ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Grantee/Contractor Laboratory: Princeton University/Princeton Plasma Physics Laboratory (PPPL)
Project/Activity Title: Infrastructure Improvements for Innovative Confinement Concept (ICC) Experiments (2005350) - ARRA
NEPA Tracking No.:_____ Type of Funding SC
B&R Code: AT5015020 Total Estimated Cost: $1,848,000

DOE Cognizant Secretarial Officer (CSO): William F. Brinkman
Contractor Project Manager: ---------- Signature: ----------
Date: ----------
Contractor NEPA Reviewer: Jerry D. Levine Signature:
Date: 1/12/10

I. **Description of Proposed Action:** The proposed action would consist of the following ICC infrastructure improvement projects: (1) Completion of the Lithium Tokamak eXperiment (LTX) to adequately investigate the consequences of low recycling boundaries on magnetically confined plasmas; (2) Fabrication of an X-ray crystal spectrometer for the Large Helical Device (LHD) Stellarator in Toki/Japan for Doppler measurements of the ion temperature profiles; and (3) Upgrade of the Princeton Field Reversed Configuration (PFRC) experimental facility to explore the physics of transport and stability in a FRC plasma sustained by enhanced radio-frequency heating. No tritium will be used in these projects. Details of the proposed work are provided in the attachment.

II. **Description of Affected Environment:** Work would take place in the existing Lab Building at C-Site, and in existing shops and facilities in the Shop Building, C-Stellarator (CS) Building and Radiofrequency (RF) Building at C-Site (see attached map). No environmentally sensitive resources would be affected.

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
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. No
17.	PCBs	17. No
18.	Import, Manufacture or Processing of Toxic Substances	18. No
19.	Chemical Storage/Use	19. Yes

Small amounts of cutting fluids, solvents, degreasers, detergents, acetone and alcohol would be safely used in fabrication and installation work. Lithium would be used in LTX experiments at approximately the same quantities as previously used in the predecessor CDX-U experiments. Liquid nitrogen would be used to chill the PFRC flux rings.

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. Yes

Very small volumes of hazardous waste (e.g., solvent soaked rags) may be generated and would be handled in accordance with current PPPL practices and procedures.

25.	Underground Storage Tanks	25. No
26.	Radioactive (AEA) Mixed Waste	26. No
27.	Radioactive Waste	27. No
28.	Radiation Exposures	28. No

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

The requirements of the PPPL ES&H Manual and the use of Job Hazard Analyses would be implemented.

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
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?

Yes

DOE-PSO NEPA Compliance Officer (NCO) Review:

Concurrence with Proposed Class of Action Recommended

CX EA EIS

Category B3.13 Performing magnetic fusion experiments that do not use tritium as fuel, with existing facilities (including necessary modifications).

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:**

SC GLD: ~~Irene Ainey~~ Lou Sadler Signature: Lorin F Sadler, Asst. Chief Counsel

Date: 1/25/2010

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: H. Allen Wrigley Signature: H Allen Wrigley

Date: 01/13/2010

ADDITIONAL INFORMATION

Infrastructure Improvements for Innovative Confinement Concept Experiments (2005350) - ARRA

1. **Completion of the Lithium Tokamak eXperiment (LTX)**: This task would:

- Complete the full scale IGBT[1]-based transformer compensated Ohmic power supply for LTX by increasing the stored energy in the supply to 1.3 MJ, thereby increasing the plasma "flattop" time by a factor of 3-4, at higher plasma current, and allowing a steady-state equilibrium plasma to be achieved.
- Reinstall toroidal field coil cooling to allow operation at higher toroidal field, which involves reconstruction of the water manifolds and 512 individual coolant connections for an existing 360 psi deionized water cooling system, with flow interlocks.
- Install a 5-channel edge Thomson scattering diagnostic with ~1 mm resolution for measuring the electron temperature profile to yield important, fundamental data on plasma-wall interactions and provide data for recycling estimates.
- Install an existing 15-20 keV, 5A, 1 sec diagnostic neutral beam for LTX, that would provide plasma core ion heating at the 100kW level (comparable to the Ohmic power), and ion temperature measurements.

2. **Fabrication of an X-ray crystal spectrometer for the Large Helical Device (LHD) Stellarator in Toki/Japan:** This task would:

- Construct an x-ray imaging crystal spectrometer (XICS), of the type previously built and successfully tested on the Alcator C-Mod experiment at MIT, to measure the radial ion-temperature profile on LHD, and provide profiles of the electron temperature and of the argon ion charge state distribution, which are of interest for impurity transport studies.
- Develop an improved equilibrium reconstruction software tool for LHD to allow accurate interpreting of data from the x-ray crystal spectrometer (and other profile diagnostics), by coupling existing codes and interfacing the coupled code to LHD diagnostic data.

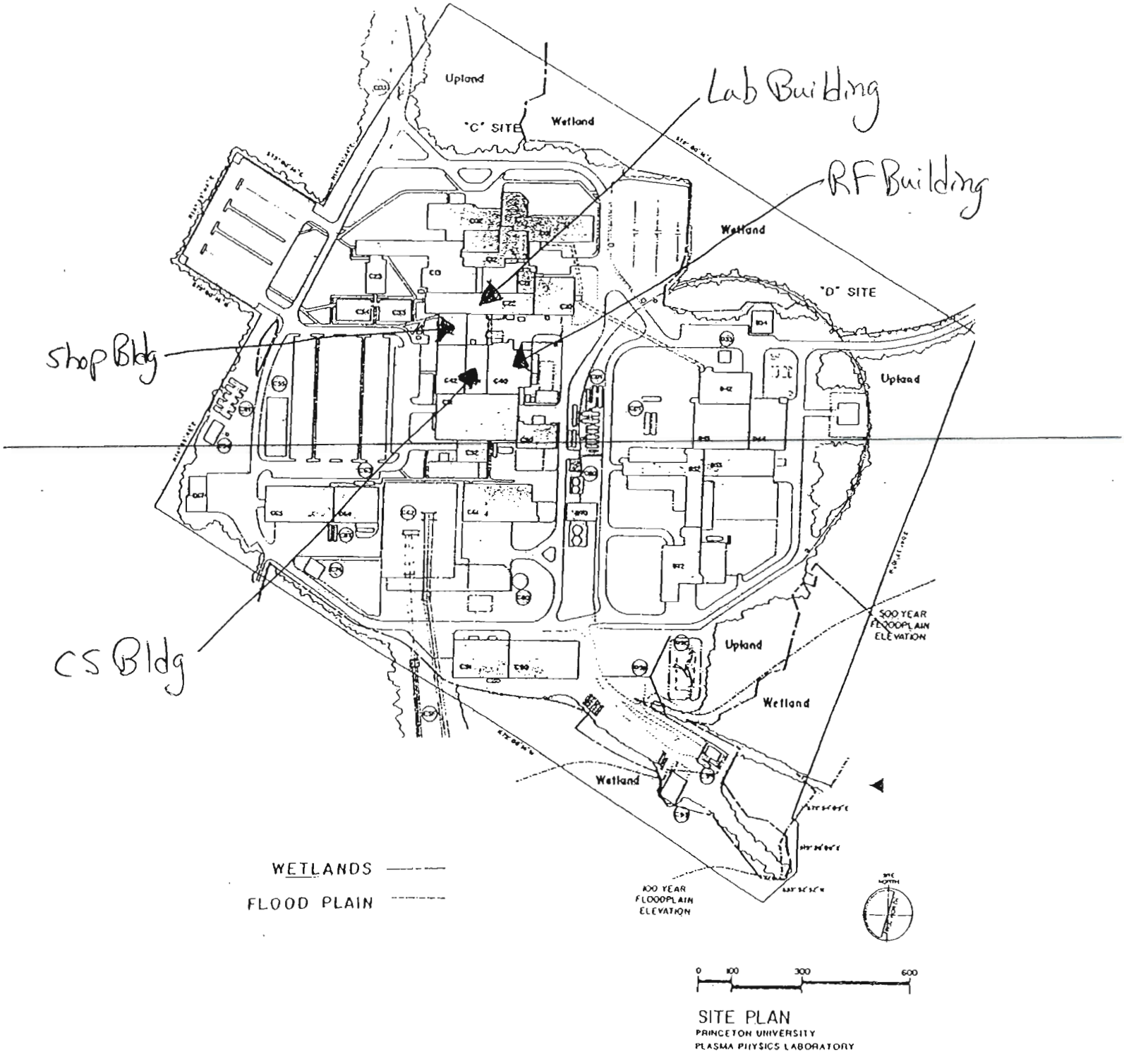
3. **Upgrade of the Princeton Field Reversed Configuration (PFRC) experimental facility**: This task would:

- Construct a larger polycarbonate vacuum vessel (with radius of 6 cm compared with 3 cm for the existing PFRC device), with better diagnostic access, internal magnetic loops, and high-temperature superconducting copper flux conserving rings.
- Upgrade the existing radiofrequency (RF) heating power system (including use of a 50 kJ fully enclosed capacitor bank) from 20 kW to 200 kW to allow FRC plasmas at a magnetic field of 1 kiloGauss (kG), pulse lengths of 100 msec, and plasma confinement times of 150 microseconds - compared with 100 G field, 3 msec pulse lengths, and 2 microsecond confinement times for the current PFRC experiment.
- Install boron nitride shields and a liquid nitrogen cooling system for the superconducting flux conserving rings.

[1] Insulated Gate Bipolar Transistor

INFRASTRUCTURE IMPROVEMENTS FOR ICC EXPERIMENTS

TCR-ESH-014.R4-001



PPPL Site Map – Floodplain and Wetlands Boundaries