

ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Grantee/Contractor Laboratory: Princeton University/Princeton Plasma Physics Laboratory (PPPL)
Project/Activity Title: Installation and Operation of FLARE (Facility for Laboratory Reconnection Experiments)

CH NEPA Tracking No.: _____ Type of Funding WFO

B&R Code: _____ Total Estimated Cost: \$ 4.2M

DOE Cognizant Secretarial Officer (CSO): _____

Contractor Project Manager: _____ Signature: _____

Date: _____

Contractor NEPA Reviewer: Jerry D. Levine Signature: _____

Date: _____

I. **Description of Proposed Action:** The Facility for Laboratory Reconnection Experiments (FLARE) device would assist in the study of magnetic reconnection, a key physics process in solar physics, magnetospheric physics, astrophysics, and high-temperature laboratory experiments. This device would follow up on the results of the Magnetic Reconnection Experiment (MRX), which has been successfully and safely operated at PPPL since the 1990's. Operation of FLARE would allow access to dimensionless physics parameters orders of magnitude beyond that presently obtained in current dedicated reconnection experiments. This would introduce new physics—beyond the standard single-reconnection-site models—that is believed to be active and crucial in nearly all plasmas of interest (space, solar, astrophysical, fusion), and would allow study of the major open questions in reconnection physics.

Manufacturing and assembly work on the components of the FLARE device would take place on the Princeton University Main Campus, about 3 miles from PPPL, as a Princeton University project. The completed device would be moved from Main Campus to PPPL and be housed in an existing test cell in the C-Site C-Stellarator (CS) Building high bay area. To support operation of FLARE, some facility renovations would be made including running high voltage AC power from the adjacent C-Site Motor Generator (MG) Bldg. to the CS high bay, installing additional piping and equipment to bring deionized water cooling for FLARE equipment from the C-Site MG Bldg. to the CS Bldg., and installing high energy capacitor banks in the CS Bldg. basement. In addition, FLARE control equipment would be installed in an existing control room space near the device location, and a platform would be constructed in the CS Bldg. high bay around the FLARE device to provide access for maintenance and operations support (the platform installation may require removal of some existing shield blocks). Various diagnostic equipment (e.g., Thomson Laser, Diagnostic Neutral Beam, probes, etc.) would be installed to measure key FLARE physics parameters. See figures below.

Installation work for FLARE would include the following key components and activities:

- Flux cores
- Guide field (GF) coils
- Equilibrium field (EF) coils
- Ohmic field (OH) coils
- Charging circuits for Flux Core Toroidal Field (FCTF) coils, Flux Core Poloidal Coils (FCPC) and GF Coils

- Firing circuit (ignitrons) for FCTF, FCPC, GF
- Capacitor bank installation for FCTF, FCPC, GF
- Installation and commissioning of FCTF, FCPC, GF
- Lab view controls and instrumentation
- Control cables
- Gas injection
- Vacuum interfaces, flanges, and seals
- Vacuum pumping capability (vacuum level must be adequate to achieve a plasma of a quality necessary to verify operation capability)
- Installation of the complete device in the test cell
- Inner and outer driver coils
- Driver coil capacitor banks and bus connections
- OH coil capacitor banks and bus connections
- Charging circuits for EF, Driver Inner (DI), Driver Outer (DO), OH coils
- Firing circuits (ignitrons) for EF, DI, DO, OH coils
- Cooling water manifolds, hoses, and connections
- Permanent cable runs from control room to test cell

II. **Description of Affected Environment:** Work would take in the C-Site CS Building 1st Floor (High Bay for Test Cell) and Basement; and C-Site MG Building (see attached map). No environmentally sensitive resources would be affected.

PPPL is located on Princeton University's James Forrestal Campus in Plainsboro Township, Middlesex County (central New Jersey), adjacent to the municipalities of Princeton, Kingston, East and West Windsor, and Cranbury, NJ. It occupies approximately 88.5 acres in the areas known as "C- and D-sites." PPPL has operated on the current site since 1959. The closest urban centers are New Brunswick, 14 miles (22.5 km) to the northeast, and Trenton, 12 miles (19 km) to the southwest. Within a 50-mile (80 km) radius are the major urban centers of New York City, Philadelphia, and Newark. Princeton University's main campus is approximately three miles west of the site, primarily located within the borough of Princeton.

The estimated resident population within 10 miles (16 kilometers) of PPPL is about 500,000. The total estimated population within a 50-mile (80 kilometer) radius of PPPL is approximately 17.7 million.

Surrounding the site are lands of preserved and undisturbed areas including upland forest, wetlands, open grassy areas, and a minor stream, Bee Brook, which flows along PPPL's eastern boundary. These areas are designated as open space in the James Forrestal Campus (JFC) site development plan.

The climate of central New Jersey is classified as mid-latitude, rainy climate with mild winters, hot summers, and no dry season. Temperatures may range from below zero to above 100 degrees Fahrenheit (°F) (-17.8° Celsius (C) to 37.8° C); extreme temperatures typically occur once every five years. Approximately half the year, from late April until mid-October, the days are freeze-free. Normally, the climate is moderately humid with a total average precipitation about 46 inches (116 cm) evenly distributed throughout the year.

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?

	<u>Yes/No</u>
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?

	<u>Yes/No</u>
13. Clearing or Excavation (indicate if greater than 1 acre; if more than 5,000 sq. ft., a Soil Erosion / Sediment Control Permit may be required from Freehold Soil Conservation District.) <i>Note: Soil disturbance includes clearing, grading, excavation, storage, and filling. Soil erosion and sediment control permits required if $\geq 5,000$ sq. ft. Note: Excavations expected to encounter ground water may require a permit.</i>	13. No
14. Dredge or Fill (under Clean Water Act section 404; indicate if greater than 1 acre)	14. No
15. Noise (in excess of regulations)	15. No
16. Asbestos Removal	16. No
17. PCBs	17. No
18. Import, Manufacture or Processing of Toxic Substances	18. No
19. Chemical Storage/Use <i>Use of standard shop chemicals as well as cleaning solvents, pump oil, and compressed gases (e.g., hydrogen, nitrogen, etc.). Compressed gases would be used and stored in compliance with the PPPL Safety Manual.</i>	19. Yes
20. Pesticide Use	20. No
21. Hazardous, Toxic, or Criteria Pollutant Air Emissions	21. No
22. Liquid Effluent	22. No
23. Underground Injection	23. No
24. Hazardous Waste	24. No
25. Underground Storage Tanks	25. No
26. Radioactive (AEA) Mixed Waste	26. No
27. Radioactive Waste	27. No

28. Radiation Exposures 28. Yes
Potential worker exposures to magnetic fields and laser radiation (from diagnostic equipment) would be controlled in accordance with PPPL Safety Manual requirements. There would be no potential exposures to the public.

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

- | | <u>Yes/No</u> |
|---|---------------|
| 29. A threatened violation of ES&H regulations/permit requirements
<i>Job hazard analyses (JHAs) would be required for these activities. The requirements of 10CFR851 (as implemented under the DOE approved PPPL Worker Safety and Health Program) would be applied to work at PPPL under this proposed action.</i> | 29. No |
| 30. Siting/Construction/Major Modification of Waste Recovery, or TSD Facilities | 30. No |
| 31. Disturbance of Pre-existing Contamination
<i>Note: Excavations that encounter contaminated ground water require a permit.</i> | 31. No |
| 32. New or Modified Federal/State Permits | 32. No |
| 33. Public controversy | 33. No |
| 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 under Subpart D of the DOE NEPA Regulations for compliance with NEPA?

DOE-PSO NEPA Compliance Officer (NCO) Review:

Concurrence with Proposed Class of Action Recommended
CX EA EIS

Category: B3.6 Small-scale research and development, laboratory operations, and pilot projects.

For Categorical Exclusions (CXs):

- A. The proposed action fits within a class of actions that is listed in Appendix A or B to Subpart D. For classes of actions listed in Appendix B, the following conditions are integral elements; i.e., to fit within a class, the proposal must not:

- 1) Threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders;
- 2) Require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities;
- 3) Disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and

- natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or
- 4) Adversely affect environmentally sensitive resources.

B. There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal; and

C. The proposal is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

V. DOE Recommendation Approval:

4) Adversely affect environmentally sensitive resources
 PSO Staff: Tracy Estes Signature: TRACY ESTES

Digitally signed by TRACY ESTES
 DN: c=US, o=U.S. Government,
 ou=Department of Energy, cn=TRACY ESTES,
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 Date: 2015.05.21 12:33:41 -0400'

B. There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal; and
 Date: _____

C. The proposal is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.
 SC GLD: Michael M. McCann Signature: Michael M. McCann
 Attorney-Advisor

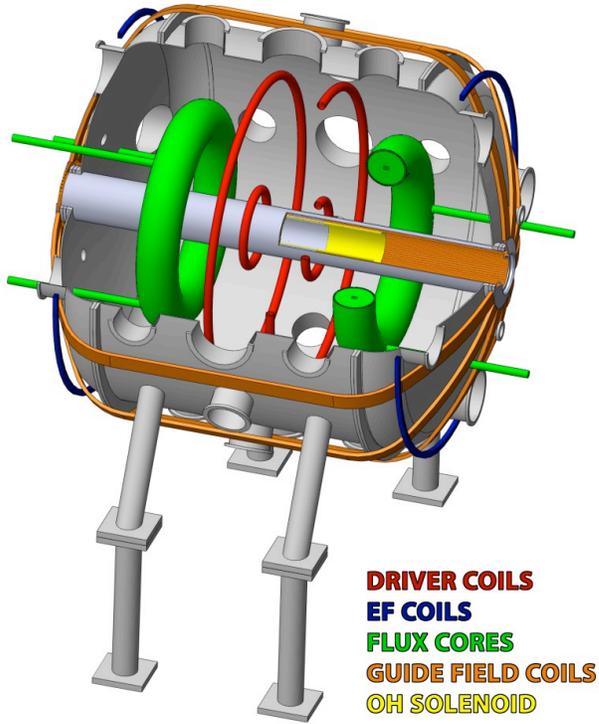
Date: 5/21/15

VI. NEPA Compliance Officer Subpart D CX Determination and Approval:

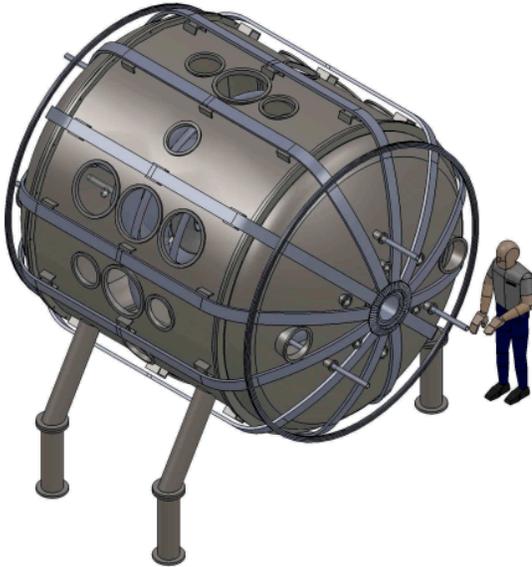
Based on my review of information conveyed to me and in my possession (or attached) concerning the proposed action, as NEPA Compliance Officer, I have determined that the proposed action fits within the specified class of actions, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

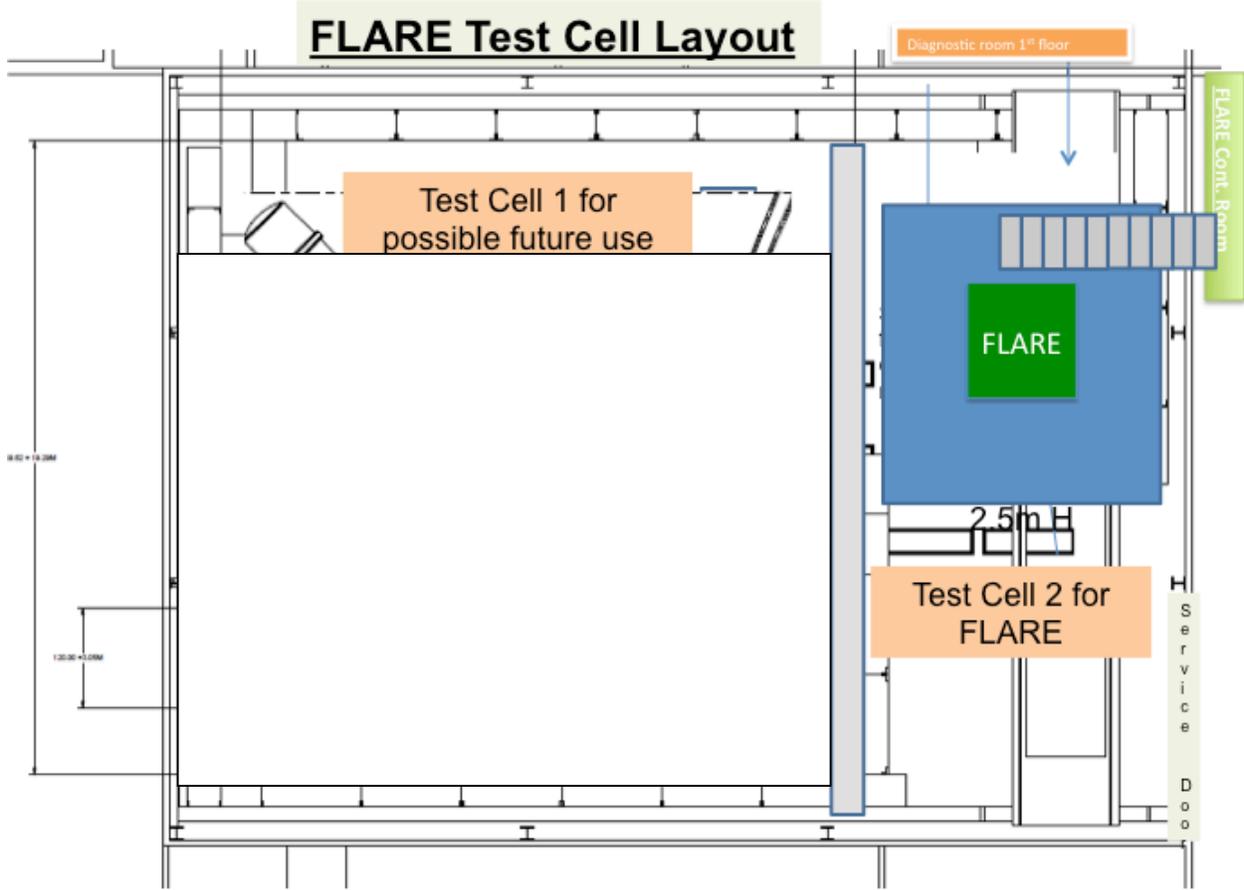
PSO NCO: Peter Siebach Signature: Peter Siebach

Date: 5/28/15

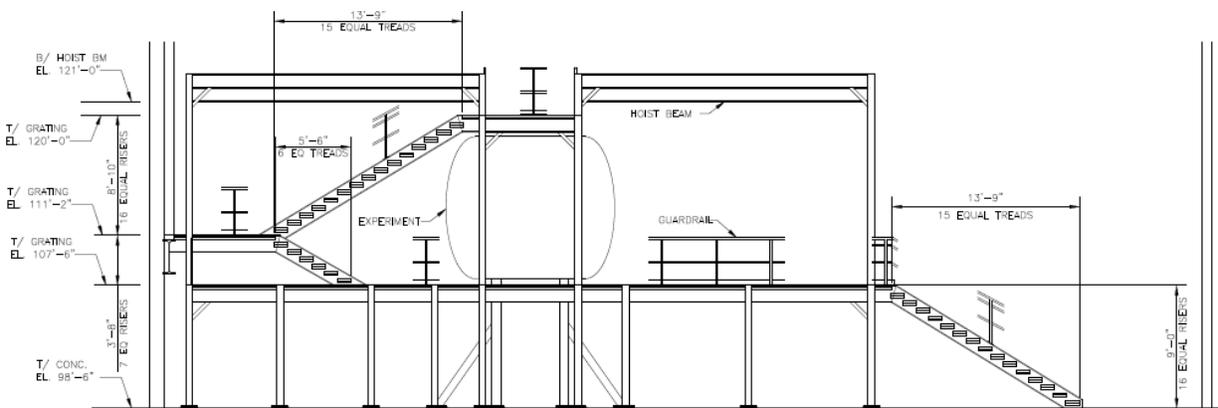


FLARE Device





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FLARE Platform Layout

