

ENVIRONMENTAL EVALUATION NOTIFICATION FORM

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

Project/Activity Title: Initial Fabrication & Start-Up of the Flowing Liquid Metal Torus (FLIT)

CH NEPA Tracking No.: _____ Type of Funding SC

B&R Code: _____ Total Estimated Cost: \$2.025M

DOE Cognizant Secretarial Officer (CSO): J. Steve Binkley

Contractor Project Manager: _____ Signature: _____

Date: _____

Contractor NEPA Reviewer: Jerry D. Levine Signature: 

Date: 10/30/17

I. Description of Proposed Action:

The Flowing Liquid Metal Torus (FLIT) experiment would develop and test, in a fusion-relevant toroidal magnetic field, the first axisymmetric (symmetrical about an axis) flowing liquid metal divertor target, suitable for future deployment in a fusion device. The project would result in a first-of-its-kind liquid metal plasma-facing component (PFC) development facility, which could be used to test liquid metal PFCs in magnetic field configurations relevant to fusion devices. There are no plans to produce plasma discharges in FLIT. Plans would include using a pulsed coilset, wound in place, within the toroidal chamber, to produce a magnetic field configuration similar to those found at the edge of a fusion device.

This project would use approximately 30 gallons of non-toxic, non-reactive galinstan (Ga-In-Sn) as a proxy for lithium or other potentially hazardous liquid metals. To prevent oxidation, the galinstan would be kept inerted under an argon purge (~1-10 lpm) that would be vented to the outside using several existing vents and fans. The experiment's coils would be placed upon an electrically-conductive frame and the entire system, including the platform, would be within a cage and grounded. The coils would have a total approximate height, including the platform, of 6 feet (see Figure 1). Operators would be further protected by interlocks. Power would be drawn from the existing Robicon power supply (14 [kA], 500 [VDC]). Low-powered lasers (class IIIa) would be used as a height diagnostic. FLIT would require approximately 10 gpm of process water for cooling from existing cooling water systems.

II. Description of Affected Environment: Work would take place in the existing C-Site ESAT Building (see Figures 2&3, attached), and use currently active utilities. 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 km) of PPPL is approximately 500,000. The total estimated population within a 50-mile radius (80km) of PPPL is approximately 17,735,164.

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 of 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)	13. No

from Freehold Soil Conservation District.)

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.

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|-----|---|---------|
| 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 | 19. Yes |
| | <i>Approximately 30 gallons of galinstan would be in use.</i> | |
| 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. No |

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 | 29. No |
| <i>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. This would include the use of job hazards analyses (JHAs) and their review by all workers at pre-job briefing prior to starting work tasks. ESHD 5008, section 3 would be used for safe use of class IIIa lasers.</i> | |
| 30. Siting/Construction/Major Modification of Waste Recovery, or TSD Facilities | 30. No |
| 31. Disturbance of Pre-existing Contamination | 31. No |
| <i>Note: Excavations that encounter contaminated ground water require a permit.</i> | |
| 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:

Initial Fabrication & Start-Up of the Flowing Liquid Metal Torus (FLIT)

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):

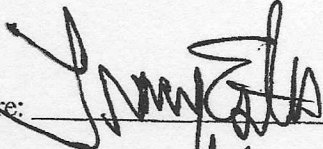
A. The proposed action fits within a class of actions that is listed in Appendix A or B to Subpart D.

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:

PSO Staff: Tracy Estes

Signature: 

Date: November 16, 2017

SC GLD: Michael M. McCann

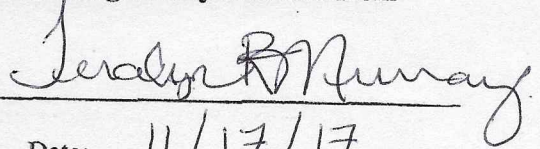
Signature: 

Date: 11/16/17

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: Teralyn Murray

Signature: 

Date: 11/17/17

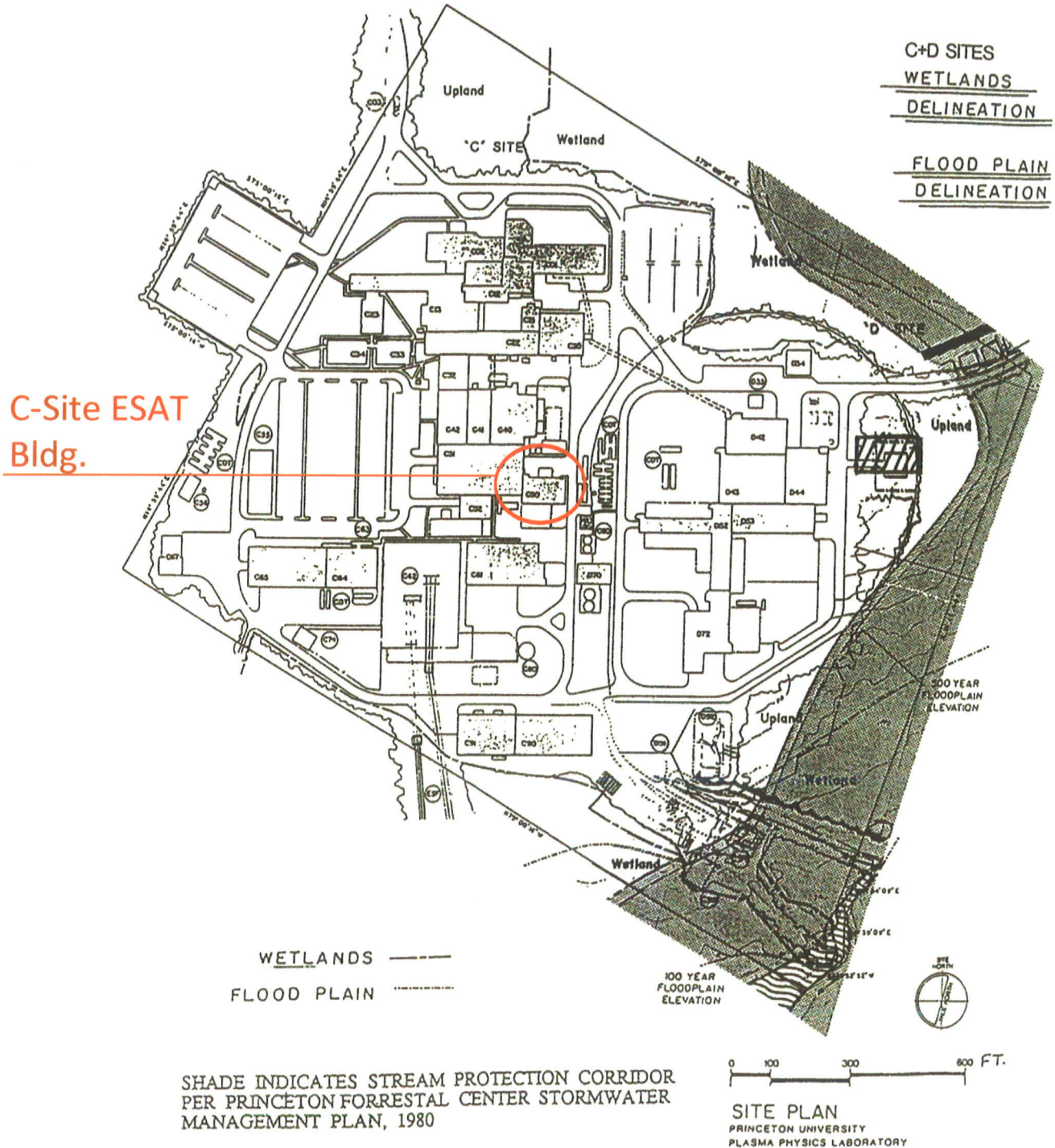


Figure 2
Initial Fabrication & Start-Up of the Flowing Liquid Metal Torus (FLIT)

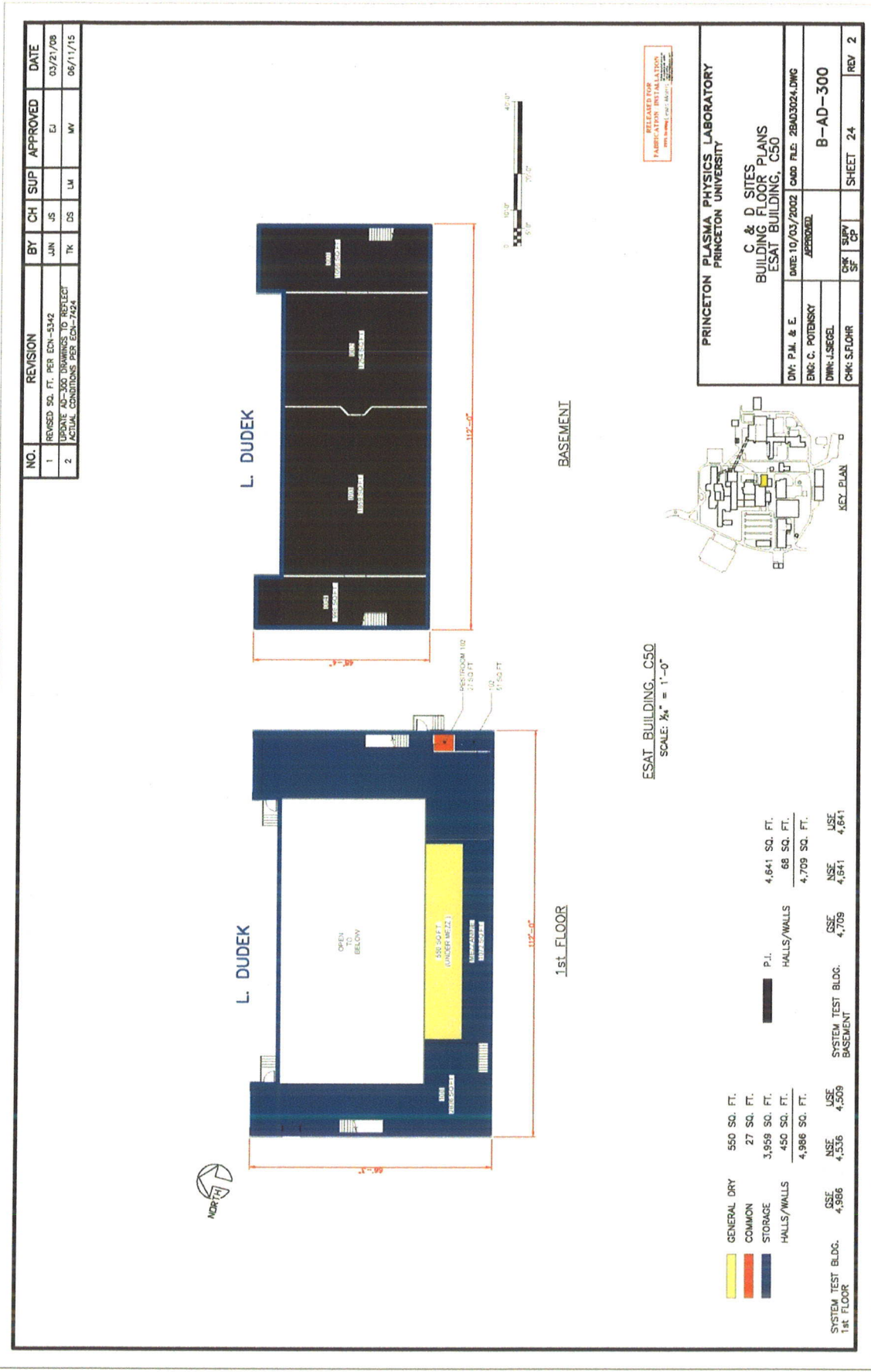


Figure 3 Initial Fabrication & Start-Up of the Flowing Liquid Metal Torus (FLIT)