

National Compact Stellerator Experiment Mini-Review

DATE: December 7, 2004

LOCATION: Department of Energy, Germantown, Maryland

COMMITTEE: David Anderson, University of Wisconsin; Kin Chao, DOE; Jeff Hoy, DOE; Stephen Meador, DOE; and Bruce Strauss, DOE

SUMMARY:

The **Committee had numerous positive findings about the project team**, such as increased cost contingency, active management involvement, and quick responses to challenges. However, **the Committee remained concerned about the project's technical complexities and the adequacy of the cost and schedule contingency amounts.**

1. CURRENT STATUS OF PROJECT:

Total Estimated Cost (MIE)	\$86.3M
Start of Operations (CD-4)	May 2008 (Forecast)
Percent Complete as of October 30, 2004	23% (vs. planned 24.5%)
Contingency	\$13.05M (~25% of Estimate-to-Complete)

2. TECHNICAL:

- The project team has been very responsive to technical issues raised in previous reviews.
- The project has made progress since the September 2004 DOE review; **however, there are still potential technical difficulties that can be encountered** (i.e., problems with casting, Vacuum Vessel Sub-Assembly (VVSA) dies, etc.)
- **A much better idea of the challenges will be known in the next few months** as the first Modular Coil Winding Form (MCWF) and VVSA are fabricated.
- **The restructuring of the MCWF delivery order is a positive development** permitting assembly work to begin earlier, thereby reducing pressure on the assembly schedule.
- **Significant technical risk to the project remains in the coil cooling mechanism using chill plates.**

Issues/Recommendations:

- **Test the proposed coil cooling system as quickly as possible in the twisted racetrack coil to ascertain its effectiveness.**
- **As the Toroidal Field (TF) coils cannot be replaced without disassembly of the machine, the Committee urged the project to investigate ways to reduce risk/mitigate failure of the TF coils.**

3. COST:

- The project has **recently updated the Estimate-to-Complete (ETC).**
- The **contingency situation has slightly improved** since the September 2004 DOE review (from 22 to 25 percent of work remaining). This was accomplished by removing some scope (non-essential for CD-4, Approve Start of Operation).
- Despite this improvement, **contingency was still very tight** and the ten percent contingency for the VVSA and MCWF fixed price contracts appeared to be low.

- Engineering changes have been modest in both scope and number; none are currently pending approval.
- The risk analysis presented appeared to be reasonable.

Issues/Recommendations:

- **Update the ETC semi-annually.**

4. SCHEDULE AND FUNDING:

- The **project schedule** has been refined and **still contains five months of contingency**. **This may or may not prove to be adequate** depending on whether there are difficulties with MCWF and VVSA vendor deliveries and with winding the Modular Coils and assembling the Stellarator Core components.
- The **NCSX Budget Authority profile may be enhanced** by moving \$1.7 million from the outyears into FY 2005, **but the annual contingency allocation is still too back-end loaded.**

Issues/Recommendations:

- **The Office of Fusion Energy Sciences is still encouraged to accelerate the funding profile to allow for contingency to be used in the years when the project will need it the most.**

5. MANAGEMENT:

- The **project team and Princeton Plasma Physics Laboratory (PPPL) management are very committed to the project**. In addition, **the PPPL/Oak Ridge National Laboratory partnership continues to work well.**
- **Although it was not an issue in the past, some positive changes have been made in the NCSX management structure**, including having the project report directly to the PPPL Director's Office and having the PPPL Engineering Department more closely involved.
- The **project team has worked very hard to generate additional cost contingency**, and as a result, very little scope contingency remains.
- The project must **continue to work aggressively to identify and implement cost and schedule efficiencies**, since **much of the difficult work remains to be completed.**
- **Vendor quality assurance oversight is well planned**, and the "Rapid Response" program, to resolve vendor questions and challenges, appears to be an effective initiative.

Issues/Recommendations:

- **The project needs to have a more specific plan on staffing for the remainder of the project, especially the technical craft labor that will be needed in future years.**

6. ACTION ITEMS:

- Conduct the next DOE review in June 2005 at PPPL.