



Date: December 14, 2016
To: M. Anerella, T. Tanabe, A. Temnykh
From: S. Peggs
Subject: **Charge for the CBETA “Magnet Buildability Review”**
Cc: I. Bazarov, S. Berg, S. Brooks, G. Hoffstaetter, G. Mahler, R. Patterson, T. Roser, K. Smolenski, D. Trbojevic, J. Tuozzolo, P. Wanderer, F. Willeke, H. Witte.

The CBETA “Magnet Buildability Review” (MBR) will be held on Tuesday December 20, in Berkner C, from 0830 until 1530. Members of the review panel are: Mike Anerella, Toshi Tanabe (chair), and Sasha Temnykh.

The report from the MBR, and the presentations made to the committee, will form one of four sets of documentation that are being prepared in the hybrid/Halbach comparison process:

1. Cost comparison
2. Technical comparison
3. **Magnet Buildability Report**
4. Schedule comparison

Details of the comparison process can be found in the December 8 email: “C-Beta hybrid/Halbach comparison process”. In part that email states:

3) MAGNET BUILDABILITY REPORT Editor: Review chair (TBD).

Separate from the “Technical Comparison” document, Peggs will invoke a narrowly focused technical “Magnet Buildability” review, as originally suggested by Willeke. The panel, with 2 or 3 BNL magnet experts and probably 1 CU expert, will generate a brief written report.

I ask the MBR panel to consider all magnetic and engineering aspects of the comparison, but not peripheral non-magnetic issues such as vacuum chamber design, power supplies, et cetera. Quadrupole and dipole correctors should be included in the comparison, since these are intimately involved with the design of the main magnets. The comparison should be “apples-to-apples” so far as possible, despite the somewhat unequal level of design development.

An examination of “buildability” will inevitably raise some cost and schedule issues. While the panel is encouraged to list and to generally assess the importance of these issues, the panel is NOT asked to attempt to quantify these implications in detail, given the short time available, and since other sets of comparison documentation will address cost and schedule issues.

In addition to the presentations that will be made on the morning of December 20, the panel will also be able to draw on the significant progress that has been made in the Superconducting Magnet Division (SMD), in response to the November 4 memo: “Hybrid/Halbach comparative cost review”. The SMD effort was led by Mike Anerella. In particular, Mike is in possession of engineering drawings of the magnets, including quadrupole and dipole correctors.

Also available to the MBR panel is the September 12 “Engineering review report: C-Beta hybrid magnets”, written by a panel that consisted of T. Tanabe (chair), M. Anerella, C. Cullen and G. Ganetis. The charge questions for this review are closely related to those asked at that review:

1. Do the modeling and analysis results validate the hybrid and Halbach magnet designs?
2. Do the prototype magnets accurately represent the final product? Do they use sufficiently detailed material properties?
3. Are the temperature compensation schemes sufficiently proven and robust? Do tests or alternate approaches need to be considered?
4. Do the two engineering designs faithfully reproduce the required magnet physics design? Have issues of mechanical stability and rigidity been considered?
5. Are there techniques or solutions to reduce the cost or complexity of the two magnet styles, in order to reduce manufacturing costs?
6. Do the designs lend themselves to tightly controlled magnet-to-magnet variations, through either the design or the manufacturing process?
7. Are there design aspects that demand extremely challenging tolerances or assembly requirements (precision sorting, critical material specifications, et cetera)?
8. Do the magnet designs adequately accommodate mounting the correctors, and mounting and positioning the magnets and correctors on the girders?