Department of Energy
Washington, DC 20585

April 18, 2013

To: NSTX Upgrade Peer Review Panel Members:

Subject: *Princeton Plasma Physics Laboratory Proposal for 5-Year Continuation of the National Spherical Torus Experiment Upgrade (NSTX-U) Research Program*

Dear Colleagues:

Thank you for your willingness to participate in a technical review of a proposal from Princeton Plasma Physics Laboratory (PPPL) to continue the NSTX-U research program for another 5 years, beginning October 1, 2013.

The NSTX-U Program involves one of the two large Magnetic Fusion Energy (MFE) facilities in the United States, and it includes major collaborators from other national laboratories (ORNL, LLNL, SNLA), several universities (Columbia, UCLA, UC Davis, UC Irvine, Wisconsin, Washington, Purdue, MIT, and others), and industry (General Atomics, Lodestar, and Comp X) in addition to PPPL. All of these collaborators receive their funding directly from the Office of Science, Fusion Energy Sciences (FES), through a separate competitive review process. Funding for collaborators represents about 1/3 of the NSTX-U research budget. The NSTX-U program also includes a large number of smaller-scale collaborations with many other U.S. and foreign laboratories and universities. PPPL has the overall responsibility to lead the NSTX-U Program, in close partnership with the collaborators.

The national team that plans and carries out the NSTX-U program has been involved in the preparation of the 2014-2018 Five-Year Plan during the past year. That plan is included in PPPL's proposal. In addition you will be provided with information on the major collaborators participating in the NSTX-U program. PPPL will also provide you with cost and schedule information for their proposal and, in less detail, summary cost information on the collaborators' programs.

We are asking you to review the overall 5-year NSTX-U research program proposal as it is described in (1) the collection of documents that will be provided for you in advance of the on-site review and (2) the presentations that will be made to you at that review meeting. We are asking you to evaluate the technical content of the program and to provide a top-level assessment of the operation of the facility (i.e., how well the facility operation plan supports the research program). We would like you to perform the following assessments:

1. Assess the **scientific** and **technical merit** of the ongoing and planned research. Does the proposed research effectively address important issues in plasma and fusion energy science and technology at the forefront of the field (e.g., those issues described in the FESAC reports *Research Needs for Magnetic Fusion Energy* (2010) and *Priorities of the Magnetic Fusion Energy Science Program (2013)*)? How well does the proposed research compare with that carried out at other U.S. and foreign tokamak facilities, both in terms of merit and originality, and how well does it maintain a U. S. leadership position in key areas of fusion research? What is the likelihood that the research will lead to new or fundamental advances in fusion science and technology?

2. Comment on the **appropriateness** of the proposed research plan. Is the proposed plan adequately developed and likely to lead to scientifically valid conclusions? Does the proposed research employ innovative concepts or methods, and are potential problems identified along with appropriate mitigation strategies? Assess the strengths of the program with respect to manpower development through graduate student training.

3. Evaluate the **competency** of the proposed senior **research personnel** and the **adequacy** of the proposed **research environment and resources**. How well qualified are the applicant's personnel to carry out the proposed research? Does the proposed work provide for an adequate set of diagnostics, other necessary facility upgrades, interactions with theory and modeling, and collaborations involving a broad group of domestic and international users? Assess the program's governance practices and the performance of the program management team, as well as the support to collaborators provided by PPPL. How well do the collaborative arrangements achieve the goal of an integrated research team?

4. Assess the **reasonableness** of the proposed **costs** for fusion research and facility operations. The cost review should be done at a summary type level, examining major items and using projections from ongoing operational experience. Does the technical proposal call for the equipment and components, labor skill mix, and hours set forth in the summary cost information, and are these reasonable to carry out the proposed research? Are the overall proposed costs reasonable? (Please note that the cost details of the proposal will also be reviewed separately by DOE. However, we are interested in hearing your views on this topic.)

5. Assess the performance of the **NSTX research team** during the previous five-year period. Were research and diagnostic milestones met? Were NSTX research results appropriately disseminated, and are they having an impact on the international fusion effort? How well did the NSTX team compare theory and experiment to further the FES goal of improving predictive modeling? Also, assess the plans for **NSTX Upgrade facility operations (at a top level).** Are planned operating, maintenance, repair and upgrade schedules appropriate to support the planned research program? Are environment, safety, health and quality assurance matters being given appropriate priority?

You also asked to provide an overall numerical rating using a standard scale used by the Office of Science (see attached).

As indicated above, these programs are carried out by collaborative national research teams. The proposed research plan from the national team should be reviewed for the relevance and quality of the proposed research and the adequacy of the proposed equipment to carry out that research. You are also welcome to comment on the relevance and quality of the research carried out by the three major collaborators, described in the companion documents.

Please feel free to comment on any other issue relevant to the proposal.

PPPL will provide you with access to copies of the proposal and any other material helpful for the review through a password-protected web site. I will ask for you to submit individual highlights of your findings in a brief summary document by the conclusion of the review, and a full written report by June 21, 2013. I will serve as the panel Chair and organize and run the meeting. I will provide a brief oral summary and an overall assessment of the review at its conclusion.

The review will take place at Princeton Plasma Physics Laboratory on May 21 – 23, 2013 beginning at 8:30 am on May 21 and finishing by around 2:30 pm on May 23. Please do not hesitate to contact me if you have any questions. I will send out additional information by email as it becomes available.

Sincerely,

Stephen Eckstrand

Stephen Eckstrand
Program Manager, NSTX-U Program
Office of Science
Fusion Energy Sciences

1 attachment

Review Panel Members:
Richard Fitzpatrick, Univ. of Texas
Dave Hill, LLNL (DIII-D)
Dave Brower, UCLA
Don Batchelor, ORNL (retired)
Chris Hegna, Univ. of Wisconsin
Rejean Boivin, GA
Brian LaBombard, MIT
Yuichi Takase, Univ. of Tokyo
Hendrick Meyer, CCFE via PeerNet only

Attachment

Overall Rating

Please rate the proposal based on the following scale:

9-10 = Excellent. Proposed research would be of great benefit to the fusion program. Must definitely be supported.

7-8 = Very Good. Proposed research would be of significant benefit to the fusion program. Should be supported.

5-6 = Good. Proposed research would be of benefit to the fusion program. Worthy of support, if funds are available.

3-4 = Fair. A proposal with deficiencies. Proposed research does not advance the field of plasma research. A low priority for support.

1-2 = Not recommended. A proposal with major deficiencies. Should not be supported.