

LBNF Project Manager's Review of Far Site Requirements and Interfaces  
Charge  
28 August 2015

The Far Site Conventional Facilities (FSCF) of the Long-Baseline Neutrino Facility (LBNF) Project will be the subject of a CD-3a Review scheduled for 1-3 December 2015, preceded by a Director's Review scheduled for 27-29 October 2015. The FSCF must provide surface and underground facilities to support the construction, installation, commissioning and operation of the large liquid argon (LAr) detector system of the Deep Underground Neutrino Experiment (DUNE), which will be located at the 4850 foot level at the Sanford Underground Research Facility in Lead, SD. The DUNE detector consists of four modules, each of which is in a large cryostat containing approximately 17 kt of LAr. A cryogenics system is required to fill the cryostats and to cool and purify the LAr. Extensive electronic systems are required for the operation and readout of the detector.

A CD-3a review examines a project's readiness to begin construction on long-lead items, in this case the FSCF which is on the critical path for completion of the first detector module of the Deep Underground Neutrino Experiment (DUNE). In this case, the CD-3a review will be based on the 100% Preliminary Design for the FSCF and the corresponding cost and schedule. To determine if this design forms an adequate basis for granting CD-3a approval, it is necessary to demonstrate that it meets the requirements, which in turn requires demonstration that the requirements and interfaces are correct and complete.

The purpose of this review is to evaluate the set of requirements, including interface control documents, and the set of specifications and parameters that follow from the requirements, to determine if they provide the necessary and sufficient basis for the FSCF design to be presented for CD-3a. This includes evaluating the sufficiency of the FSCF requirements that are provided by the LBNF cryostat and cryogenics subproject and the DUNE detector project to support those parts of the project, and that they, in turn, can be traced back to the high-level scientific goals and engineering requirements of the overall LBNF/DUNE Project. The review will also examine the interface documents to assure that points of connection between FSCF and the other facility and detector components are clear. In sum, the review will answer the question: if the LBNF far site conventional facilities are built according to the requirements and associated parameters, along with the documented interfaces, will the facility meet the LBNF/DUNE objectives?

A separate independent design review will occur outside this requirements and interfaces review.

The review committee will consist of two or three senior Conventional Facilities managers with experience in large scientific enterprises, supported by one or two technical experts in cryogenics systems and high-energy physics experiments.

The format of the review will be as follows. Relevant documentation will be provided to the review committee no later than September 2, 2015. On that day, a three-hour kick-off teleconference will be held which will include presentations on:

- an overview of the LBNF/DUNE Project with emphasis on the FSCF design,
- the system of requirements, interface control documents, specifications and parameters, how they interrelated and how they flow down from the scientific goals of LBNF/DUNE
- a roadmap to the requirements documentation
- sample drill-downs to illustrate the flow down from higher-level to more detailed requirements and to the FSCF design

Substantial time will be allotted for discussion and questions by the committee.

Over the following approximately two weeks, the review committee will study the requirements documentation and interact with the LBNF FSCF team in order to develop an in-depth understanding of the LBNF FSCF requirements and interfaces. The review will conclude with a full-day face-to-face meeting at Fermilab on September 18, in which the review committee and the FSCF team will jointly work through the requirements and at the end of which the review committee will provide a written report of its evaluation.

### Review Participants

#### Review Committee

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