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Associate Laboratory Director's Cost & Schedule Review of the C-Beta Project February 6 – 7, 2017 Charge to the Review Committee

The C-Beta Project, currently under development by Brookhaven National Laboratory and Cornell University, has been proposed and received preliminary acceptance from the New York State Energy and Research Authority (NYSERDA) with expected funding beginning in early 2017. Its principal goal is the construction of a multi-turn Energy Recovery Linac (ERL) with a Fixed-Field Alternating Gradient (FFAG) return loop, which will serve as a prototype for the potential ERL at eRHIC, a future electron-ion collider under design at BNL. The C-Beta accelerator is being jointly designed by Cornell and BNL, and deployed and operated at the Wilson Laboratory on the Cornell Campus.

The project plan is expected to adhere to the guidelines and requirements appropriate for modern projects of this magnitude, and to adequately support the anticipated construction activities and technical goals. The project has been asked to present a plan that is of sufficient maturity to support a project baseline and construction start. The committee should evaluate the project's readiness to move forward in this context. Should the committee identify any portions of the plan that require refinements, it is requested that, in addition to calling these out, they try to include in their evaluation a means by which the project team might buttress their case in the most timely and efficient manner possible.

It is requested that the review committee evaluate the following specific items:

1. Technical Design: Is the overall technical design conceptually sound and likely to meet the project's technical performance requirements? Has a technical plan at a level of detail sufficient to support construction been presented and documented?
2. Project Scope: Are the project scope and specifications sufficiently well-defined to support a detailed cost and schedule estimates? Are the scope apportionment and deliverables that are split between BNL and Cornell clearly established and well defined? Is a viable scope contingency plan in place, including decision criteria and branch points? Are the NYSERDA milestone well defined?
3. Cost and Schedule: Are the cost, schedule and contingency estimates in support of construction credible and realistic? Is a statussing and reporting plan/structure in place to allow regular tracking of project progress and cost performance upon receipt of funds?
4. Management and ES&H: Is the project being appropriately managed? Will the management model properly support the project goals? Have the anticipated roles and responsibilities of both the institutions and the project principals been adequately defined and understood by all parties? Is the project team populated with sufficiently dedicated personnel to the necessary WBS level, and in the Project Office? Is there a sufficient level of Laboratory and University support to provide the

necessary oversight? Is the project's ES&H plan well-tailored to the project's technical goals and scope, and is it soundly based?

5. Risk: Are risk analysis and mitigation strategies in place? Is there a viable plan in place to track the risks as the project evolves? Does the contingency estimate properly take into account the project risks?
6. Documentation: Has the necessary documentation been developed? Does it adequately support the start of construction?

The review will take place on Monday-Tuesday, February 6 – 7, 2017 at BNL. A closeout will be presented to the C-Beta project team, the Laboratory and Cornell prior to adjourning. A final report should be submitted to my office by close of business on Monday, February 13.

I very much appreciate your willingness to lend your time and expertise to this important step in the C-Beta review process, and look forward to receiving your assessment.

Sincerely,

Berndt Mueller
Associate Laboratory Director for Nuclear and Particle Physics
Brookhaven National Laboratory