OCT 23 2013

Ms. Victoria A. White
Chief Operating Officer
Fermilab
P.O. Box 500
Batavia, IL 60510

Dear Ms. White:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION AT FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB) – T-1037 FLYSUB-CONSORTIUM TRACKING AND RICH PERFORMANCE EVALUATION

Reference: Letter, from V. White to M. Weis, dated October 17, 2013, Subject: NEPA Environmental Evaluation Notification Form (EENF) for the T-1037 FLYSUB-Consortium Tracking and RICH Performance Evaluation

I have reviewed the Fermilab EENF for the T-1037 FLYSUB-Consortium Tracking and RICH Performance Evaluation. Based on the information provided in the EENF, I have approved the following categorical exclusion (CX):

Project Name	Approved	CX
T-1037 FLYSUB Consortium Tracking and RICH Performance Evaluation	10/22/2013	B3.6

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,

— 5 —

Michael J. Weis
Site Manager

Enclosure:
As Stated

cc: N. Lockyer, w/o encl.
M. Michels, w/encl.
T. Dykhuis, w/encl.
A. Aparicio, w/o encl.

bc: P. Siebach, CH-STS, w/encl.
M. McKown, CH-OCC, w/o encl.
J. Scott, FSO, w/o encl.
R. Hersemann, FSO, 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: T-1037 FLYSUB-Consortium Tracking and RICH Performance Evaluation

ES&H Tracking Number: 01110

I hereby verify, via my signature, the accuracy of information in the area of my contribution for this document and that every effort will 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 will 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 Project Owner: Aria Soha (X4463)

Signature and Date Aria Soha 10/16/13

Fermilab ES&H Officer: Angela Aparicio (X3701)

Signature and Date Angela Aparicio 10/16/13

I. Description of the Proposed Action and Need

Purpose and Need:
FLYSUB is a consortium consisting of Brookhaven National Laboratory (BNL), Florida Tech, Stony Brook University (SBU), University of Virginia (UVa), and Yale University, that has assembled a set of detectors to be tested within the Fermilab Test Beam Facility (FTBF). The test beam campaign is investigating the following:

- Development of a mini-drift Gamma-Electron-Muon (GEM) detector for resolving the issue of losing resolution for inclined particle tracks and applying different frontend electronics
- Development of large area planar GEM detectors for endcap tracking
- Development of Cherenkov detectors in the forward direction, with particular emphasis on high momentum hadron ID and development of large area low cost Vacuum Ultraviolet (VUV) mirrors
- Development of alternative read-out structures for reducing the number of channel counts but conserving the resolution

Alternatives Considered:

The FTBF is one of two in the world (the other is at CERN) that provide versatile test beams for experimenters to test their detectors and instrumentation. Not being able to run these tests would leave the experimenters unsure of how their equipment would react within a beam.

Alternative gases were considered in place of the CF4. First was SF6, but it has a higher Global Warming Potential; and the other was Argon/CO2, but there was not enough ionization of the gas to get a good signal.

Proposed Action:
FLYSUB is proposing to assemble a set of detectors at the FTBF that are targeted towards tracking and Particle Identification (PID) components of an Electron-Ion Collider (EIC) detector. The ultimate goal of this test-beam effort is to test and verify the performance of the individual components according to their expectation. The detectors are foreseen to share the same beam-line and would be arranged according to their need for particle impact. The specifics are the following:

1) BNL would be testing a mini-drift Gamma-Electron-Muon (GEM) detector made out of 10x10 cm^2 GEM foils. Gas to be used is mixed Ar/CO2 (70/30), Ar/CO2/CF4 (95/3/2) or pure CF4.
2) Florida Tech and UVa would test one or two chambers with trapezoidal prototypes (100 cm x 44-22 cm) and radial strip readout and one more chamber with zigzag strips. A GEM prototype chamber (50x50 cm^2) and GEM prototype (30x30 cm^2) with zigzag readout strips would also be tested.
3) SBU would test the performance of a Ring-Imaging-Cherenkov (RICH) detector based on GEM detectors and CF4 as the radiator/counting gas. This technology is foreseen to become part of the Particle Identification (PID) system of an EIC-detector. The detector consists of a stainless steel tube which is closed at one end with a mirror and at the other end with the GEM detector in the focal plane of that mirror.
4) Yale University would be testing two sets of 4 chambers each (10x10 cm^2).

II. Description of the Affected Environment

This action would result in venting of gases, mentioned above, to the atmosphere at a rate of between 10 cubic centimeters (ccs) per minute – 500 ccs/minute for approximately 2 weeks. In addition, the detector would be placed within an existing beamline, which could potentially activate portions of the detector.

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: Will 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: Will 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: Will 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.

Air Emissions

The following gases would be used and emitted at a rate between 10 – 500 cubic centimeters per minute: Tetrafluoromethane (CF4), either in mixtures (with argon and/or carbon dioxide) or pure gases and Argon/Carbon Dioxide mixtures with varying ratios (70/30 and 80/20). CF4 (Global Warming Potential (GWP) of 6500) and Carbon Dioxide (GWP of 1) are greenhouse gases; therefore all emissions would be tracked. An IEPA construction air permit would not be necessary because the low flow of emissions is exempt according to 35 IAC Section 201.146 jjj) Replacement, addition, or modification of emission units at permitted sources that are not major sources subject to Section 39.5 of the Act and that do not have a federally enforceable State operating permit limiting their potential to emit, in circumstances where:
1) The potential to emit of any regulated air pollutant in the absence of air pollution control equipment from the new emission unit, or the increase in the potential to emit resulting from the modification of any existing emission unit is either:
A) Less than 0.1 pound per hour or 0.44 tons per year; or
B) Less than 0.5 pound per hour, and the permittee provides prior notification to the Agency of the intent to construct or install the unit. The unit may be constructed, installed or modified immediately after the notification is filed;

Radioactive exposures or radioactive emissions

The detector would be placed within an existing beamline, which could potentially activate portions of the detector. As Low As Reasonably Achievable (ALARA) principles would be followed, along with established procedures and training to minimize exposure to workers.

V. NEPA Recommendation

Fermilab staff has reviewed this 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 B3.6 which states:

B3.6 Small-scale research and development, laboratory operations, and pilot projects: "Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment."

Fermilab NEPA Program Manager: Teri L. Dykhuis

Signature and Date Teri L. Dykhuis 10/17/2013

VI. DOE/FSO NEPA Coordinator Review

Concurrence with the recommendation for determination:

Fermi Site Office (FSO) Manager: Michael J. Weis

Signature and Date 10/23/2013

FSO NEPA Coordinator: Rick Hersemann

Signature and Date Rick Hersemann 10/22/2013