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

MAY 21 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) – DRELL-YAN SEAQUEST PROJECT

Reference: Letter, B. Chrisman to M. Bollinger, dated May 7, 2010, Subject: National Environmental Policy Act (NEPA) Environmental Evaluation Notification Form (EENF) for the Drell-Yan SeaQuest Project

I have reviewed the Fermilab EENF for the Drell-Yan SeaQuest Project. Based on the information provided in the EENF, I have approved the following categorical exclusion (CX):

Project Name	Approved	CX(s)
Drell-Yan SeaQuest Project	5/19/2010	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: Drell-Yan SeaQuest Project
ES&H Tracking Number: 01083
Funding Source: Operating and National Science Foundation
Fermilab Environmental Officer (submitted NEPA PIF): Eric McHugh (X3199)
Fermilab Project Lead: David Christian (X4001)

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: David Christian

Signature David Christian

Date 5/6/10

Fermilab NEPA Reviewer: Teri L. Dykhuis

Signature Teri L. Dykhuis

Date 5/6/10

I. Description of the Proposed Action and Need

Purpose and Need:
The Fermilab SeaQuest (E906) Experiment is part of a series of fixed target Drell-Yan experiments designed with the purpose of measuring the quark and antiquark structure of the nucleon and the modifications to that structure which occur when the nucleon is embedded in a nucleus. In order to fulfill this purpose, there is a need to build and operate a new spectrometer (detector) for the experiment.

Proposed Action:
Fermilab proposes to build and operate a spectrometer in the New Muon 4 (NM4) Hall and renovate the 120 GeV beam line from enclosure B to NM4. The 120 GeV beam is necessary for the experiment and Fermilab is uniquely capable of providing this via its existing facility.

The currently unused experimental space in NM4 would be reconfigured to accommodate installation of the proposed experiment utilizing existing components such as shielding, magnets, and gas chambers. The gasses proposed for the experiment would include argon, ethane (C2H6), CO2, methane (CH4), and tetrafluoromethane (CF4). The experiment is expected to run for 2-4 years.

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

II. Description of the Affected Environment

No new buildings would be needed; therefore no excavation is necessary and renovating the beam line would be done with existing components. However, radiation exposure due to the 120 GeV beam line

is a potential impact. Gas flow rates would be determined by the leak rate of the gas chambers but the rates are expected to be below 1 cubic feet/hour per chamber (below 20 cubic feet/hour total). The proposed gas mixtures are the following: 1) 50% Argon, 50% ethane (bubbled through ethanol); 2) 10-20% CO2, balance Argon, and 3) 5-15% CF4, 5-8% CH4, balance Argon. The proposed spectrometer would be built using new scintillation counter arrays, and a combination of existing and new wire chambers. The experiment plans to reuse approximately 80,000 pounds of magnet steel.

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 5/19/10

Acting Fermi Site Office Manager: ~~Mark~~ Bollinger

Signature [signature]

Date 5/21/10

VI. Comments on checked items in section III.

Demolition or Decommissioning
After completion, the Drell Yan experiment would be dismantled. The equipment that belongs to Fermilab will be stored for future use or disposed of as appropriate. The balance of the equipment would be shipped to the institution that owns it at the owner's expense.

Air Emissions
Methane (CH4) and ethane (C2H6) are exempt from the definition of volatile organic material per 35 IAC Section 211.7150; argon is inert; and tetrafluoromethane (CF4) and CO2 are not regulated via the stationary emission unit permitting process. Therefore, emission of the proposed wire chamber gases would not require the Lab to obtain an air emissions unit permit-to-construct from the Illinois Environmental Protection Agency. However, CF4, CH4, and CO2 are greenhouse gas (GHG) and the recently passed Sustainability Executive Order 13514 calls for a Federal Agency-wide reduction in emissions of GHGs. CF4 has a Global Warming Potential (GWP) of 6500 which is calculated over a 100 year time horizon (highest GWP of any substances is 23,900) and predicted atmospheric lifetime of 50,000 years; CH4 has a GWP of 21 and atmospheric lifetime of 12$\pm$3 years; and CO2 has a GWP of 1 (CO_2 is the reference gas) and atmospheric lifetime of 50-200 years. Considerable effort has been expended but no substitute gases with similar performance characteristics have been identified. In addition, environmentally friendly ways to manage the gas, such as recycling, were explored; however, the purity and quality standard necessary for the experiment could not be met through recycling. In addition, if it could even be done, the supplier is not able or willing to receive the recaptured gases due to it being a mixture for which there is no market (if there was only one chemical, this might be possible). Therefore, these small volumes would be vented to the atmosphere during operation.

Radioactive exposures or radioactive emissions
The safety assessment document (SAD) module would be developed that would address radiation exposures to workers and members of the public due to the operation of the Neutrino area. The SAD would also address the potential radioactive emissions due to the proposed project. Personnel and public exposures would remain well below regulatory limits and within guidelines of the Fermilab Radiological Control Manual including the control of occupational radiation exposures during maintenance activities. Radionuclide emissions would be monitored and reported in accordance with existing practices and regulatory requirements. Cumulative air emissions are expected to remain substantially below the National Emission Standards for Hazardous Air Pollutants (NESHAPs) threshold for continuous monitoring and far below the regulatory limit for effective dose to members of the public.

Action/involvement of another federal agency
SeaQuest Collaborators from the University of Illinois, University of Maryland, University of Michigan, and Rutgers are supported by the National Science Foundation.