

Deliverables for Phase IIa (March 1, 2000)

Improved physics tools to implement new requirements.

Physics Requirements

1. Startup, flexibility, and robustness requirements (plausible profile sets) defined, and snapshot transport/stability assessments complete. **(Zarnstorff)**
2. Access. Requirements for heating, diagnostic, and pumping access are defined. **(Zarnstorff)**
3. Documentation. Updated Physics Requirements document is issued. **(Zarnstorff, Reiersen)**

Equilibrium code upgrades.

4. Upgraded VMEC, with convergence and resolution issues resolved, completed and implemented in the configuration optimizer. **(Hirshman, Reiman)**
5. PIES code modifications to improve physics (implementation of neoclassical effects) and efficiency (speed, usability) and are implemented and tested. **(Monticello)**
6. PIES and VMEC consistent with each other. **(Hirshman, Monticello)**

Physics targeting.

7. At least one improved transport evaluator implemented/tested in plasma configuration optimizer. **(Reiman, Zarnstorff)**
8. Optimizer criteria for obtaining good magnetic surfaces implemented/tested in plasma configuration optimizer. **(Reiman, Zarnstorff)**

Flexibility evaluation.

9. Methodology for evaluation of coil-set flexibility/startup/robustness is developed and tested. **(Zarnstorff)**

Coil configuration searching.

10. Improved methodology for finding the optimum conformal coil configuration for a given plasma and background coil set implemented/tested. **(Hirshman)**
11. Capability to handle alternative background and conformal coil topologies of interest is available. **(Hirshman)**

Reactor extrapolations

12. QA Reactor parameter sensitivities based on scoping using available QA plasma and modular-coil solutions and spreadsheet models complete. **(Lyon)**

Candidate machine topology options for evaluation.

Access evaluation

13. Implications of access requirements set by Physics (space envelopes, constraints) are understood well enough to evaluate proposed machine concepts. **(Reiersen)**

Machine topology options definition.

14. Several machine topology options have been explored and are defined for comparative evaluation in the next phase. Background coil options currently envisioned to be studied are:
 - A) Straight vertical TF coils
 - B) Tilted, planar TF coils
 - C) Modular coils (tilted TFs with out-of-plane deformations)
 - D) Torsatron windingConformal coils can be saddles, wavy PF's, modulars, or combinations thereof. **(Reiersen)**

Cabled conductor R&D

15. Cabled conductor design criteria are defined. **(Nelson)**