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Department of Energy
Office of Science
Washington, DC 20585

MEMORANDUM FOR: STEPHEN MEADOR
DIRECTOR
OFFICE OF PROJECT ASSESSMENT

FROM: JAMES SIEGRIST *JS*
ASSOCIATE DIRECTOR FOR HIGH ENERGY PHYSICS
OFFICE OF SCIENCE

SUBJECT: REQUEST TO CONDUCT AN INDEPENDENT PROJECT
REVIEW OF THE LBNF/DUNE PROJECT

I request that your office organize and conduct an Office of Science Independent Project Review (IPR) of the Long Baseline Neutrino Facility/Deep Underground Neutrino Experiment (LBNF / DUNE) Project on March 20–22, 2018 at Fermilab. The purpose of this review is to assess the project's current status and progress since the last IPR.

LBNF/DUNE is a major international project hosted by Fermilab consisting of two multinational efforts: (1) construction of LBNF by DOE with minority participation by international partners; and (2) fabrication of DUNE with leadership by international partners and minority participation by DOE. DOE's participation in both efforts is being managed as a single line-item construction project under DOE Order 413.3B.

LBNF will construct a high-intensity neutrino beamline and related facilities at Fermilab and will excavate and outfit caverns for the DUNE detectors and the cryogenic infrastructure needed for those detectors at the Sanford Underground Research Facility (SURF) in Lead, South Dakota.

The DUNE collaboration will build the detectors for both the Fermilab site and at SURF. DUNE is currently fabricating detector prototypes to be tested at CERN in a program known as ProtoDUNE.

The international project's objective is for the DUNE collaboration to use the high-intensity neutrino beam and large-volume precision detectors to make accurate measurements of the properties of neutrino oscillations; and search for proton decay and neutrinos from supernova bursts.

The project received CD-1 (*Approve Alternative Selection and Cost Range*) approval on November 5, 2015 and CD-3A (*Approve Initial Far Site Construction*) on September 1, 2016. The Total Project Cost is \$1536 million. Of this, the funding for the CD-3A scope, including contingency, is \$308 million.

The CD-3A scope covers the initial far site conventional facilities construction required to support installation of cryostats and cryogenic systems needed to start DUNE detector installation. The scope includes construction management, pre-excavation, drift and cavern excavation, and supporting buildings and site infrastructure. The CD-3A scope is being executed with a rigorous implementation of the Fermilab project management system, including EVMS. The Committee's evaluation should take cognizance of this in its evaluation.



The remaining scope of the project is still under development with a planned CD-2 approval in FY 2020.

As part of your assessment, your committee should address the following items:

1. Is the project making sufficient progress to give confidence that CD-2 can be achieved by December 2019? Are there adequate resources in place to complete the work needed for CD-2?
2. Is the DUNE collaboration's plan to complete its technical design by CD-2 reasonable and achievable? Have they identified the resources needed to carry out that plan? Has Fermilab provided the technical and management support to the DUNE collaboration consistent with its host lab role? In particular, assess the progress by US DUNE in defining US contributions to the DUNE experiment.
3. Is the program to construct, install, and operate prototype liquid argon TPCs at CERN making appropriate progress to inform the DUNE design?
4. Is the work on the scope approved at CD-3A proceeding as planned? Are procurements being executed in an efficient and timely manner?
5. Are the requirements, the design and the interfaces pertaining to the far site conventional facility CD-3A scope under effective configuration control and management?
6. Are all ES&H organizations, plans, and resources adequate to effectively address all aspects of ES&H for all project activities at all project locations?
7. Is the LBNF/DUNE Project being appropriately and effectively managed, including risk and contingency? Does the tailoring strategy provide concrete benefits in lowering the risk or cost and improving the schedule without significant management complications?
8. Has the project responded appropriately to recommendations from past reviews?

Dr. William Wisniewski and Dr. Michael Procario will work with you, as necessary, to plan and carry out this review. We appreciate your assistance in this matter. As you know, these reviews play an important role in our program. I look forward to receiving your Committee's report within 60 days of the review.

cc: Steve Binkley, SC-2
Michael Procario, SC-25
Theodore Lavine, SC-25
William Wisniewski, SC-25
Michael Weis, FSO
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