ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Grantee/Contractor Laboratory: Princeton University/Princeton Plasma Physics Laboratory (PPPL)
Project/Activity Title: Infrastructure Improvements for General Plasma Science (GPS) User Facilities (2005365) - ARRA
NEPA Tracking No.:_____ Type of Funding SC
B&R Code: AT5030500 Total Estimated Cost: $446,500

DOE Cognizant Secretarial Officer (CSO): William F. Brinkman
Contractor Project Manager: ---------- Signature: ----------
Date: ----------

Contractor NEPA Reviewer: Jerry D. Levine Signature: Jerry D. Levine
Date: 2/8/10

I. **Description of Proposed Action:** The proposed action would consist of the following General Plasma Science (GPS) infrastructure improvement projects: (1) An upgrade of the existing laboratory free-surface liquid-metal flow experiment to study thermal convection under the influence of an applied magnet field; (2) Expansion of diagnostic capabilities for Kα-line radiation of medium-Z ions utilizing the horizontal x-ray spectrometer on the existing National Spherical Torus Experiment (NSTX); and (3) Fabrication of a laser induced fluorescence (LIF) apparatus based on a tunable diode to improve diagnostic hardware used in studies of electron kinetics in partially magnetized low temperature plasmas (part of the Plasma Science Center for Predictive Control of Plasma Kinetics: Multi-Phase and Bounded Systems). 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. No
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 during fabrication and assembly activities, 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 B3.6 Siting/construction/operation/decommissioning of facilities for bench-scale research, conventional laboratory operations, small-scale research and development 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:**

SC GLD: Louis F. Sadler Signature: Louis F Sadler
Assistant Chief Counsel

Date: 02/08/10

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: 02/08/2010

1. **Upgrade of the Existing Laboratory Free-Surface Liquid-Metal Flow Experiment**: This task would:

- Obtain and install an infrared camera on the existing Liquid Metal Experiment (LMX) to obtain accurate temperature measurements with sufficient spatial and temporal resolutions to study thermal convection and its dependence on an externally applied magnetic field. How heat is convected in a free-surface magnetohydrodynamic (MHD) flow is an important issue in astrophysics as well as in the application of liquid-metal flow to a fusion environment.
- Use the new infrared camera to perform experiments with the LMX to: (1) use two-dimensional temperature measurements after a small and local heat deposition to quantify surface turbulence and its modifications by an external magnetic field; (2) determine the required heat deposition amount to modify the flow stability and thus the heat transport; and (3) quantify the effect of a magnetic field at different orientations on the thermal convection.

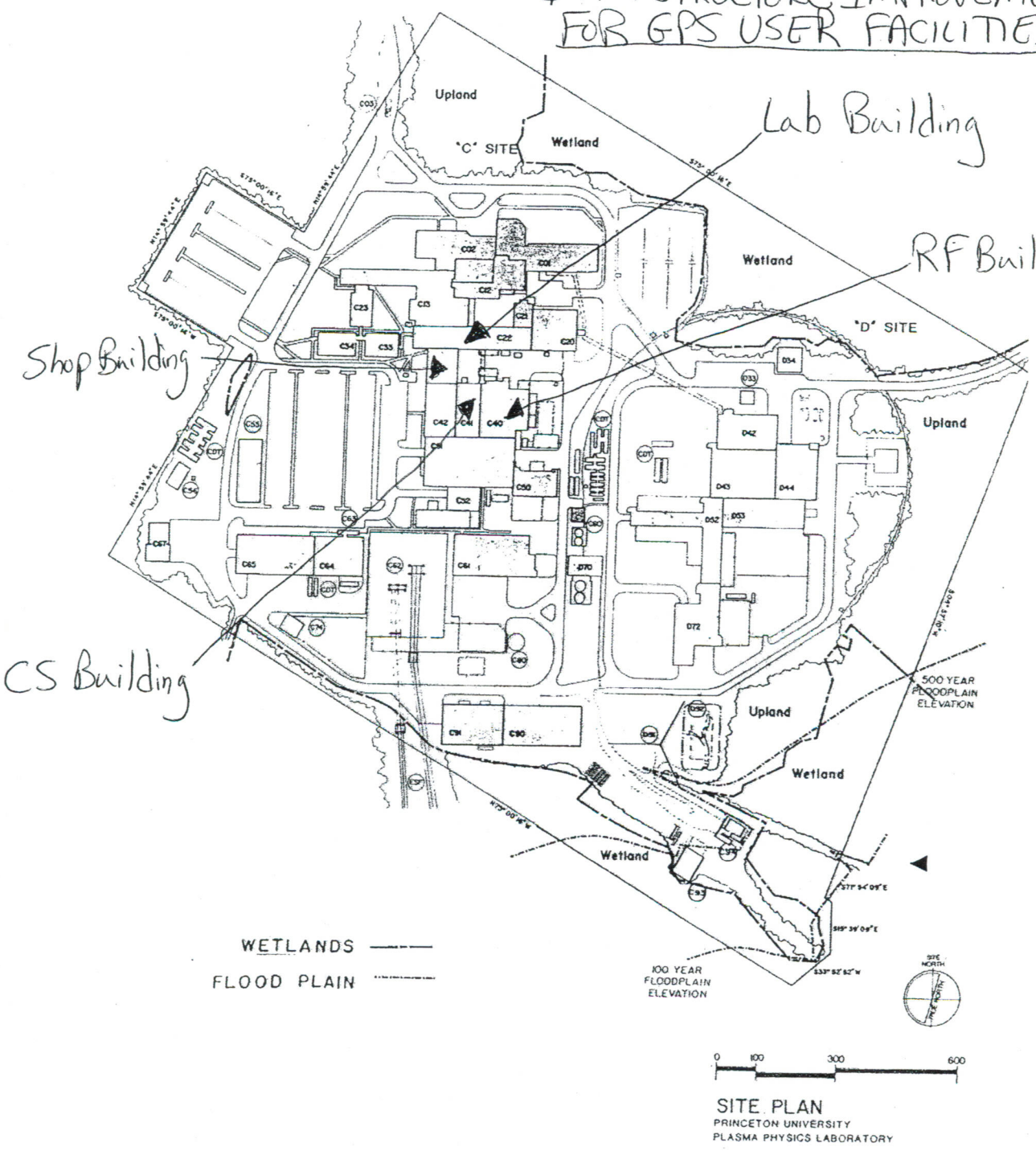
2. **Expansion of diagnostic capabilities for Kα-line radiation of medium-Z ions utilizing the horizontal x-ray spectrometer on NSTX:** This task would:

- Equip the NSTX horizontal x-ray spectrometer with a modern Pilatus detector (for measuring x-rays via the photoelectric effect in silicon), and a spherically bent 422-germanium crystal of high integrated reflectivity, which would obtain spectra with high spectral, spatial, and time resolutions. A beryllium window would be purchased and installed to separate the spectrometer chamber from the high vacuum of the NSTX vessel.
- Support an NSTX Laboratory Astrophysics Project by performing simultaneous measurements with the modified x-ray spectrometer and another existing NSTX diagnostic to obtain a comprehensive data set for determining the plasma pressure, which plays an important role in solar models that describe atmospheric heating, loop structures, or magnetic reconnection in different environments.

3. **Assembly of a laser induced fluorescence (LIF) diagnostic**: This task would:

- Fabricate a laser induced fluorescence (LIF) apparatus based on tunable diode lasers to improve diagnostic hardware used in studies of electron kinetics in partially magnetized low temperature plasmas.
- Use the LIF diagnostic to conduct experiments on two existing PPPL devices: the magnetized target experiment (MTX) and the spiral antenna helicon high intensity background (SAHHIB) plasma source. This would enable measurements of ion and neutral velocities and (indirectly) the electric field in the plasmas without significant perturbations, thus permitting complete characterization of the effects of the active boundaries on the magnetized plasmas.

INFRASTRUCTURE IMPROVEMENTS FOR GPS USER FACILITIES



PPPL Site Map – Floodplain and Wetlands Boundaries