

LBNE Reconfiguration Steering Committee 3rd Meeting

April 13, 2012

Committee Members Present:

- Young-Kee Kim, FNAL, Chair
- Jon Bagger, JHU
- Charlie Baltay, Yale
- Gary Feldman, Harvard
- Kevin Lesko, LBNL
- Ann Nelson, Washington, Seattle
- Mel Shochet, U.Chicago (chair of physics group)
- Bob Svoboda, UC Davis
- Jeffrey Appel, FNAL, Scientific Secretary

Ex-Officio Members Present:

- HEPAP chair, NRC study chair: Andy Lankford, UC Irvine
- DPF chair: Pierre Ramond, U. Florida
- DOE Intensity Frontier Workshop co-chairs: Harry Weerts, ANL and JoAnne Hewett, SLAC
- LBNE Project Manager: Jim Strait
- Fermilab Director: Pier Oddone

The agenda:

- 3:00 pm Clarification on Brinkman's charge – Pier Oddone
- 3:10 pm Report from the Physics Working Group + Discussion – Mel Shochet
- 3:25 pm Report from the Engineering/Cost Working Group + Discussion – Mark Reichenadter (TBC)
- 3:40 pm Workshop plan – Young-Kee Kim
- 3:50 pm AOB

Charge Clarification

Pier (later in meeting, once the FRA Visiting Committee for Science Review was over) provided the clarification from Jim Siegrist about developing Homestake for experiments other than neutrino oscillation not being part of the charge.

Physics Working Group Report

The WG was reviewing the options, and will assume that the mass hierarchy will either be known before LBNE runs or will be known by the end of Phase 1.

It is not expected that proton decay or supernova neutrino measurements can be done on the surface.

A lot of work has already been done on sensitivities for $\sin^2(2\theta_{13})$ between 0.092 and 0.10. Results will be taken as equivalent for purposes of comparisons.

Detector parameters for use in GLOBUS projections of sensitivity are being finalized.

A conservative $6E20$ protons on target (POT) per year will be considered equivalent to 700 kW of power for Fermilab beam.

There is a suggestion for an additional option at Homestake, dropping the near detector and hall to increase the mass of the far detector. A rough estimate is for a 10 kT, given the slightly over \$100M cost of these items and about \$10M per kT incremental cost of LAr detector. There is also work being done inside the LBNE Collaboration to consider a mini LAr near detector in a "man hole".

Work has already been done for many components of the needed sensitivities, particularly by Mary Bishai, Gina Rameika, and Sam Zeller. These will be presented to the WG at its meeting on Monday.

A question was asked at this SC meeting why there is much more background assumed at SOUDAN at 2350 ft. compared to Homestake at 4850 ft.

Engineering/Cost Working Group Report

The report was given by Jim Strait in the absence of Mark Reichenadter due to a power outage affecting all of SLAC for the day.

The first WG meeting completed just as this SC meeting was about to beginning.

The effort required for cost estimates was deemed too great to do all the options on the table. So, it was agreed to limit costs to three: 33-34 kT, 16.5-17 kT, and a small size between 5 and 10 kT. The sizes should be the same whether for Homestake or Minnesota. Shared detector mass between SOUDAN and Ash River options should be 50/50; i.e., equal at the two sites. The SC agreed to use 5kT (not, e.g., 8.5 kT) and add a fourth if the scaling is not at least approximately linear.

Some effort will go into determining if there can be some cost savings for the beam to Homestake, in particular if there is some phasing possible there.

Work will be done to determine if a near detector can fit into the MINOS cavern.

The Working Group has a list of building blocks which can be combined in various combinations to give cost estimates matching the options to be costed. Work on many of the building block cost estimates began almost as soon as the Brinkman letter was known, both inside the LBNE Collaboration and by the LBNE Project team.

There is an issue of any upgrades needed to run the NuMI beam in a low energy configuration at 700 kW. These would need to be costed. Also, how large a near detector is needed to do the physics of Phase 1?

Among the criteria not part of this stage of planning is how any Phase 2 could benefit from the choices made for Phase 1. The current exercise is to focus on Phase 1 costs and physics reach. However, for example, any Phase 1 beam would have to be capable of the LBNE baseline or upgradable reasonably to that level.

Costs will not be assumed to be "off project", but identified as part of the cost, including dewatering at Homestake during construction, etc. when they will not

already exist for earlier programs since these get charged to a Project. Refuges and ventilation shafts will be included in cost estimates when they do not already exist. There may be additional requirements to allow the Minnesota Division of Natural Resources to continue to have tours in SOUDAN mine.

The report will include what is not known at the time it is put together.

Workshop Agenda

Community input format was discussed. Input from the LBNE Collaboration will be moved to the second day, to better overlap with the planned Collaboration meeting. Decisions on moderators for the more structured part of the community input sessions will be made once people have had a chance to register for the workshop.

There is need to get the agenda out publicly soon, and work will be done over the weekend to make this possible early in the week.

The Steering Committee will meet in the afternoon of the second (half) day of the workshop to discuss what was learned at the workshop and writing assignments for the draft report.