Department of Energy
Fermi Site Office
Post Office Box 2000
Batavia, Illinois 60510

NOV 10 2014

Ms. Martha E. Michels
Assistant Director for ESH&Q
Fermilab
P.O. Box 500
Batavia, IL 60510

Dear Ms. Michels:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT DETERMINATION AT FERMI NATIONAL ACCELERATOR LABORATORY – SHORT BASELINE NEUTRINO PROGRAM

Reference: Letter, from M. Michels to M. Weis, dated November 3, 2014, Subject: National Environmental Policy Act Environmental Evaluation Notification Form for the Short Baseline Neutrino Program

I have reviewed the National Environmental Policy Act (NEPA) Environmental Evaluation Notification Form (EENF) for the Short Baseline Neutrino Program. Based on the information provided in the EENF, I have approved the following generic categorical exclusion (CX):

Project Name	Approved	CX
Short Baseline Neutrino Program:	11/4/2014	B1.15, B1.30, B1.31

I am returning a signed copy of the EENF for your records. No further NEPA review is required. This project falls under categorical exclusions provided in 10 *CFR* 1021, as amended in November 2011.

Sincerely,

Michael J. Weis
Site Manager

Enclosure:
As Stated

cc: N. Lockyer, w/o encl.
J. Lykken, w/o encl.
T. Meyer, w/o encl.
A. Kenney, w/o encl.
T. Dykhuis, w/encl.

FERMILAB ENVIRONMENTAL EVALUATION NOTIFICATION FORM (EENF) for documenting compliance with the National Environmental Policy Act (NEPA), DOE NEPA Implementing Regulations, and the DOE NEPA Compliance Program of DOE Order 451.1B

Project/Activity Title: Short Baseline Neutrino Program
ES&H Tracking Number: 01129

I hereby verify, via my signature, the accuracy of information in the area of my contribution for this document and that every effort would be made throughout this action to comply with the commitments made in this document and to pursue cost-effective pollution prevention opportunities. Pollution prevention (source reduction and other practices that eliminate or reduce the creation of pollutants) is recognized as a good business practice which would enhance site operations thereby enabling Fermilab to accomplish its mission, achieve environmental compliance, reduce risks to health and the environment, and prevent or minimize future Department of Energy (DOE) legacy wastes.

Fermilab Action Owner: Peter Wilson (X2156)
Signature and Date 10/29/2014

Fermilab ES&H Officer: Angela Aparicio (X3701)
Signature and Date 10/30/14

I. Description of the Proposed Action and Need

Purpose and Need:
The purpose of the proposed action/project is to establish a Fermilab Short Baseline Neutrino (SBN) program that would include three distinct neutrino detectors based on the Liquid Argon Time Projection Chamber (LAr-TPC) technology. The Program currently includes the MicroBooNE experiment that is nearing completion of detector installation in the Liquid Argon Test Facility (LArTF), the construction of the LAr1-Near Detector (ND) to be located in a proposed SBN Near Detector building, and moving the existing Icarus detector from Europe into the proposed SBN Far Detector building. The program would take advantage of the existing Booster Neutrino Beam (BNB) developed for the MiniBooNE experiment. Each of the three detectors would be exposed to neutrinos from the BNB with at least 6.6×10^{20} protons on target as shown in the figure in Section VII.

The need for the three-detector SBN program is to enable scientists to make the most sensitive search for a low mass sterile neutrino and address the anomalies seen by the Large Scintillator Neutrino Detector and MiniBooNE experiments. With similar detectors spread out along the beamline at 110m (LAr1-ND), 470m (MicroBooNE) and 600m (Icarus), it would be possible for the first time to observe the possible time evolution of electron neutrino rate on the BNB. The excess of low energy electromagnetic events observed by the MiniBooNE experiment would be resolved into electron and photon components with the LAr-TPC technology used by all three detectors. The combined analysis of the electron neutrino signal in the three detectors is expected to either exclude or observe neutrino oscillations between muon neutrinos and electron neutrinos at values $\Delta m^2 \sim 1eV^2$.

Proposed Action:
Fermilab currently utilizes an extracted particle beam (call the Booster Neutrino Beam or BNB) to study the properties of the neutrino. The site location and well known properties of the existing beam make it an ideal candidate for expanding the neutrino program to accommodate future experiments. The current plan for the Short Baseline Neutrino Program (SBNP) is to install two (2) detectors along the existing beamline. A preliminary assessment of the physics potential indicates that a location approximately 600 meters (1,968 feet) from the existing target is well suited for location of the SBN Far Detector.

This action would include construction of a 1,350 square foot below grade enclosure approximately 32 feet below grade to house the LAr-1 SBN Near Detector and associated support equipment and an

associated 2,300 square foot above grade service building that would contain a truck loading/unloading area and staging area. In addition, the action would include construction of a 7,300 square foot below grade enclosure approximately 32 feet below grade to house the SBN Far Detector, support equipment, and an associated 4,340 square foot above grade service building which would contain a truck loading/unloading area, staging area, and support functions. Additionally, the existing SciBooNE Detector Enclosure would be re-purposed to house detector support equipment. The Icarus detector sections would be shipped via air and then transported via a truck similar to that shown in Section VII. The sections would arrive on-site and be transported to the Far Detector building along the Pine Street entrance of Fermilab and over a gravel drive to the Far Detector building.

In addition, three soil borings and laboratory testing would be performed to characterize the subsurface conditions. One boring would be located approximately 30 feet north of the existing SciBooNE Detector Enclosure and two borings would be located between the existing MiniBooNE Detector Enclosure and the NOvA Surface Building (approximately 600 meters north of the MI-12 Target).

Alternatives Considered:
As stated above Fermilab currently utilizes the BNB to study the properties of the neutrino because the site location and properties make it an ideal candidate for expanding the neutrino program to accommodate future experiments. Other locations were considered but they would not provide the beam quality necessary to further the understanding of the neutrino.

Since the far detector has to be located along the BNB, distances other than the selected 600 meters, were considered. This included 700m (2,296 feet), a 700m location slightly off axis and a location at 800 meters (2,625 feet). The 700m location was ruled out since it would require the building to be located at an existing stream within a larger wetland area. The 700 meter off-axis location was ruled out since the physics was less than ideal and construction so close to adjacent facilities was deemed to be problematic. The 800 meter location was found unsuitable based on the proximity to the existing road and drainage ways.

The 'no action' alternative would not meet the purpose and need.

II. Description of the Affected Environment

Transportation
The Icarus detector sections would be shipped from Europe to the United States via air (proposed receiving site would be the DuPage Airport) and then transported via a truck similar to that shown in Section VII. The detector sections would arrive on-site and be transported to the Far Detector building along the Pine Street entrance of Fermilab and over a gravel drive to the Far Detector building. The detector would arrive in two 77' long, 18" wide, and 20' tall 50 metric tons detector sections. CERN would lead the logistics of transporting the detector to Fermilab.

Construction
Approximately 27,000 cubic yards of material would be excavated for the construction of SBN Near and Far Detector buildings. The majority of the material would be used as backfill around the enclosures, and excess material would be retained on the Fermilab site and located in active stockpile locations. Utilities would be run from several locations through previously disturbed land, and would include domestic water, fire safety, sanitary, storm, telecommunications, and conventional power.

Operations
The SBN program would take advantage of the existing Booster Neutrino Beam (BNB) developed for the MiniBooNE experiment. Each of the three detectors (Near, MiniBooNE, and Far) would be exposed to neutrinos from the BNB with at least 6.6×10^{20} protons on target. The location of the SBN program is shown in the following site map.

III. Potential Environmental Effects (If the answer to the questions below is "yes", provide comments for each checked item and where clarification is necessary.)

A. Sensitive Resources: Would the proposed action result in changes and/or disturbances to any of the following resources?

- ☐ Threatened or endangered species
- ☐ Other protected species
- ☒ Wetland/Floodplains
- ☐ Archaeological or historical resources
- ☐ Non-attainment areas

B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated substances or activities?

- ☒ Clearing or Excavation
- ☐ Demolition or decommissioning
- ☐ Asbestos removal
- ☐ PCBs
- ☒ Chemical use or storage
- ☐ Pesticides
- ☒ Air emissions
- ☒ Liquid effluents
- ☐ Underground storage tanks
- ☐ Hazardous or other regulated waste (including radioactive or mixed)
- ☐ Radioactive exposures or radioactive emissions
- ☐ Radioactivation of soil or groundwater

C. Other Relevant Disclosures: Would the proposed action involve any of the following actions/disclosures?

- ☐ Threatened violation of ES&H permit requirements
- ☐ Siting/construction/major modification of waste recovery or TSD facilities
- ☐ Disturbance of pre-existing contamination
- ☒ New or modified permits
- ☐ Public controversy
- ☐ Action/involvement of another federal agency
- ☐ Public utilities/services
- ☐ Depletion of a non-renewable resource

IV. Comments on checked items in section III.

Wetland/Floodplain

Far Detector Building

The Far Detector building is located near Kane County Advanced Identification (ADID) wetland #2851, and would disturb approximately 0.17 acres of wetland. An Army Corps of Engineers permit application was submitted in October 2014 for review. The Far Detector building is located downstream of the National Pollutant Discharge Elimination System (NPDES) Outfall #004 (IL0026123); however, since no industrial discharges are expected, the NPDES Outfall #004 would not need to be changed.

Clearing and/or Excavation

Near Detector Building

Approximately 4,800 cubic yards of material would be excavated for the construction of SBN Near Detector. The majority of the material would be used as backfill around the enclosure. Excess material would be retained on the Fermilab site and located in active stockpile locations. The activity site is less than 1 acre. Excavation dewatering efforts and erosion control measures consistent with Fermilab

standards would be incorporated in the Final Design documents.

Far Detector Building
Approximately 21,406 cubic yards of material would be excavated for the construction of this activity. The majority of the material would be used as backfill around the enclosure. Excess material would be retained on the Fermilab site and located in active stockpile locations. Excavation dewatering efforts and erosion control measures consistent with Fermilab standards would be incorporated in the Final Design documents.

Chemical Use or Storage
Near Detector Building
The Near Detector is a 129 cubic meter Liquid Argon (LAr) detector. All chemical handling measured consistent with Fermilab standards would be incorporated in the Final Design documents.

Far Detector Building
The Far Detector is a 100 metric ton Liquid Argon (LAr) detector. All chemical handling measured consistent with Fermilab standards would be incorporated in the Final Design documents.

Air Emissions
New HVAC systems would utilize modern refrigerant in accordance with Fermilab policies.

Far Detector Building
A 150 KW diesel generator may be installed to provide electrical power to critical equipment. This capacity of generator is well below the threshold of that requiring a preconstruction air permit.

Liquid Effluents
Liquid effluents resulting from stormwater runoff from the buildings and sump discharges would empty into the surrounding graded stormwater flow paths. No hazardous effluents are anticipated as a result of the SBN program.

New or modified permits and Wetland/Floodplains
Far Detector Building
Since the activity is expected to impact greater than 1 acre, a Storm Water Permit would be obtained for it. Personnel from the Facilities Engineering Services Section are currently working with project personnel to delineate and mitigate 0.17 acres of wetland within the activity area.

V. NEPA Recommendation

Fermilab staff has evaluated the proposed action and believe a Categorical Exclusion is appropriate. It is believed that the proposed action meets the description found in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B1.15, B1.30 and B1.31 as follows.

B1.15 Support Buildings
Siting, construction or modification, and operation of support buildings and support structures (including, but not limited to, trailers and prefabricated and modular buildings) within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible). Covered support buildings and structures include, but are not limited to, those for office purposes; parking; cafeteria services; education and training; visitor reception; computer and data processing services; health services or recreation activities; routine maintenance activities; storage of supplies and equipment for administrative services and routine maintenance activities; security (such as security posts); fire protection; small-scale fabrication (such as machine shop activities), assembly, and testing of non-nuclear equipment or components; and similar support purposes, but exclude facilities for nuclear weapons activities and waste storage activities, such as activities covered in B1.10, B1.29, B1.35, B2.6, B6.2, B6.4, B6.5, B6.6, and B6.10 of this appendix.

B1.30 Transfer actions

Transfer actions, in which the predominant activity is transportation, provided that (1) the receipt and storage capacity and management capability for the amount and type of materials, equipment, or waste to be moved already exists at the receiving site and (2) all necessary facilities and operations at the receiving site are already permitted, licensed, or approved, as appropriate. Such transfers are not regularly scheduled as part of ongoing routine operations.

B1.31 Installation or relocation of machinery and equipment
Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.

Fermilab NEPA Program Manager: Teri L. Dykhuis
Signature and Date Teri L. Dykhuis 10/31/2014

VI. DOE/FSO NEPA Coordinator Review

Concurrence with the recommendation for determination:

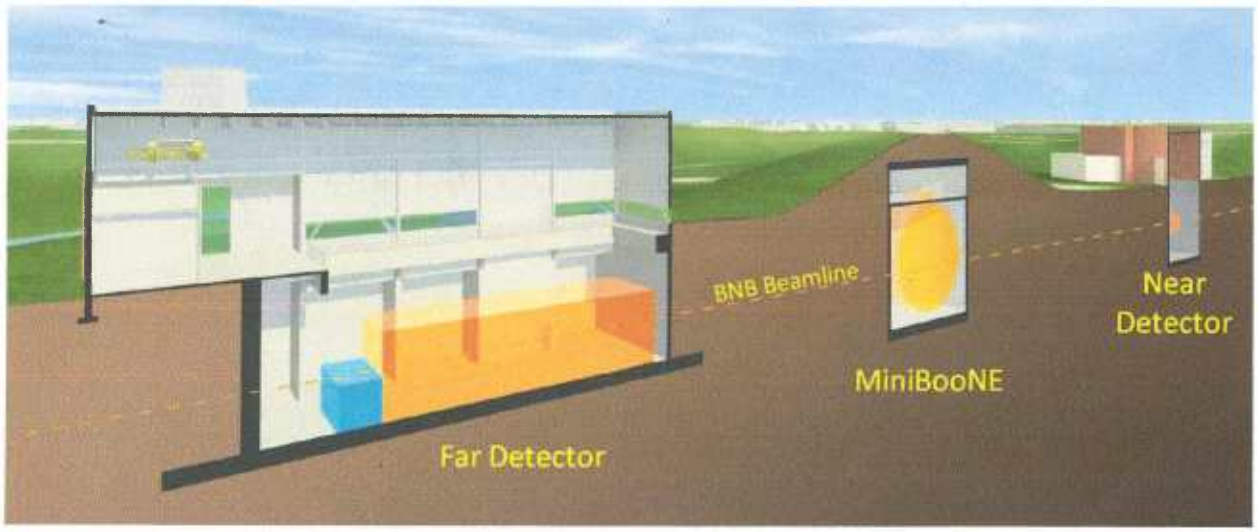
Fermi Site Office (FSO) Manager: Michael J. Weis
Signature and Date 11/7/2014

FSO NEPA Coordinator: Rick Hersemann
Signature and Date Rick Hersemann 11/4/2014

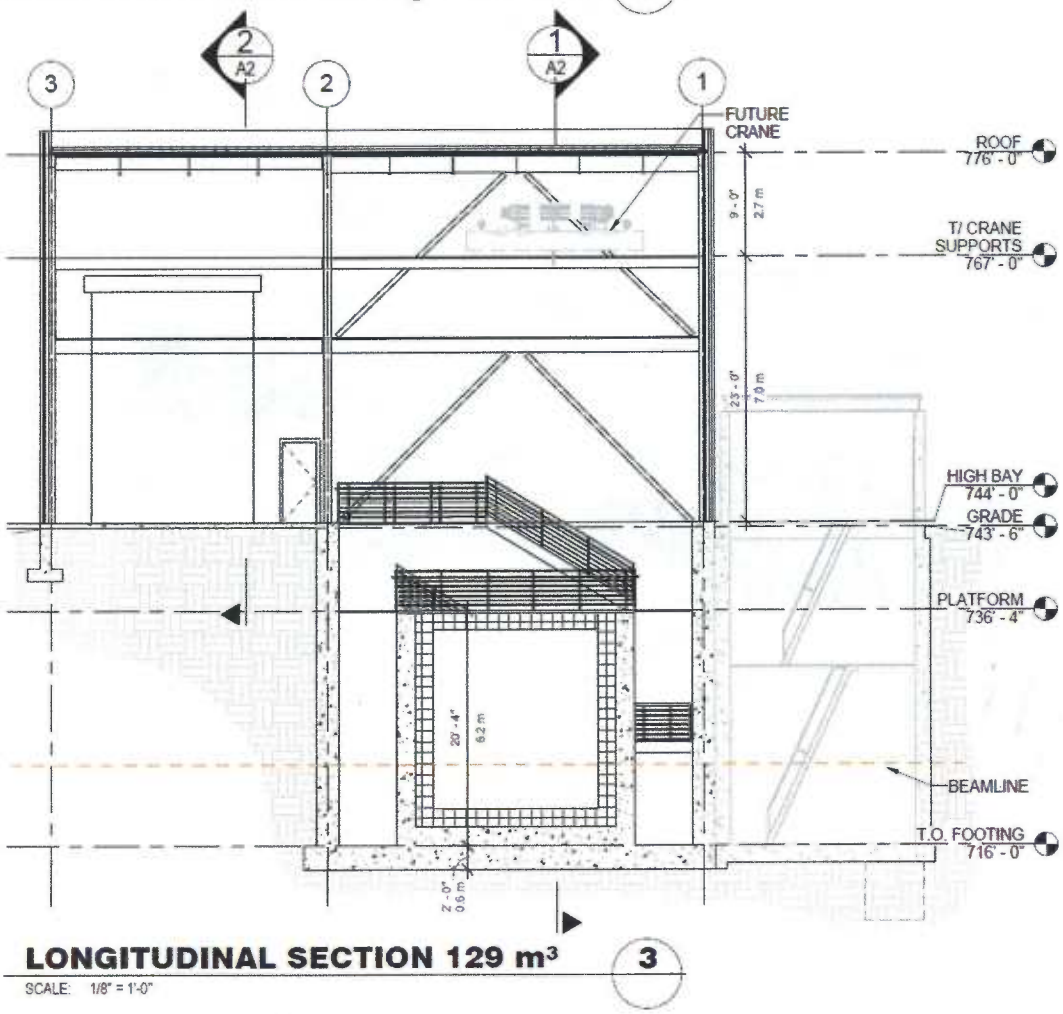
VII. Appendix – Diagrams

Booster Neutrino Beamline with the Proposed SBN Program Near and Far Detectors

Rendering of SBN Program Buildings



Longitudinal Section of the SBN Program Near Detector



Longitudinal Section of the SBN Program Far Detector

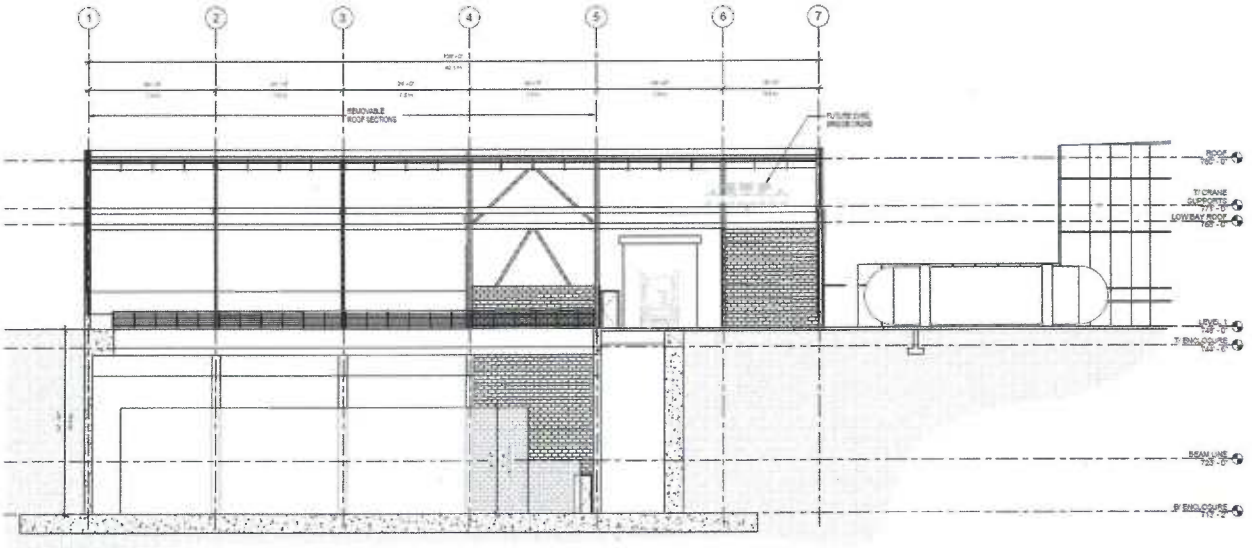


Photo of Truck Transporting Sections of the ICARUS Detector from Italy to CERN