Date (PEP)</u>	<u>Actual Date</u>
II	Vacuum Vessel Sub-Assembly FDR	July 2004	May 2004
II	Modular Coil Winding Form FDR	July 2004	May 2004
Joule	Prototype MCWF Casting Made	June 2004	May 2004

<u>Key Milestones</u> (LEVEL)	<u>Upcoming (Next Three Months)</u>	<u>Baseline Date(PEP)</u>	<u>Forecast Date</u>
I	CD-3	October 2004	September 2004
II	Award Vacuum Vessel Sub-assembly	December 2004	September 2004
II	Award Modular Coil Winding Form	November 2004	September 2004

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NARRATIVE HIGHLIGHTS (April 1 – June 30, 2004)

Modular Coil Winding Forms (MCWF) and Vacuum Vessel Sub-Assemblies (VVSA)

- Both vacuum vessel suppliers, Major Tool and Machine and Rohwedder, Inc., delivered their prototype vacuum vessel segments to PPPL.
- Both MCWF suppliers completed key steps in the fabrication of prototype MCWFs. The Energy Industries of Ohio (EIO) team completed all post-processing of the casting and delivered it to their machining partner. The J.P. Pattern team poured the casting and began the dimensional and radiographic inspection process.
- A final design documentation package for the VVSA and MCWF was issued, including system requirements, design descriptions, product specifications, and fabrication statements of work. The documents were posted on the project's web site for the FDR.
- A successful Final Design Review (FDR) was held May 19-20. The review panel, chaired by Carl Strawbridge of the SNS Project at ORNL, found that the VVSA and MCWF designs satisfy the technical requirements and are ready to proceed with procurement and fabrication.
- The fabrication drawings, CAD models, specifications, and statements of work were revised to incorporate FDR recommendations and underwent formal checking prior to being issued for fabrication.
- Requests for Proposals (RFPs) for fixed-price contracts for VVSA and MCWF fabrication were issued to the qualified supplier teams. (Proposals received and currently under evaluation.)

Modular Coil Windings

- Winding trials on the closed twisted tee form ("inch worm") were completed. Accomplishments from this activity include the development of conductor handling techniques, measurement techniques, tooling, and staff qualifications.
- An extensive series of materials tests was completed to determine the properties of the modular coil cable conductor and winding pack. Many epoxy-impregnated conductor specimens were fabricated to support the tests.
- Static properties measured included axial and transverse compression, and tensile modulus.
- Fatigue tests: accomplishments include the achievement of more than 150,000 cycles at LN2 temperatures and 1.5 to 2 times the alternating strain expected in the modular coils during operation; and a successful 2.6 million cycle (20 times life) test at LN2 temperatures.
- The preparation of the modular coil manufacturing facility, located in the former TFTR test cell, began. Accomplishments include the fabrication of the autoclave (the vacuum oven that will be used for vacuum-pressure impregnation of the coils) and placement in the facility, installation of the clean rooms for the winding and molding operations, and procurement of a laser scanning measurement arm following an evaluation of several sources.
- The insulated copper rope conductor that will be used for winding the twisted racetrack coil was delivered.
- Machining of the twisted racetrack winding form began. It is being fabricated under a contract with Energy Industries of Ohio (EIO). Delivery expected in early August.

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NARRATIVE HIGHLIGHTS (April 1 – June 30, 2004), cont'd.

Other Work Packages

- Conventional coils: an evaluation of U.S. industrial capability to fabricate the toroidal and poloidal field coils, the so-called conventional coil systems, showed that there are multiple viable U.S. suppliers capable of fabricating these coils, with careful project oversight.
- Power systems: A study showed that an alternative design using two D-Site circuits and six C-Site Robicon rectifiers can satisfy project requirements at reduced cost. The potential savings is approximately \$500k. Subcontract awarded for installation/assembly of D-site to C-site power supply structures.

Management

- A successful Office of Science (SC) Independent Project Review (IPR), or “Lehman” Review, of the NCSX project was held June 8-9. The review committee chaired by Steve Meador concurred with the FDR conclusion that the project is ready to proceed with the VVSA and MCWF procurements. They found that
 - the cost estimates and contingency at the current stage of the project are reasonable
 - the project schedule has been developed in greater detail since the project was baselined and remains credible.
 - the project has a strong team, with management tools and processes in place, and strong management support from PPPL and ORNL.
 - They recommended that, pending a successful outcome of the VVSA and MCWF procurement process, CD-3 should be approved.
- In preparation for the IPR and CD-3, documentation was issued addressing all the IPR/CD-3 scope items identified in the DOE project management document M413.3-1. The information is posted on the project’s web site.
- The project completed reports documenting its responses to the recommendations from the October, 2003 PDR and the November, 2003 Performance Baseline Review. The FDR committee found that design-related PDR issues have been adequately addressed.
- Dr. Manfred Wanner, head of the Wendelstein-7X stellarator device engineering team and a member of the FDR panel, gave a candid presentation of the experiences with the design, procurement, and assembly of major components for W-7X. It was very valuable for the NCSX team to learn how W-7X is meeting difficult challenges common to both projects.

- Performance metrics as of 6/30/2004
 - SPI = 0.92**
 - CPI= 0.93**

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WBS Cost Summary Plan (BO \$k)

Scope Item	<u>FY03 Actual</u>	<u>FY04 Plan</u>	<u>Actual</u>	<u>FY05 Plan</u>	<u>FY06 Plan</u>	<u>FY07 Plan</u>	<u>FY08 Plan</u>	<u>Total</u>
WBS-1 Core Systems	\$4,005	\$11,376	\$8,016	\$12,945	\$13,168	\$1,955	\$290	\$43,740
WBS-2 Heating, Fueling	\$ 207	\$101	\$111	\$108	\$520	\$758	-	\$1,694
WBS-3 Diagnostics	\$ 155	\$78	\$60	\$273	\$622	\$527	\$38	\$1,693
WBS-4 Power Systems	\$ 115	\$567	\$196	\$1,133	\$2,524	\$988	\$3	\$5,331
WBS-5 Central I&C	\$ 10	\$13	\$18	\$13	\$427	\$2,128	-	\$2,590
WBS-6 Facilities	\$ 9	\$32	\$16	\$14	\$331	\$1,684	-	\$2,071
WBS-7 Assembly	\$ 164	\$435	\$187	\$299	\$1,025	\$1,661	\$654	\$4,237
WBS-8 Project Mgmt	<u>\$1,277</u>	<u>\$2,370</u>	<u>\$2,101</u>	<u>\$1,869</u>	<u>\$1,854</u>	<u>\$2,523</u>	<u>\$903</u>	<u>\$10,793</u>
Total Plan (BO)	\$5,942	\$14,972	\$10,705	\$16,653	\$20,469	\$12,224	\$1,889	\$72,149
Contingency	-	\$ 0		\$1,355	\$2,465	\$7,145	\$3,215	<u>\$14,180</u>
Total Plan (BO)(ECP-9)	\$5,942	\$14,972		\$18,008	\$22,934	\$19,369	\$5,104	\$86,329
Total Plan (BA)	\$5,942	\$17,907		\$15,909	\$22,098	\$19,384	\$5,089	\$86,329