Fermilab

SBN Program Office
Neutrino Division

Memorandum

Sept 18, 2015

To: Cat James (Deputy SBN Program Coordinator), Ting Miao (Technical Coordinator for SBND)

From: Peter Wilson (SBN Program Coordinator)

Subject: SBN Independent Technical Assessment of the SBND TPC and TPC Readout

Please organize and conduct a technical assessment of SBND sub-systems, specifically the TPC detector design, the TPC assembly and installation plan, and the TPC readout development plan, to be held in September 2015.

The Short Baseline Neutrino Program will have a Director's Progress Review in November 2015, covering the program's planning and execution and focusing on scope, cost and schedule, and management. In preparation, a series of technical assessments on the status of the detectors and facilities will be held in the months prior to the Director's Progress Review. Reports from the technical assessments will be provided to the Director's Progress Review as background for the cost and schedule, to demonstrate these are for systems which meet the scientific and technical requirements of the SBN Program.

These SBND sub-system assessments will be held as three sessions on 28-29 of September:

Monday 28 Sep - morning – Preliminary design review TPC construction
Monday 28 Sep - afternoon - TPC detector assembly and installation planning
Tuesday 29 Sep - morning - TPC readout electronics design status, testing and test stand planning, and DAQ interface planning

A detailed agenda will be provided in the days prior to 28 September on a web site, along with links to background materials.

A committee is formed to perform the assessments, using as guidance the questions included below. A committee Chair oversees all three sessions, and specific committee members are asked to focus on one or more of the sub-systems. The committee and assignments are listed below. The committee is asked to submit a report of their assessments within two weeks to the SBN Program Coordinator.

Assessment guidance questions

For the TPC detector component session

- Are the detector performance requirements clearly stated and derived from the SBND scientific requirements? Do the TPC detector component design parameters follow from the performance requirements?
- The APA frame, the CPA and field cage parts, and the related connecting/supporting structures - are at an advanced preliminary design level.
  - Have engineering analyses been performed, and do they show that the relevant technical parameters are being met by the design?
  - Have any lessons from MicroBooNE or DUNE 35T TPC design and fabrication experience been utilized for the SBND TPC? There are both similarities and differences between the SBND TPC and the DUNE TPCs; is there a listing of potential synergies where the two designs might learn from each other?

    - Are the designs for each of these components ready to move to the final detailing design stage?
    - Do the fabrication plans being developed for these components include inspection and testing procedures, and/or quality acceptance criteria?
- Are the anode wire-winding plans at a reasonable level of detail, given the desired timeline for delivery of completed wound anode planes? Does the winding plan include adequate prototyping of the apparatus and practice with its usage? Are testing procedures and quality acceptance criteria being developed?
- The TPC detector components have interfaces with other systems, such as the cryostat, the readout electronics, and the enclosure. Is there a process, in place or under development, to identify, agree on, and make changes to the interfaces between systems?

For the TPC assembly and installation planning session

- Are the detector performance requirements clearly stated and derived from the SBND scientific requirements? Do TPC installation parameters (for example, handling or alignment) follow from the performance requirements?
- Is the TPC assembly and integration planning at a reasonable level of detail, given the desired timeline for detector operations?
- Are there any aspects of the assembly and installation plan still under development which might trigger adjustments to the finalized design of the TPC components?
- Does the designated assembly space at DAB meet the assembly –phase requirements for materials handling, materials storage, and environmental control?
- The TPC assembly interfaces with other systems, such as the cryostat, the readout electronics, and the enclosure. Is there a process, in place or under development, to identify, agree on, and make changes to the interfaces between detector systems?

For the electronics and readout session

- Are the detector performance requirements clearly stated and derived from the SBND scientific requirements? Do the readout electronics design parameters follow from the performance requirements?
- Have any lessons from MicroBooNE or DUNE 35T electronics and readout experience been utilized for the SBND TPC?
- Are there plans for electronics component QA/QC including testing at various design and production stages? Do the readout testing plans include apparatus for testing at intermediate stages during the detector and electronics assembly and installation process?
- The TPC readout electronics have interfaces with other systems, such as the cryostat and the enclosure. Is there a process, in place or under development, to identify, agree on, and make changes to the interfaces between detector systems?
- Do the preliminary readout/DAQ power, cooling and floor space needs provided for the building design criteria allow for adjustments during finalization of the readout design?
- Is there a plan to develop a coordinated facility and detector grounding scheme between SBN and DUNE? Is there a process being developed to ensure the detector grounding is correctly implemented?

Committee and Assignments

Chair, all sessions : Rick Tesarek
Session 1, morning - 28 September **Preliminary design review of TPC construction**
Lee Greenler, Jen Raaf, Michelle Stancari, Francesco Pietropaolo, Sandro Centro
Session 2, afternoon – 28 September **TPC assembly and installation**
Lee Greenler, Jen Raaf, Michelle Stancari, Russ Rucinski
Session 3, morning – 29 September **TPC electronics and readout**
Terri Shaw, Francesco Pietropaolo, Sandro Centro, TBD