

Applicability: this form shall be prepared as early as possible for each new or continuing activity at PPPL. Physical implementation of PPPL activities shall not proceed prior to NEPA certification of this form.

Originator: Erik D. Perry WP/Project #: 1513, 1547

Project/Organization: NSTX Total Estimated Cost: \$7M

Title of Activity/Change: NSTX Facility Upgrades

Description of Activity: [include physical description of activity, purpose, location, changes to any operating parameters or approved environmentally related limits, potential or actual ES&H impacts, as applicable. [Attach additional sheets if needed] Circle one of these choices: **GENERIC** UNIQUE

1. Add channels to the Thompson Scattering Diagnostic
2. Enhance pumping capability of Liquid Lithium divertor
3. Increase staff of Post-docs
4. INSTALL A 2ND Switching Power Amplifier (SPA)
5. Support completion of MSE-LIF diagnostic

ES&H Considerations: Will the change/activity, either individually or cumulatively with other known activities, result in changes and/or disturbances to the following entities (see Attachment 2 for directions on answering)*

	YES	NO		YES	NO
1: Air Emissions	<u> </u>	<u> X </u>	13: Sewage System	<u> </u>	<u> X </u>
2: Liquid Effluent	<u> </u>	<u> X </u>	14: Water/Energy Use	<u> X </u>	<u> </u>
3: Domestic Waste	<u> X </u>	<u> </u>	15: Pesticide Use	<u> </u>	<u> X </u>
4: Radioactive Waste	<u> </u>	<u> X </u>	16: Chemical Use/Storage	<u> X </u>	<u> </u>
5: Hazardous Waste	<u> </u>	<u> X </u>	17: Petroleum Use/Storage	<u> X </u>	<u> </u>
6: Mixed Waste	<u> </u>	<u> X </u>	18: Radiation Exposure	<u> X </u>	<u> </u>
7: Asbestos Waste	<u> </u>	<u> X </u>	19: Impacts to Workers	<u> X </u>	<u> </u>
8: Wetlands	<u> </u>	<u> X </u>	20: Noise Levels	<u> </u>	<u> X </u>
9: Floodplains	<u> </u>	<u> X </u>	21: Pollution Prevention Applies	<u> X </u>	<u> </u>
10: Indoor/Outdoor Clearing or Excavation	<u> </u>	<u> X </u>	22: Stored Energy	<u> X </u>	<u> </u>
11: Soil Movement	<u> </u>	<u> X </u>	23: Fire Safety Issues	<u> X </u>	<u> </u>
12: PPPL Water Systems	<u> </u>	<u> </u>	24: Electrical/RF/Lasers	<u> X </u>	<u> </u>

* Provide any necessary explanations on a separate sheet attached to this form

The undersigned have reviewed the description and assessment of ES&H considerations and state that they are accurate and complete.

Work will not proceed until NEPA certified form (page 2) is received by cognizant person.

COG PERSON/ATI: Erik D. Perry DATE: 7/24/09

DIV HEAD/RLM: [Signature] DATE: 7/24/09

[Handwritten initials]
8/4/09

NSTX ARRA:

NSTX Facility Upgrades (Project Code 2005310) – scope definition

Upgrade multi-pulse Thomson scattering system for improved spatial resolution (additional channels) for the pedestal study planned in the FY2011 Joint Research Milestone.

- Upgrade and renovate MPTS polychromator (an optical instrument) room (including rerouting of conduits, upgrading grounding, upgrading the HVAC system and installation of new shelving) to accommodate additional channels.
- Fabricate polychromator boxes and purchase and install filters, lenses, APD and preamplifiers into polychromator boxes and install polychromator boxes in polychromator room.
- Procure and fabricate electronics for sample and hold boards (SHB) required for operation of each additional channel and install them in polychromator room.
- Split existing fibers bundles; remove the bundles from the existing polychromators, split the output ends of a subset of fiber bundles, reinsert the fibers into polychromators.

Enhance liquid lithium divertor capability for improved divertor pumping to access lower collisionality regimes.

- Procure parts (bellows, vacuum hardware, pump carts and support stand equipment) and fabricate a 3rd and 4th LITER fill system.
- Procure and install 2 each Phantom-12 cameras, fiber bundles, and various filters and lenses for improved LLD characterization and operation.
- Procure CCD cameras, spectrograph, fiber optics and input optics to install to provide a Divertor UV-VIS spectrometer for LLD particle source and sink profile measurements.

Increase post-docs staff to support enhanced research capability.

- Hire 2 new full-time post-docs.

Allow implementation of a 2nd switching power amplifier for improved error field/resistive wall mode/resonant magnetic perturbation spectra.

- Procure and install a second bipolar switching power amplifier (SPA).
- Procure and install 3 additional disconnect & Ground Switches.
- Procure and install control and power.
- Protection, Control, and Software changes are to be made and tested.

NEPA for NSTX Facility Upgrades

Domestic waste: Small volume of disposable gloves, tie-wraps, tapes and miscellaneous construction materials. Paper for recycling from control room activities.

Water/Energy Use: Energy used for coil systems, vacuum systems, water systems, diagnostics and computers.

Chemical use/storage: Vacuum pump oil, cutting fluids, solvents, degreasers, detergents, acetone and alcohol.

Petroleum use/storage: Vacuum pump oil.

Radiation Exposure: Potential in NSTX Test Cell

Impacts to Workers: Potential use of Lockout/Tagout and bypassed interlocks for testing.

Pollution Prevention Applies: Reduction in chemicals used and use of recycled paper.

Stored Energy: Stored energy may be present in power systems, coil systems, vacuum systems and diagnostics.

Fire Safety Issues: Access restricted to some areas during operations. These areas would need to be safed before entering to fight a fire.

Electrical/RF/Lasers: Power systems, coil systems, RF systems, Thompson Scattering Laser.

pg 2 of 2 **NEPA PLANNING FORM # 1463**

NEPA Evaluation: (attach "Environmental Evaluation for PPPL Change Proposal" and "Environmental Evaluation Notification Form")

Covered by an existing DOE approved categorical exclusion? YES NO

If yes, specify _____

Approval for categorical exclusion required from DOE? _____

DOE approval: 10 CFR 1021, Appendix B, B3.13 Date: 8/17/09

Other NEPA documentation required? _____

If yes, specify _____

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NEPA Review for this Activity has been Completed :

[Signature]

NEPA Compliance Manager (or designee)

8/17/09

Date:

NEPA PLANNING FORM # 1463

NEPA & SAFETY ANALYSIS REVIEW STATUS FORM

ACTIVITY: NSTX Facility Upgrades

DATE RECEIVED & LOGGED IN: 8/3/09

READY FOR REVIEW:

NEPA PROCESS ON HOLD: To PSO on 8/13/09. ex signal 8/17/09.

REASON

SAFETY ANALYSIS REVIEW

SAFETY ANALYSIS REVIEWER/DATE: JL 8/13/09

SAFETY REVIEW/DOCUMENT. REQTS 7 JHAs required.

REVIEW COMPLETE

ENV EVALUATIONS COMPLETED, REVIEWED BY M&ES DIVISION HEAD (OR DESIGNEE) AND SIGNED BY ENVIRONMENTAL ENGINEER OR ALTERNATE

NEPA FORMS READY TO BE SENT OUT

NEPA PLANNING FORM CERTIFIED BY NEPA COMPLIANCE MANAGER

NEPA FORMS SENT OUT

- ONE COPY-ORIGINATOR
 - ONE COPY-COGNIZANT PERSON/ATI
 - ONE COPY-DIVISION HEAD/RLM
 - ONE COPY-FACILITY MANAGER(S) FOR THE AREA(S) AFFECTED (Von Halle)
 - ONE COPY-INDUSTRIAL HYGIENIST
 - ONE COPY-M&ES DIVISION HEAD [IF POTENTIAL ENVIRONMENTAL IMPACTS ARE INVOLVED]
 - ONE COPY-M&ES ENVIRONMENTAL ENGINEER [IF AIR EMISSIONS OR LIQUID EFFLUENTS ARE INVOLVED]
 - ONE COPY-SITE PROTECTION DIVISION HEAD [IF HAZARDOUS MATERIALS ARE INVOLVED]
 - ONE COPY-OPERATIONS CENTER [IF A D-SITE CHANGE IS INVOLVED]
 - ONE COPY-SAFETY ANALYSIS REVIEWER (IF APPLICABLE)
 - ONE COPY-OTHERS OMO
- ORIGINAL-NEPA FILES)

ENVIRONMENTAL EVALUATION FOR PPPL CHANGE PROPOSAL

NSTX FACILITY UPGRADES WITH ARRA FUNDING

TITLE OF CHANGE OR PROJECT

E. PERRY
COGNIZANT PERSON

WP #1513, 1547
PROJECT NUMBER

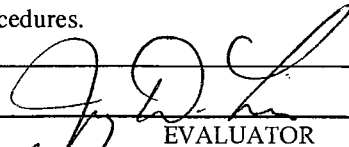
E v a l u a t i o n

ISSUE	APPLICABILITY		POTENTIAL IMPACT			ISSUE	APPLICABILITY		POTENTIAL IMPACT		
	A	NA	N	NAI	AI		A	NA	N	NAI	AI
CONSTRUCTION ACTIVITY						LAND USE CONSIDERATION					
DUST	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WETLANDS/ FLOODPLAINS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NOISE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CRITICAL HABITATS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ARCHAEOLOGICAL SITES	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFFLUENTS AND CONTAMINANTS						FACILITY CONSIDERATIONS					
SOLIDS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AESTHETICS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LIQUIDS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PUBLIC RELATIONS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GASES	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OTHER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENERGY EMISSIONS						CATEGORICAL EXCLUSION		YES	<input checked="" type="checkbox"/>		
RADIATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NO		<input type="checkbox"/>			
OTHER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10CFR1021, Appendix B, Category B3.13					
APPLICABILITY: A - PPLICABLE, NA - POT APPLICABLE POTENTIAL IMPACT: N - PONE, NAI - NO ADVERSE IMPACT (POSSIBLE IMPACT BUT NOT EXPECTED TO BE HARMFUL), AI - MIDVERSE IMPACT											

COMMENTS & CONCLUSIONS

ANY APPLICABLE ISSUE REQUIRES COMMENT STATEMENT - ASE ADDITIONAL PAGES IF NECESSARY.

Small volume of disposable gloves, tie-wraps, tapes and miscellaneous construction materials would be disposed of as domestic waste per existing PPPL practices and procedures. Very small volumes of hazardous waste from use of vacuum pump oil, cutting fluids, solvents and degreasers may be generated and would be handled in accordance with current PPPL practices and procedures. Lithium handling would be comparable to current practices for the NSTX Project. Potential for very small radiation exposures from working in and near the NSTX machine would be the same as is currently experienced and would be controlled per current radiation safety procedures.


EVALUATOR


PPPL ENVIRONMENTAL ENGINEER (OR DESIGNEE)

8/11/09
EVALUATION DATE

8/13/09
APPROVAL DATE

ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Grantee/Contractor Laboratory: Princeton University/Princeton Plasma Physics Laboratory (PPPL)

Project/Activity Title: NSTX Facility Upgrades with ARRA Funding

NEPA Tracking No.: _____ Type of Funding SC

B&R Code: _____ Total Estimated Cost: \$7M

DOE Cognizant Secretarial Officer (CSO): Patricia M. Dehmer

Contractor Project Manager: _____ Signature: _____

Date: _____

Contractor NEPA Reviewer: Jerry D. Levine Signature: _____

Date: 5/13/09

- I. **Description of Proposed Action:** The proposed action would consist of the following upgrades to the existing National Spherical Torus Experiment (NSTX) fusion facility: (1) Upgrade the Multi-Pulse Thomson Scattering (MPTS) diagnostic system for improved spatial resolution (additional channels); (2) Enhance the liquid lithium divertor capability for improved divertor pumping to access lower collisionality regimes; (3) Increase the post-doctoral research staff to support enhanced research capability; (4) Implement a 2nd switching power amplifier for improved error field/resistive wall mode/resonant magnetic perturbation spectra; and (5) Complete the Motional Stark Effect-Laser Induced Fluorescence (MSE-LIF) advanced diagnostic for internal magnetic and electric field measurements. Details of the proposed work are provided in the attachments.
- II. **Description of Affected Environment:** Work would take place in the existing NSTX Test Cell and Gallery at D-Site, and in the existing Field Coil Power Conversion (FCPC) Building at D-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?

	<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 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 <i>Small amounts of vacuum pump oil, cutting fluids, solvents, degreasers, detergents, acetone and alcohol would be safely used in fabrication and installation work. Lithium would be used in experiments at approximately the same quantities as currently used.</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 <i>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.</i>	24. Yes
25. Underground Storage Tanks	25. No
26. Radioactive (AEA) Mixed Waste	26. No
27. Radioactive Waste	27. No
28. Radiation Exposures <i>Potential for very small radiation exposures from working in and near the NSTX machine would be the same as is currently experienced and would be controlled per current radiation safety procedures.</i>	28. Yes

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>The requirements of the PPPL ES&H Manual and the use of Job Hazard Analyses would be implemented.</i>	29. No
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 by the OM under Subpart D of the DOE NEPA Regulations for compliance with NEPA?

Yes

DOE-PSO NEPA Compliance Officer 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).

V. **DOE Recommendation Approval:**

SC GLD: Irene Atney

Signature: _____

Irene P. Atney

Date: _____

8/17/09

VI. **NEPA Compliance Officer (NCO) Subpart D CX Determination and Approval:**

The preceding pages are a record of documentation required under DOE Final NEPA Regulation, 10 CFR Part 1021.410, and SEN-15-90 to establish that an action may be categorically excluded from further NEPA review. I have determined that the proposed action meets the requirements for the Categorical Exclusion referenced above. Therefore, by my signature below, I have determined that the proposed action may be categorically excluded from further NEPA review and documentation.

PSO NCO: H. Allen Wrigley Signature: _____

H. Allen Wrigley

Date: _____

08/14/2009

ADDITIONAL INFORMATION

NSTX Facility Upgrades with American Recovery and Reinvestment Act of 2009 (ARRA) Funding

1. Upgrade Multi-Pulse Thomson Scattering (MPTS) system for improved spatial resolution (additional channels): This task would:

- Upgrade and renovate the MPTS polychromator (an optical instrument) room in the NSTX Gallery (including rerouting of conduits, upgrading grounding, upgrading the HVAC system and installation of new shelving) to accommodate additional channels.
- Fabricate polychromator boxes; purchase and install filters, lenses, avalanche photodiode (APD) and preamplifiers into polychromator boxes; and install polychromator boxes in polychromator room.
- Procure and fabricate electronics for sample and hold boards (SHB) required for operation of each additional channel and install them in polychromator room.
- Split existing fibers bundles; remove the bundles from the existing polychromators, split the output ends of a subset of fiber bundles, reinsert the fibers into the polychromators.

2. Enhance liquid lithium divertor (LLD) capability for improved divertor pumping to access lower collisionality regimes: This task would:

- Procure parts (bellows, vacuum hardware, pump carts and support stand equipment) and fabricate a 3rd and 4th Lithium Evaporator (LITER) fill system.
- Procure and install two each Phantom-12 cameras, fiber bundles, and various filters and lenses for improved LLD characterization and operation.
- Procure and install charge coupled device (CCD) cameras, spectrograph, fiber optics and input optics to provide a Divertor ultraviolet-to-visual spectrum (UV-VIS) spectrometer for LLD particle source and sink profile measurements.

3. Increase the post-doctoral research staff to support enhanced research capability: This would require hiring two new full-time post-doctoral researchers.

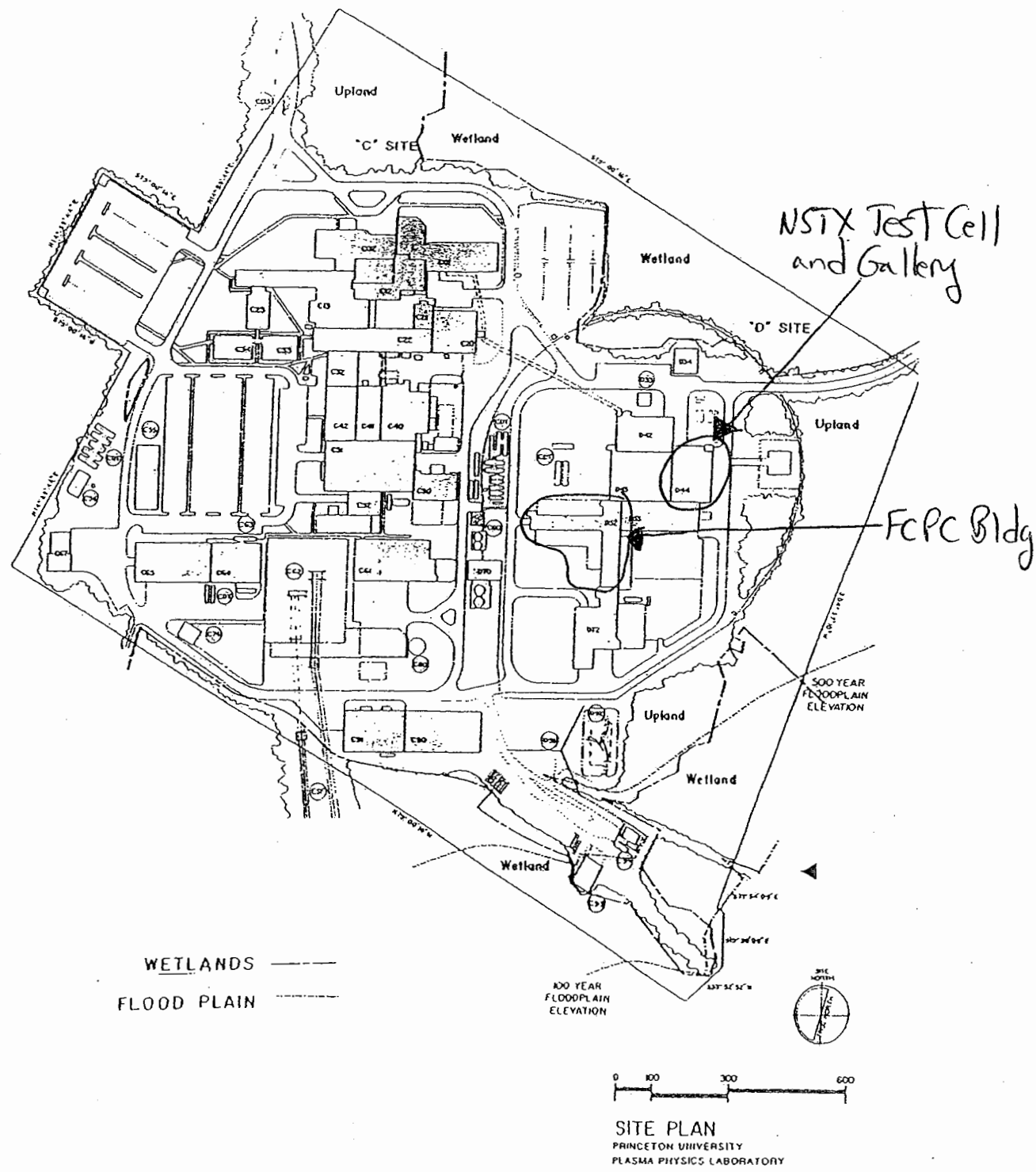
4. Implement a 2nd switching power amplifier for improved error field/resistive wall mode/resonant magnetic perturbation spectra: This task would:

- Procure and install a second bipolar switching power amplifier (SPA).
- Procure and install three (3) additional disconnect & Ground Switches.
- Procure and install control and power.
- Implement and test Protection, Control, and Software changes.

5. Complete the Motional Stark Effect-Laser Induced Fluorescence (MSE-LIF) advanced diagnostic for internal magnetic and electric field measurements: This task would:

- Prepare the NSTX Bay G area for the installation of the MSE-LIF diagnostic: modify the Bay G port cover for the shutter and viewport; rearrange the Locked Mode Sensor; fabricate & install a new Resistive Wall Mode (RWM) coil; and relocate Helium gas and water piping.
- Design & fabricate a new Tangential Bolometer, including removing the existing tangential port and installing a radial port.
- Redesign, fabricate and install a target tile for the Bay G Interferometer, and remove the existing Optical Soft X-Ray (OSXR) diagnostic.
- Modify the NSTX platform to accommodate the weight of the MSE-LIF Diagnostic Neutral Beam (DNB).
- Install the DNB and flight tube.
- Install services including deionized water, air, electrical power, instrumentation and controls (I&C): install Optics & Fibers; write data acquisition sub-routines; and design and install electrical support and I&C components, including safety interlocks.

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ESH-014 Rev 5
			Attachment 4
Map (Floodplains and Wetlands)			page 1 of 1



PPPL Site Map – Floodplain and Wetlands Boundaries

