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

JUN 02 2010

Dr. Bruce Chrisman
Chief Operating Officer
Fermilab
P.O. Box 500
Batavia, IL 60510

Dear Dr. Chrisman:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION AT FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB) – MINERvA TEST BEAM DETECTOR PROJECT

Reference: Letter, B. Chrisman to M. Bollinger dated May 17, 2010, Subject: National Environmental Policy Act (NEPA) Environmental Evaluation Notification Form (EENF) for the MINERvA Test Beam Detector Project

I have reviewed the Fermilab EENF for the MINERvA Test Beam Detector Project. Based on the information provided in the EENF, I have approved the following categorical exclusion (CX):

Project Name	Approved	CX(s)
MINERvA Test Beam Detector Project	5/27/2010	B3.6

I am returning a signed copy of the EENF for your records. No further NEPA review is required. This project falls under a categorical exclusion provided in 10 CFR 1021, as amended in November 1997.

Sincerely,

Mark E. Bollinger
Acting Site Manager

Enclosure:
As Stated

cc: P. Oddone, w/o encl.
Y.-K. Kim, w/o encl.
N. Grossman, w/encl.
T. Dykhuis, w/encl.

FERMILAB ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Project/Activity Title: MINERvA Test Beam Detector Calibration Experiment
ES&H Tracking Number: 01082
Funding Source: National Science Foundation Major Research Instrumentation
Fermilab Environmental Officer (submitted PIF): Rob Bushek (X2399)
Fermilab Project Lead: Aria Meyhoefer (X2460)

I hereby certify via my signature that every effort would be made throughout this project 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 DOE legacy wastes.

Fermilab Project Lead: Aria Meyhoefer

Signature _____

Date May 17, 2010

Fermilab NEPA Reviewer: Teri L. Dykhuis

Signature Teri L. Dykhuis

Date 05/17/2010 T.D.

I. Description of the Proposed Action and Need

Purpose and Need:
The purpose of the Main Injector Neutrino ExperRiment ν-A (MINERvA) is to make detailed neutrino nucleus cross section measurements over a range of energies (one to tens of GeV) and target nuclei (He, CH, C, Fe, Pb). This range is not yet explored completely or consistently, yet understanding these interactions is vital for current and upcoming neutrino oscillation experiments such as the Neutrinos at the Main Injector (NuMI) Off-Axis Electron Neutrino (ν_e) Appearance Experiment (NOvA). At this time, MINERvA experimenters want to: 1) calibrate the detector scintillator response (visible energy) to the following particles: protons, pions, and electrons; 2) measure detector resolution; and 3) estimate the bias on the calorimetric energy reconstruction for the above mentioned particles. In order to do this they need to construct a smaller version, or prototype, of the full scale MINERvA detector and expose it to a test beam (MINERVA Test Beam Detector).

Proposed Action:
The proposed MINERvA Test Beam Detector would be constructed and receive beam at the Fermilab Test Beam Facility. The detector would be approximately 1.1 meters square and roughly two meters long and the frame that would contain the active components would be approximately 3.5m x 3.5m x 3m in size. The scintillator readout would be set up in the same UXVX orientation sequence as the full scale MINERvA detector. The frame holding the detector would allow the experimenters to insert and remove lead and iron absorbers equivalent to the electron calorimeter (ECAL) and hadron calorimeter (HCAL) portions of the full scale MINERvA detector.

The MINERvA Test Beam Detector would utilize a gas mixture of Argon and CO_2 that would be vented to the air. Alternative gasses (a tetrafluoromethane (CF4)/isobutane mixture and an argon/ethane/isopropyl alcohol mixture) were considered but isobutane and isopropyl alcohol are

volatile organic materials that are permit program regulated air pollutants, and CF4 is a greenhouse gas (GHG) with a global warming potential (GWP) of 6,500 (highest is SF6 at 23,900) and atmospheric lifetime of 3200 years. Additionally, isopropyl alcohol is highly flammable and can form an explosive mixture with air; ethane is flammable and can form an explosive mixture with air; isobutane can be explosive; and CF4 can create an oxygen deficiency hazard due to its ability to displace oxygen.

The detector performance utilizing Argon and CO_2 was satisfactory and although CO2 is a GHG, the GWP is low (1) compared to CF4, and therefore the mixture chosen is the best alternative considering environmental, safety, and performance factors. Additionally, preliminary maintenance (e.g. repairs to the foils, etc.) would be conducted on the wire chambers to minimize leakage through the gas system.

The 'No Action' alternative would not meet the above stated purpose and need.

II. Description of the Affected Environment

The MINERvA Test Beam Detector would utilize 500 cc/min of an Argon (80%) and CO_2 (20%) mix which is about one 310 standard cubic foot cylinder per week and this would be consistent throughout the duration of the project which is scheduled to run until the end of September 2010. CO_2 is a greenhouse gas (GHG) with a Global Warming Potential (GWP) over a 100 year time horizon of 1 (CO_2 is the reference gas) and an atmospheric lifetime of 50-200 years. Argon is an inert non-regulated gas but can be an asphyxiant in closed areas so ODH safety precautions would be observed.

III. Potential Environmental Effects (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

- ☐ 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. NEPA Recommendation

Fermilab staff have reviewed this proposed action and concluded that the appropriate level of NEPA determination is a Categorical Exclusion. The conclusion is based on the proposed action meeting the applicable requirements in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B3.6 which states: "Siting, construction, (or modification), operation and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible). See also C12."

V. DOE/CH-FAO NEPA Coordinator Review

Concurrence with the recommendation for determination:

NEPA Coordinator Reviewer, U.S. DOE FSO: Rick Hersemann

Signature Rick Hersemann

Date 5/27/10

Acting Fermi Site Office Manager: Mark Bollinger

Signature M Lee

Date 5/28/10

VI. Comments on checked items in section III.

Air Emissions

The MINERvA Test Beam Detector would utilize a gas mixture of Argon and CO_2 that would be vented to the air. Alternative gasses (a tetrafluoromethane (CF4)/isobutane mixture and an argon/ethane/isopropyl alcohol mixture) were considered but isobutane and isopropyl alcohol are volatile organic materials that are permit program regulated air pollutants, and CF4 is a greenhouse gas (GHG) with a global warming potential (GWP) of 6,500 (highest is SF6 at 23,900) and atmospheric lifetime of 3200 years. Additionally, isopropyl alcohol is highly flammable and can form an explosive mixture with air; ethane is flammable and can form an explosive mixture with air; isobutane can be explosive; and CF4 can create an oxygen deficiency hazard (ODH) due to its ability to displace oxygen. The detector performance utilizing Argon and CO_2 was satisfactory and although CO2 is a GHG, the GWP is low (1) compared to CF4, and therefore the mixture chosen is the best alternative considering environmental, safety, and performance factors. Additionally, preliminary maintenance (e.g. repairs to the foils, etc.) would be conducted on the wire chambers to minimize leakage through the gas system.

Argon is an inert non-regulated gas but can be an asphyxiant in closed areas so ODH safety precautions would be observed. CO_2 is not a regulated air pollutant for which a permit-to-construct an air emissions unit must be obtained. It is, however, as stated above, a GHG for which the recently passed Sustainability Executive Order 13514 calls for a Federal Agency-wide reduction in emissions.

In order to carry out the purpose and need for this project (stated earlier) a small amount of gas would be emitted. Specifically, the MINERvA Test Beam Detector would utilize 500 cc/min of an Argon (80%) and CO_2 (20%) mix which is about one 310 SCF cylinder per week and this would be consistent throughout the duration of the project which is scheduled to run until the end of September 2010.

Demolition or Decommissioning

After completing the tests, the MINERvA Test Beam Detector would be dismantled and stored for future calibration tests, or kept available to be reused for future scintillator detector R&D projects. All recyclable materials would be staged pending the DOE moratorium of metal recycling.