

## Bob Simmons

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**From:** Don Rej  
**Sent:** Wednesday, June 04, 2008 7:43 AM  
**To:** Jeffrey Harris; Hutch Neilson; Ronald L. Strykowski; Bob Simmons; Mike Williams; Phil Heitzenroeder; Lawrence E. Dudek; Alfred von Halle; Michael C. Zarnstorff; Don Hillis; Mike Cole  
**Cc:** Robert J. Goldston; Richard J. Hawryluk; Stan Milora; A.J. Stewart Smith  
**Subject:** OFES feedback on NCSX MIE Closeout Work

OFES feedback (in red) on NCSX MIE Closeout Work (proposed to DOE by PPPL on 5/27). Comments made at the Weekly Conf Call (6/2/08)

Present: Fonck, Nardella, Eckstrand, Oktay, Faul, Pitonak, Makiel, Goldston, Hawryluk, Tang, Rej

1. Closeout of NCSX MIE Project (FY08-09) Most work to be accomplished in FY08. Hard pressed for little more than publications in FY09.

a. Complete fabrication of major stellarator components very close completion (OK)

i. Modular coils. Total value \$40M; cost to complete \$150k.

ii. Toroidal field coils. Total value \$4.2M; cost to complete \$125k.

iii. Vacuum vessel sectors with installed services. Total value \$12M; cost to complete final testing \$200k.

b. Complete selected stellarator core design and R&D tasks to retire risks and reduce cost and schedule uncertainties

This section "doesn't hit the mark in what we are looking for;" perceived as "business as usual;" "need to scrub" to make sellable; "(DOE) will be taken to woodshed" on every activity; "Must have tremendous value to continue," like the modular coils; show significant cost avoidance if there is a real need to restart work later on ; wrapping up FDRs that are "95% complete" ok ; no MIE support for pre-PDR work (Gorenson's LN2 Manifold PDR on 6/5 an exception - conduct/document review but do not resolve chits) ; need to identify/communicate tasks that Project is not doing to show it is not business as usual.

i. Complete design integration of the stellarator core

\* Complete cryostat and cryogen supply and distribution system design through PDR. Value: Documentation of a self-consistent cryogenic cooling scenario and system design, reducing cost and schedule risks associated with assembly and cooldown. No. Do not do as part of MIE. Could be considered for R&D program in future years.

\* Complete electrical leads and neutral beam transition duct design through PDR. Value: Reduces cost and schedule risks associated with assembly and integration of the stellarator core with external electrical and mechanical systems. No. Do not do as part of MIE. Could be considered for R&D program in future years.

\* Complete FDRs of conventional coil support structures. Value: Completes the integration of the conventional (TF, PF, and trim) coil systems with the stellarator core, reduces risks associated with their fabrication and assembly, and completes the fabrication specifications for these systems. (Fabrication specifications for the coils

themselves are already complete.) OK.

\* Complete and document magnet analyses: coil protection limits and strategy; operating scenarios and fault modes; coil cooling. Documentation OK but do not do any new design analyses as part of the MIE.

\* Update the assembly sequence plan and assembly estimates. No. Do not do as part of MIE.

ii. Prototype critical assembly operations.

\* Assemble one complete field period through installation of two half-periods over a vacuum vessel sector (Station 3). Value: Retires cost and schedule risks associated with assembly including interference uncertainties, tooling performance, and completing the A-A modular coil joint in the vertical configuration.

Will consider a 2nd HPA, plus a trial fit of one HPA over a VVSA (trial fit and documentation only - no major rework) but Project must provide DOE a compelling justification of value, and show that it fits within remaining budget envelope.

\* Prototype critical Station 5 operations: alignment, welding, and leak check of ports; alignment and installation of TF coils. Value: Retires cost and schedule risks associated with assembly including alignment issues and tooling performance. No. Do not do as part of MIE. Could be considered for R&D program in future years.

\* Conduct targeted risk-reduction R&D studies for final field period assembly (Station 5) and final machine assembly (Station 6), using CAD modeling, small-scale physical models (e.g., stereolithography), and small-scale tests and mockups. Value: Reduce cost and schedule risks associated with port interference uncertainties, installation of high-performance insulating materials, assembly of the final vacuum vessel joints and coil joints at the field period interface. No. Do not do as part of MIE. Could be considered for R&D program in future years.

iii. Produce a credible final estimate to complete (ETC).

\* Update risk register based on results of closeout activities. OK.

\* Update estimates of the cost and schedule to complete the project, including a risk-based contingency analysis. No. Do not do as part of MIE.

\* Produce a resource-loaded schedule for remaining MIE work. No. Do not do as part of MIE.

\* Validate ETC through external peer review. No. Do not do as part of MIE.

c. Document and publish contributions to fusion engineering knowledge made by the NCSX project. OK.

d. Secure equipment OK.

e. Closeout costs OK.

Procurements, etc

f. Issue final MIE project closeout report OK.

