ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Grantee/Contractor Laboratory: Princeton University/Princeton Plasma Physics Laboratory (PPPL)
Project/Activity Title: Construction and Operation of the National Compact Stellerator Experiment (NCSX)
CH NEPA Tracking No.: Type of Funding SC
B&R Code: AT5015020 Total Estimated Cost: $69M

DOE Cognizant Secretarial Officer (CSO): Raymond L. Orbach
Contractor Project Manager: --------- Signature: --------
Date: --------

Contractor NEPA Reviewer: Jerry D. Levine Signature:
Date:

I. **Description of Proposed Action:** The National Compact Stellarator Experiment (NCSX) would be an experimental research facility whose purpose would be to develop the physics of compact stellarators, an innovative fusion confinement concept. NCSX would consist of a plasma confinement device made up of an assembly of several magnet systems and structures that surround a highly shaped plasma (see attached figure). Coils would be provided to produce a magnetic field for plasma shape control, inductive current drive, and field error correction. A vacuum vessel and plasma facing components would produce a high vacuum plasma environment with access for heating, pumping, diagnostics, and maintenance. The device would be enclosed in a cryostat to permit cooling of the magnets at cryogenic temperature.

The NCSX device would be installed in the C-site test cell (formerly occupied by the Princeton Large Torus and Princeton Beta Experiment facilities) at the Princeton Plasma Physics Laboratory. This test cell would be refurbished and would have been previously cleared of equipment that would not be reused. NCSX would be equipped with neutral-beam heating systems, radiofrequency (RF) heating systems, pumps, fueling systems, diagnostics, control systems, and data acquisition systems. Site infrastructure such as cryogenic systems and utility services would be used. The PBX/PLT computer and control rooms, which are contiguous to the test cell, would be refurbished and utilized. Power supplies currently located at D-site would be used by running approximately 500 ft of copper transmission lines from equipment in the D-Site Field Coil Power Conversion (FCPC Building) to the C-Site EF/OH Building, and then to NCSX. The FCPC Building 2nd floor would be mostly cleared to provide space for NCSX Electrical equipment and associated raceways / cable runs to be installed in that area. All the equipment / offices in the TF wing except the Vacuum Lab located in the West side of the wing and HVAC equipment, would be cleared. In the PF wing, all the Surface Pumping equipment and the offices would be cleared (note: none of the basic building infrastructure equipment would be cleared, including HVAC, lighting, fire protection, electrical outlets located in permanent walls, etc). Ancillary systems would be provided using a combination of new and existing equipment. Major site credits (existing equipment and facilities) to be used would be the PBX-M neutral beams, D-site magnet power supplies originally used on TFTR, some C-site power supplies, the PBX-M vacuum pumping and gas injection systems, the test cell and associated infrastructure, and the adjacent control and computer rooms. As part of the project, the facilities and equipment to be re-used would be reconfigured or refurbished as needed to meet NCSX requirements.

It is planned to fabricate the NCSX device from three (3) identical sections, each comprised of one third of the vacuum vessel plus six (6) Toroidal Field (TF) and modular coils. These sections (or "field periods") would be pre-assembled in the TFTR Test Cell at D-Site, where they would be baked out using the existing NSTX Bakeout System and vacuum leak checked. Each field period would then be transported to the C-Site test cell for final machine assembly. After completion of assembly and installation, an integrated testing program would be carried out and a plasma ("first plasma") would be produced in the device to make it ready for experimental operations.

Experiments, would be carried out using hydrogen, helium and deuterium; no tritium fuel would be used. Emissions to the environment would consist of very small amounts of these gases, tritium produced by D-D fusion (estimated to be < 1 Ci/yr), and 10,000-30,000 gallons per week of vaporized liquid nitrogen boiloff from the cryostat. Maximum offsite radiation doses (due to tritium and radiation produced by the plasmas) would be very small, < 2 mrem/yr; worker exposures would comply with PPPL and DOE standards. Waste disposed would be mainly steel and copper, and would not require construction of any new facilities. Construction activities would involve the removal of approximately 160 tons of stainless steel, 80 tons of copper and 5 tons of aluminum that would be recycled to the maximum extent possible and several tons of non-metals (plastics, wood and fiberglass) that would be disposed of as domestic waste. About 140 tons of material (stainless steel, copper, inconel, graphite, aluminum, glass & foam) would be used to fabricate the NCSX device, and 30-35 tons of copper cable would be run between D-Site and C-Site to power the coil systems. Sheet rock, new lighting, and new floors and ceiling would be used to construct the NCSX Control Room. Wastes may include small amounts of hazardous wastes (i.e., machinist coolant, used vacuum pump oil, epoxy/cements, waste solvents, and solvent soaked rags), and very small amounts (< 0.001 Ci per year) of tritium contaminated vacuum pump oil. Construction and fabrication activities would take place mainly in 2004-2006, with operations commencing in 2007.

II. **Description of Affected Environment:** Work would take place in the former PBX-M and PLT test cells and PBX-M/PLT control room at C-Site, the OH/EF Building at C-Site, the TFTR Test Cell at D-Site, and the FCPC Building at D-Site. Also, the power cable run from D-Site to C-Site will pass over some outdoor areas and require digging. See attached map and figures.

III. **Potential Environmental Effects:** (Attach explanation for each "yes" response, and "no" responses if additional information is available and could be significant in the decision making process.)

A. Sensitive Resources: Will the proposed action result in changes and/or disturbances to any of the following resources?

		Yes/No
1.	Threatened/Endangered Species and/or Critical Habitats	1. No
2.	Other Protected Species (e.g. Burros, Migratory Birds)	2. No
3.	Wetlands	3. No
4.	Archaeological/Historic Resources	4. No
5.	Prime, Unique or Important Farmland	5. No
6.	Non-Attainment Areas	6. No
7.	Class I Air Quality Control Region	7. No

8.	Special Sources of Groundwater (e.g. Sole Source Aquifer)	8. No
9.	Navigable Air Space	9. No
10.	Coastal Zones	10. No
11.	Areas w/Special National Designation (e.g. National Forests, Parks, Trails)	11. No
12.	Floodplain	12. No

B. Regulated Substances/Activities: Will the proposed action involve any of the following regulated substances or activities?

Yes/No

13. Clearing or Excavation (indicate if greater than 5 acres) — 13. No
Some digging for footings would be required for the power cable runs between D-Site and C-Site; disturbed area would be about 0.2 acres.
14. Dredge or Fill (under Clean Water Act section 404; indicate if greater than 10 acres) — 14. No
15. Noise (in excess of regulations) — 15. No
16. Asbestos Removal — 16. Yes
The C-Site Test Cell walls are made of asbestos panels. Any wall modifications (e.g., penetrations) could result in asbestos waste, which would be handled using existing PPPL procedures.
17. PCBs — 17. No
18. Import, Manufacture or Processing of Toxic Substances — 18. No
19. Chemical Storage/Use — 19. Yes
Examples of chemicals that would be used during this work would include ethanol, acetone, epoxy, RTV sealant and insulating compounds. All chemicals would have accompanying material safety data sheets (MSDSs) reviewed with Industrial Hygiene, and would be used and stored per PPPL policies and procedures. Gases such as hydrogen, deuterium, helium, argon & nitrogen would be used for experiments.
20. Pesticide Use — 20. No
21. Hazardous, Toxic, or Criteria Pollutant Air Emissions — 21. No
About 1 Ci/yr maximum of tritium produced during operations would be vented to the atmosphere, well within the site limit of 500 Ci/yr.
22. Liquid Effluent — 22. No
23. Underground Injection — 23. No
24. Hazardous Waste — 24. Yes
Wastes may include small amounts of hazardous wastes (i.e., machinist coolant, used vacuum pump oil, epoxy/cements, waste solvents, and solvent soaked rags). These would be disposed of in accordance with approved PPPL procedures.
25. Underground Storage Tanks — 25. No
26. Radioactive (AEA) Mixed Waste — 26. No
27. Radioactive Waste — 27. Yes
V*ery small amounts (< 0.001 Ci per year) of tritium contaminated vacuum pump oil may be produced during D-D operations. These would be disposed of in accordance with approved PPPL procedures.*
28. Radiation Exposures — 28. Yes
Radiation shielding and administrative controls would limit worker exposures in accordance with PPPL requirements (e.g., ≤ 1,000 mrem/yr, ≤ 600 mrem/qtr). Doses to the public from direct/scattered radiation from the plasma and from air emissions would be < 2 mrem/yr.

C. Other Relevant Disclosures. Will the proposed action involve the following?

Yes/No

29. A threatened violation of ES&H regulations/permit requirements — 29. No
Equipment would require application of proper electrical and/or mechanical safing

procedures, including lockout/tagout. All activities would apply safety requirements of the PPPL ES&H Manual and PPPL policies and procedures (e.g., hoisting and rigging). Appropriate personal protective equipment (e.g., fall protection, hard hats, safety shoes, gloves, etc.) would be used. Work preplanning (e.g., job hazard analyses) to mitigate hazards would be conducted, and the area would be posted to limit unauthorized access. Appropriate measures would be taken to protect workers from adverse effects of atmospheric emissions of up to 30,000 gallons/wk of vaporized LN2.

30. Siting/Construction/Major Modification of Waste Recovery, or TSD Facilities — 30. No
31. Disturbance of Pre-existing Contamination — 31. No
32. New or Modified Federal/State Permits — 32. No
33. Public controversy — 33. No

Trucking in of liquid nitrogen (estimated to require up to 3 trucks per day during operating periods) would not add significantly to current traffic patterns in the vicinity of PPPL.

34. Action/involvement of Another Federal Agency (e.g. license, funding, approval) — 34. No
35. Action of a State Agency in a State with NEPA-type law. (Does the State Environmental Quality Review Act Apply?) — 35. No
36. Public Utilities/Services — 36. No
37. Depletion of a Non-Renewable Resource — 37. No

IV. **Section D Determination:** Is the project/activity appropriate for a determination by the OM under Subpart D of the DOE NEPA Regulations for compliance with NEPA?

Yes

A. **DOE-CH NEPA Coordinator Review:**

DOE-CH NEPA Coordinator Reviewer: Allen Wrigley

Signature:_____ Date:_____

B. **DOE CH NCO NEPA Review:**

NCO Concurrence with Proposed Class of Action Recommended

CX **EA** EIS

Category

DOE CH NCO Reviewer: J. T. Zamirowski

Signature:_____ Date:_____

DOE Recommendation Approvals:

CH PG: Jerry W. Faul Signature:_____

Date:_____

CH NCO: J. T. Zamirowski Signature:_____

Date:_____

CH GLD: Irene P. Atney Signature:_____

Date:_____

CH ESHD: Michael J. Flannigan Signature:_____

Date:_____

CH AMST: John P. Kennedy Signature:_____

Date:_____

Office Manager Subpart D Determination

I HAVE DETERMINED THAT AN EA SHOULD BE PREPARED FOR THE PROPOSED ACTION DESCRIBED IN THE EENF AND BY MY SIGNATURE BELOW, YOU ARE AUTHORIZED TO PROCEED WITH THE PREPARATION OF AN EA. No further action should be taken on the project until the EA is completed, except in accordance with 40 CFR 1506.1(a). I also request that you prepare and submit a schedule to the CH NCO for the activities associated with the completion of the EA.

CH Office Mgr: Marvin E. Gunn Signature:_____

Date:_____