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Weis
MJW
12/20/12

Mr. Jack W. Anderson
Chief Operating Officer
Fermilab
P.O. Box 500
Batavia, IL 60510

Dear Mr. Anderson:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION AT FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB) – PROJECT TO ESTABLISH A MUON GYROMAGNETIC RATIO MEASUREMENT (g-2) EXPERIMENT WITHIN THE MUON CAMPUS

Reference: Letter, from J. Anderson to M. Weis, dated November 27, 2012, Subject: NEPA Environmental Evaluation Notification Form (EENF) for the Project to 'Establish a Muon Gyromagnetic Ratio Measurement (g-2) Experiment within the Muon Campus"

I have reviewed the Fermilab EENF for the Project to "Establish a Muon Gyromagnetic Ratio Measurement (g-2) Experiment within the Muon Campus." Based on the information provided in the EENF, I have approved the following categorical exclusion (CX):

Project Name	Approved	CX
Project to "Establish a Muon Gyromagnetic Ratio Measurement (g-2) Experiment within the Muon Campus."	12/20/2012	B1.30, B1.31, B3.10

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

bc: P. Siebach
M. McKown, CH-OCC, w/o encl
J. Scott, w/o encl
P. Philp, w/encl
R. Hersemann, w/encl

S: todo: CX- g-2 Experiment 120512.rh.docx

File:

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 451.1

Project/Activity Title: Establish a Muon Gyromagnetic Ratio Measurement (g-2) Experiment within the Muon Campus
ES&H Tracking Number: 01099

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 Project Manager: Chris Polly (X2552)
Signature and Date Charles C Polly 27 Nov 2012

I. Description of the Proposed Action and Need

Purpose and Need:
The purpose of the proposed action/project is to construct and operate a Muon Gyromagnetic Ratio Measurement (g-2) Experiment within the proposed Fermilab Muon Campus Program. The Program currently includes the construction and operation of the Muon to Electron Conversion (Mu2e) Experiment and the construction of the Muon Campus (MC)-1 Building. It is expected that the Muon Campus Program would maximize the synergy between the Mu2e Experiment and the Muon g-2 Experiment and minimize the overall cost of developing them individually due to the ability to share utilities, consolidate infrastructure, and mobilize civil construction concurrently.

The Muon g-2 Experiment is needed to measure the muon anomalous magnetic moment to 0.14 ppm, a fourfold improvement over the previous Brookhaven National Lab (BNL) E821 Experiment. The muon anomaly is a fundamental quantity, which can be precisely measured and accurately computed within the Standard Model (The Standard Model of particle physics is a theory concerning the electromagnetic, weak, and strong nuclear interactions, which mediate the dynamics of the known subatomic particles.) and a comparison of experiment to theory is a sensitive test of the completeness of the theory. The current comparison to the accepted theory shows a deviation of more than 3 standard deviations, which might be an indication of New Physics beyond the Standard Model. The Fermilab beam complex would enable scientists to prepare a custom muon beam that would be injected into the relocated (from BNL) muon storage ring. The goal is a factor of 20 times increase in statistics and a significant reduction in systematic uncertainties compared to the BNL experiment. Additionally, since E821 was completed over a decade ago, the Muon g-2 Experiment would benefit from improvements in detector technology that have taken place since then.

Proposed Action:
This proposed action includes the installation of the Muon g-2 Experiment apparatus, specifically a new detector and storage ring comprised of superconducting coils, into the MC-1 Building within the Muon Campus. The DOE Fermi Site Office approved, on June 8, 2012, a NEPA Categorical Exclusion for the Muon Campus; however, since DOE Critical Decision Zero approval had not yet been obtained for the Muon g-2 Experiment, it was not fully described in the EENF. The Muon Campus EENF contained the following:

- a new beamline enclosure, to be shared by the anticipated Muon g-2 Experiment , the proposed Mu2e Experiment, and other potential future experiments;

- modification of the Fermilab Antiproton Debuncher Ring (The Antiproton Source was an accelerator where physicists steered proton beams onto a nickel target and the collisions produced a wide range of secondary particles, including many antiprotons.);
- construction of a shared cryogenics facility using refrigerators and compressors recycled from the Tevatron (The Fermilab Tevatron was the second most powerful proton-antiproton accelerator in the world before it shut down on Sept. 29, 2011); and
- construction of the Muon Campus (MC)-1 Building.

This proposed action would initially include disassembly of the Muon g−2 storage ring at BNL and transporting the device to Fermilab where it can be reassembled with necessary upgrades and coupled to a beam capable of delivering 20 times the stored muon intensity.

The storage ring and associated subsystems must be carefully disassembled at BNL, catalogued and delivered to Fermilab. There follows a labor-intensive period in which the storage ring is reconstructed and the magnetic field is adjusted using passive and active shimming components in order to produce a highly uniform magnetic field. Modifications to the existing accelerator complex would be required in order to produce the required muon beam and this was described in the Muon Campus EENF.

Construction of the Muon g-2 detector would take place at various locations around Fermilab, at collaborating institutions and in industry in the US and possibly abroad. Final assembly and installation of the detector would take place at Fermilab. This would not involve any digging, trenching, demolishing or conventional construction.

The Muon g-2 detector hall, housed within the MC-1 Building (see Figure 1 for an artist rendering), would be located near the South Booster Road between the Fermilab Booster and the former Antiproton facility, as shown on the attached site map (see Figure 2).

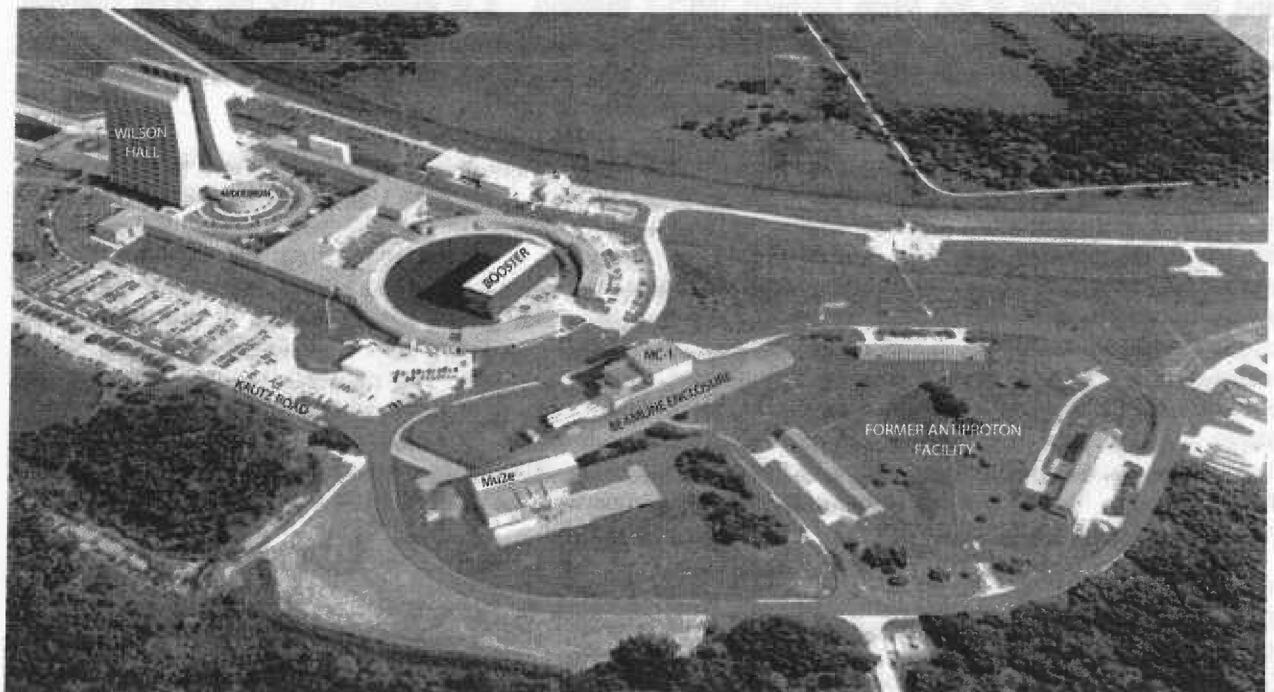

Figure 1: Artist rendering of the proposed Muon Campus including the MC-1 Building, where the Muon g-2 Experiment would be housed, and the Mu2e Building.

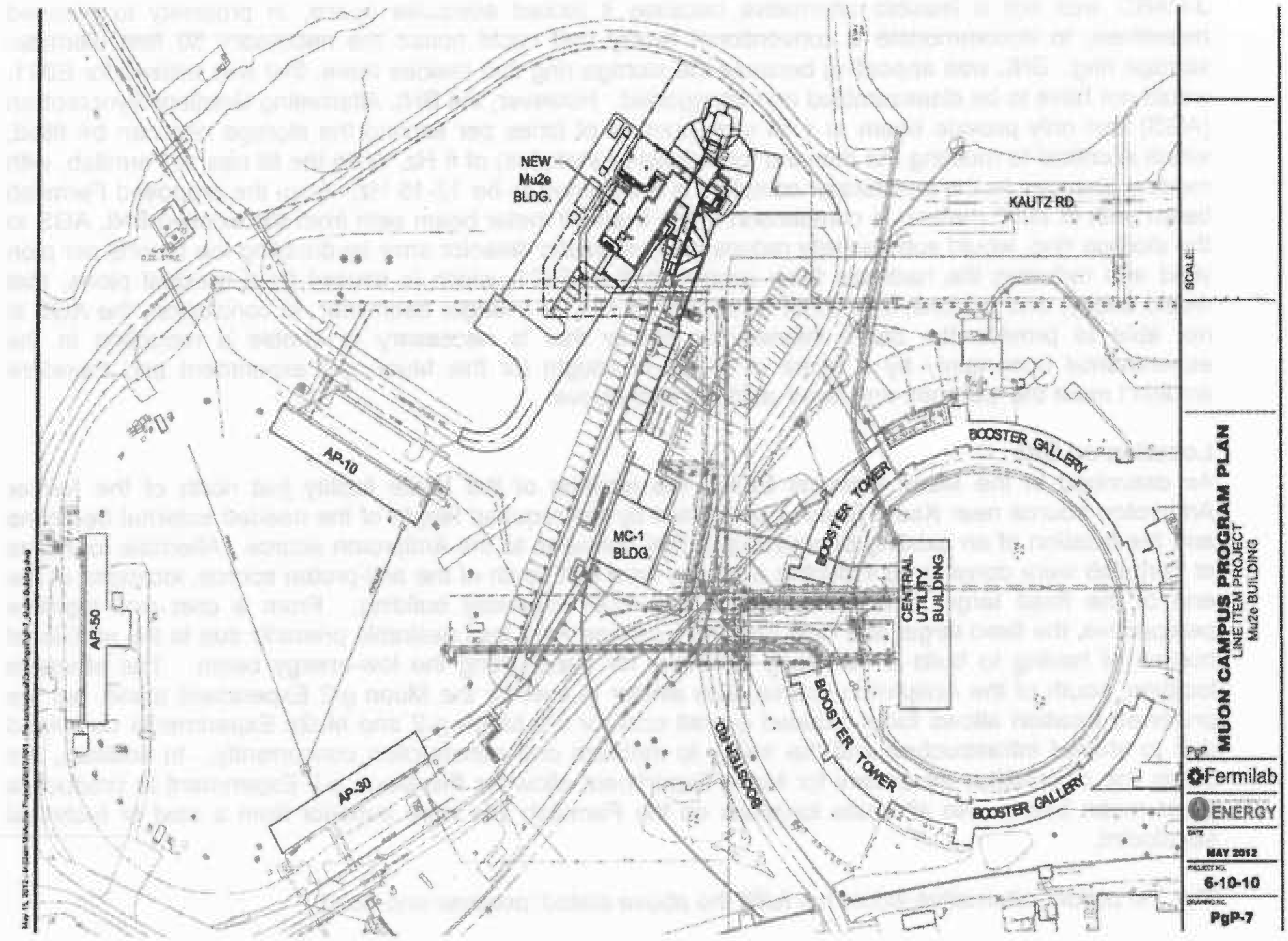

Figure 2: Layout of the Muon Campus showing the MC-1 Building, which would house the g-2 Detector and superconducting coils.

Alternatives Considered

Technology

The known alternative technologies to access this type of physics include: rare muon decay experiments, rare kaon decay experiments and experiments to search for muon-to-electron conversion. While each of these approaches is interesting and could shed light on important new physics processes, the Muon g-2 Experiment would access very different structures of new physics.

Among the alternatives above, the muon g-2 is the only precision measurement showing significant deviation from predictions. The muon g-2 measurement technique using 3.1 GeV muons in a storage ring, although very mature, is statistically limited and continues to be the most promising method for improving the uncertainties.

Site

In addition to Fermilab, the Japan-Proton Accelerator Research Complex (J-PARC) and the Brookhaven National Lab (BNL) were explored when the Muon g-2 Experiment was initially considered. However, BNL and J-PARC were not feasible for a number of reasons. Of these, critical factors included the ability to produce the required muon flux to accumulate 20 times the statistics of the previous BNL Muon g-2 Experiment (E821); deliver a beam quality and facility necessary to control systematic errors at a level commensurate with the improved statistical error; mount the experiment on a timescale competitive with results flowing from the Large Hadron Collider; and the overall cost to achieve the scientific requirements.

J-PARC was not a feasible alternative because it lacked adequate space, in proximity to planned beamlines, to accommodate a conventional facility that could house the necessary 50 feet diameter storage ring. BNL was appealing because the storage ring that resides there, that was utilized for E821, would not have to be disassembled and transported. However, the BNL Alternating Gradient Synchrotron (AGS) can only provide beam at a fill rate (number of times per second the storage ring can be filled, which is critical to meeting the demand for increased statistics) of 4 Hz, while the fill rate at Fermilab, with modest changes to the accelerator complex, is anticipated to be 12-15 Hz. Also, the proposed Fermilab beam path of 2000 meters, in comparison to the fixed 80 meter beam path from the existing BNL AGS to the storage ring, would substantially reduce the systematic detector error by doubling the muons per pion yield and reducing the hadronic flash experienced in E821, which is caused from residual pions, that would decay, and protons, that could be separated out, in a longer beamline. In conclusion, the AGS is not able to provide the beam intensity or quality that is necessary to enable a reduction in the experimental uncertainty by a factor of 4 that is sought for this Muon g-2 experiment and therefore wouldn't meet the 'purpose and need' as described above.

Location on Site

As described in the Muon Campus EENF, the location of the Mu2e facility just north of the former Antiproton source near Kautz Road was dictated by the required length of the needed external beamline and the location of an existing beamline stub that connects to the Antiproton source. Alternate locations at Fermilab were considered including a nearby area just south of the anti-proton source, locations at the end of the fixed target beamlines, and at the CDF assembly building. From a cost and logistics perspective, the fixed target and CDF building locations were less desirable primarily due to the additional burden of having to build a very long beamline for transporting the low-energy beam. The alternate location, south of the Antiproton source, was similar in cost for the Muon g-2 Experiment alone, but the preferred location allows for a reduced overall cost for the Muon g-2 and Mu2e Experiments combined due to shared infrastructure and the ability to mobilize civil construction concurrently. In addition, the beam line capabilities necessary for Mu2e Experiment allow for the Muon g-2 Experiment to produce a purer muon beam. No alternate locations on the Fermilab site were superior from a cost or technical standpoint.

The "no action" alternative would not fulfill the above stated 'purpose and need.'

II. Description of the Affected Environment

Transportation

The Storage Ring superconducting coils would be transported from BNL to Fermilab. These are 50 foot diameter coils that cannot be disassembled into smaller sections so the coils would be transported by truck from BNL to the port at Shoreham, NY, a trip of approximately 9 miles. There, the coils would be transported by barge to Romeoville, IL either via the St. Lawrence Seaway, into the Great Lakes, and then into the I&M Canal water way or via the eastern seaboard down to the Gulf of Mexico, up the Mississippi River and then the Illinois River. From Romeoville, IL the coils would be transported by truck to Fermilab, a trip of approximately 30 miles. Potential impacts of transportation from BNL to the Shoreham, NY port and loading onto the barge are covered in the attached document (BNL NEPA EENF: g-2 Shipping of Magnets BNL to FNL) and all other potential impacts are covered in this document.

A commercial vendor with experience in the technical and logistical aspects of moving large objects would be utilized and would handle logistics and details such as applying for permits to use municipal roads and highways. These permits would allow vegetation to be cut and replanted, signage temporarily removed and replaced, and utilities temporarily altered, should that become necessary. It is anticipated that during the truck transportation in New York and Illinois, roads may need to be temporarily closed in order to accommodate the oversized load, and to potentially utilize the opposite side of the roadways.

It is anticipated that truck transport in Illinois would be scheduled after midnight during a weekend to minimize local traffic disruption and the truck would maintain a speed of approximately 5 miles/hour, to keep the forces on the coils at a safe level. Service utilities, such as telephone and electrical power, are not expected to be interrupted and road signs would be immediately restored, if it is necessary to temporarily remove them. The plan has been discussed with the Illinois Department of Transportation, the Illinois Tollway Authority, and the Illinois State Police who have committed to assisting the vendor in successfully and safely transporting the coils.

Construction

Approximately 9000 cubic yards of soil would be excavated for the Muon g-2 Detector Hall, which would have a floor area of approximately 13,500 square feet. About 20,000 cubic yards of soil would be excavated for the external beamline needed for both the Mu2e and Muon g-2 projects. For both of these projects, about 34,000 cubic yards of excess soil would be stockpiled on the Fermilab site or disposed off-site and the remainder would be used for backfill and soil shielding.

Utilities would be run from several locations through previously disturbed land. Described below are utility effects for the entire Muon Campus, which would include both the Mu2e and Muon g-2 projects:

- 13.8 kV power would be run approximately 500 feet to the Mu2e Detector Hall/Enclosure from the MC-1 Building area. Power to the Muon Campus would be extended from the loop that currently circles the Antiproton Area (Debuncher/Delivery Ring).
- Low Conductivity Water (LCW), Chilled Water (CW), and Sanitary Sewer (SS) would be run approximately 600 feet to the Mu2e Detector Hall/Enclosure from the Central Utility Building (CUB). Some of the Low Conductivity piping corridor between the CUB and the Antiproton (AP) Area would be replaced. LCW to the MC-1 and Mu2e buildings would be through the new beamline enclosure. The existing lift station at the AP Area would be removed and connecting piping to the existing tie-ins would be reconnected to a new sanitary lift station installed at the MC-1 Building. The Mu2e Facility would connect into this new lift station.
- Industrial Cooling Water (ICW), Drinking Water System (DWS), and natural gas (NG) would be run approximately 150 feet each from the existing corridor along the relocated Kautz Road. The relocation of Kautz Road would also repositions the ICW, DWS, and NG.

Operations

The Muon g-2 Experiment would utilize the existing Antiproton Source facility that was in operation from 1985 until October 2011 when it was shut down in conjunction with the termination of the Tevatron collider program. By comparison, beam power for Muon g-2 at the Antiproton facility would decrease significantly from levels required to support the Tevatron Collider Program. Beam power required at the Antiproton Source Target Station for the Tevatron was a 120 GeV, 70 KW beam. Beam power required for the Muon g-2 Experiment would be an 8 GeV, 19 KW beam. The layout in this area is shown in Figure 3.

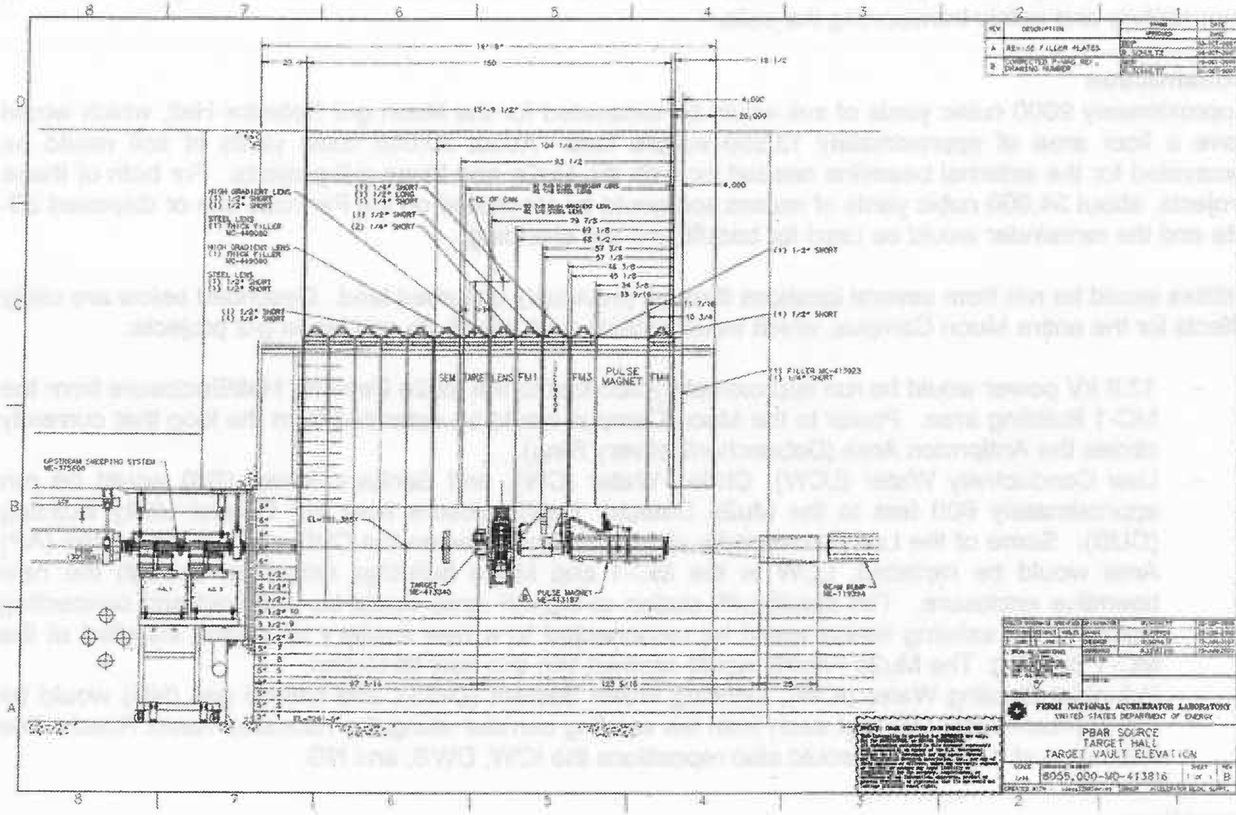

Figure 3: Layout of the Muon g-2 Target Station

When the Muon g-2 experiment is running, tritium and other short-lived radionuclides would be produced as a normal by-product of beamline operations at about half the rate formerly produced for Tevatron operation. The airborne radionuclides produced by the Muon g-2 beam would continue to be released into the atmosphere through a vent stack to the surface; however, environmental emissions would be limited by maximizing radioactive decay of radioisotopes before release. As done previously, the ventilation system would continue to be monitored for radionuclide emissions and the dose rate at the site boundary due to Muon g-2 operations would be at least a factor of two lower than that resulting from Antiproton Source operations in support of the Tevatron Collider Program.

Target station components (including the collection lens, pulsed magnet, and beam absorber) would be cooled by a closed loop water system. The water in this system becomes radioactive over time due to beam operations; Tritium, 7Be, and activated corrosion products are produced and remain within the closed loop water systems. The water is collected for radioactive waste disposal at intervals specified by the Fermilab Radiological Control Manual.

Residual magnetic fields would be present in the detector enclosure when the superconducting solenoids are powered. The largest field would be 1.5T (see Figure 4), confined to the muon storage ring region at approximately R=711 cm and Z=0 cm. The magnetic field falls rapidly outside this region. It is at most 200G at ~130 cm from the maximum region, falling off to less than 5G at ~190 cm from the maximum region. Access would be controlled when solenoids are powered and signage would be posted to prevent entry by people with pacemakers. In addition, boundaries would be delineated for the use of ferromagnetic tools.

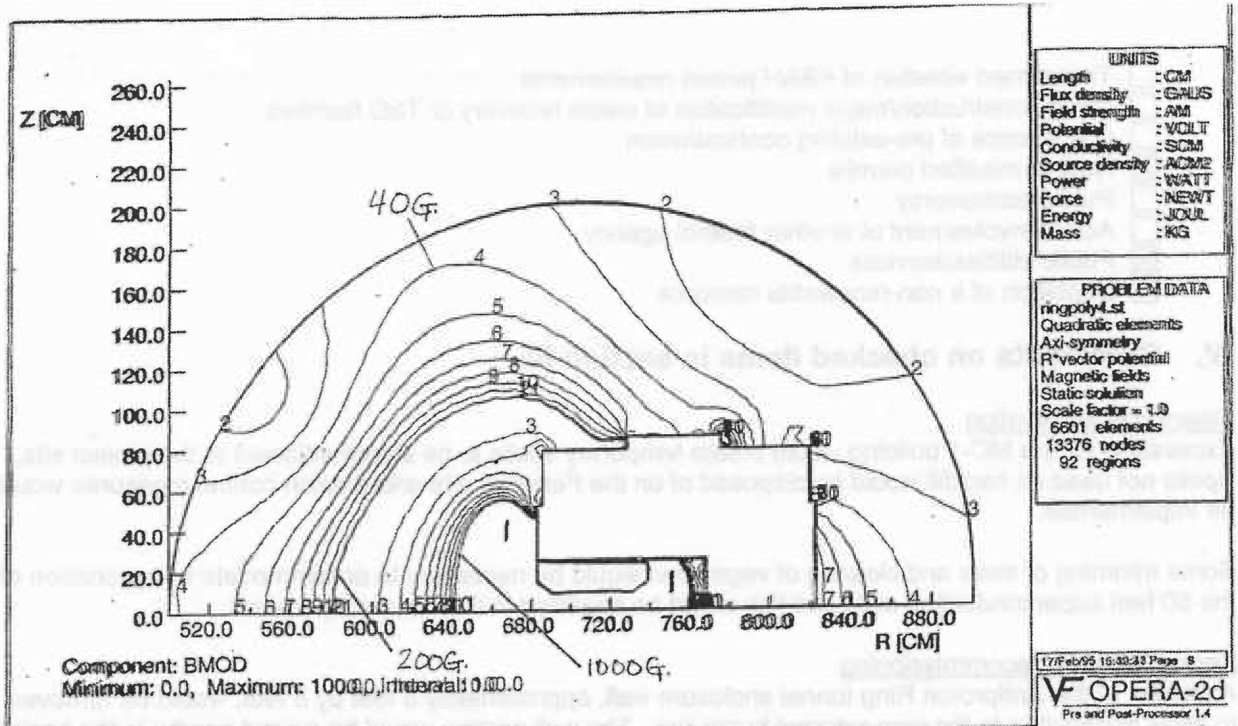

Figure 4: Map of the residual magnetic field taken from BNL E821 Memo 228.

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?

- [x] Clearing or Excavation
- [x] Demolition or decommissioning
- [ ] Asbestos removal
- [ ] PCBs
- [ ] Chemical use or storage
- [ ] Pesticides
- [x] Air emissions
- [x] Liquid effluents
- [ ] Underground storage tanks
- [x] Hazardous or other regulated waste (including radioactive or mixed)
- [x] 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
- [x] New or modified permits
- [ ] Public controversy
- [ ] Action/involvement of another federal agency
- [x] Public utilities/services
- [ ] Depletion of a non-renewable resource

IV. Comments on checked items in section III.

Clearing or Excavation

Excavation for the MC-1 building would create temporary spoils to be stored adjacent to the project site. Spoils not used as backfill would be disposed of on the Fermilab site and erosion control measures would be implemented.

Some trimming of trees and clearing of vegetation would be necessary to accommodate transportation of the 50 feet superconducting coils and this would be specified in the vendor's proposal.

Demolition and Decommissioning

A section of the Antiproton Ring tunnel enclosure wall, approximately 8 feet by 8 feet, would be removed to allow connection to the new external beam line. The wall section would be placed nearby in the backfill of the excavation.

Air Emissions

There would be typical internal combustion engine emissions from construction vehicles during the construction phase of the Muon g-2 Detector Hall as well as that from the barge and trucks used to move the 50 foot superconducting coils but these are mobile sources, which are exempt from permitting.

Tritium and other short-lived radionuclides would be produced, as a normal by-product of beamline operations, at about half the rate formerly produced for Tevatron operation. The airborne radionuclides produced by the Muon g-2 beam would continue to be released into the atmosphere through a vent stack to the surface; however, environmental emissions would be limited by maximizing radioactive decay of radioisotopes before release. As done previously, the ventilation system would continue to be monitored for radionuclide emissions and the dose rate at the site boundary due to Muon g-2 operations would be at least a factor of two lower than that resulting from Antiproton Source operations in support of the Tevatron Collider Program.

Liquid Effluent

Liquid effluents would result from pumping groundwater that seeps into the underground portions of the external beamline and experimental hall/enclosure to the surface ponds at Fermilab. The ponds may discharge to streams that flow offsite. The resulting concentration of radionuclides would be a factor of 500-1000 times below the regulatory limits.

Roof and parking lot drains would empty into storm water drainage systems and all other liquid effluents would be discharged to the sanitary sewer system. Work planning, experimental review and safety inspections are the three methods for ensuring that hazardous effluents do not enter the sanitary waste stream.

Hazardous or other regulated waste

Beam line elements and detector components may become activated during operation of the experiment and therefore a cool down period would be required before D&D could begin. All commonly reused valuable equipment such as magnets would be stored.

Target station components (including the collection lens, pulsed magnet, and beam absorber) would be cooled by a closed loop water system. The water in this system becomes radioactive over time due to beam operations; Tritium, 7Be, and activated corrosion products are produced and remain within the closed loop water systems. The water is collected for radioactive waste disposal at intervals specified by the Fermilab Radiological Control Manual.

Radiation exposures or radioactive air emissions
Airborne radionuclides would also be produced by the Muon g-2 beam and would be released into the atmosphere through a vent stack to the surface as described previously. Air from the ventilation system would be monitored for radionuclide emissions. The dose rate at the site boundary due to Muon g-2 operations would be less than half of the dose rate due to Antiproton source operations, which were terminated in September 2011, and well below the regulatory limit.

A 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 Muon g-2. The SAD would also address the potential radioactive emissions due to the proposed project. Personnel and public exposures would remain well below regulatory limits (Fermilab designs facilities for potential exposures of 10 mrem per year, while the regulatory limit is 100 mrem per year to the public per DOE Orders 458.1) 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.

New or modified permits
For transporting the 50 foot diameter coils, the commercial vendor would need to apply for permits with the local municipalities and relevant DOTs to close down the roadway so that an oversized load could be transported. The truck is expected to move at 5 mph; however, it is necessary to shut down only a small portion of the road, rather than the entire length from beginning to end. Transport would take place via truck during a weekend morning after midnight to minimize the disruption to local traffic.

For roads that are sufficiently narrow, so that vegetation needs to be cut and subsequently replanted, our commercial vendor would apply for an "encroachment" permit. This is expected to occur only on city or municipal property, and no private property.

Public utilities/services
Existing utilities at Fermilab would be tapped into in the immediate area for the Muon g-2 Detector Hall. This could involve rerouting of some existing lines.

For transporting the 50 foot diameter coils, the commercial vendor would arrange to provide bypasses for the local utilities such as electrical and telephone, so that these services are not interrupted.

V. 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 description found in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B1.30, B1.31, and B3.10 which states:

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.

B3.10 Particle accelerators
Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100 MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

Fermilab NEPA Program Manager: Teri L. Dykhuis
Signature and Date Teri L. Dykhuis 11/27/2012

VI. DOE/FSO NEPA Coordinator Review

Concurrence with the recommendation for determination:

Fermi Site Office (FSO) Manager: Michael J. Weis
Signature and Date [signature] 12/20/2012

FSO NEPA Coordinator: Rick Hersemann
Signature and Date Rick Hersemann 12/20/2012

Brookhaven National laboratory

National Environmental Policy Act (NEPA)

ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Project/Activity Title: g-2 Shipping of Magnets BNL to FNL

BNL Project Tracking No.: ______ DOE NEPA No.: ______

BNL Project Manager: W. Morse Signature: William Morse

Date: 11/19/12

BNL NEPA Reviewer: T. Green Signature: [signature]

Date: 11/19/12

I. **Description of Proposed Action:**

The purpose of this project is to transport three (3) major components of the G-2 magnets from the Brookhaven National Laboratory (BNL) in Upton, New York to Fermilab in Batavia, Illinois. The three (3) Cryostat components consist of three independent rings. Each ring is comprised of the following:

Outer Ring: 301.36″ (7654.5 mm) radius x 11.22″ (285 mm) width x 19.69″ (500 mm) height x 17,000 lbs.

Inner Upper Ring: 268.39″ (6817 mm) radius x 11.81″ (300 mm) width x 10.24″ (260 mm) height x 7,200 lbs.

Inner Lower Ring: 268.39"(6817 mm) radius x 11.81″ (300 mm) width, 11.81″ (300 mm) height x 7,600 lbs.

The above specifications do not include approximately 3,000 pounds of additional miscellaneous interconnect hardware that need to be in an orientation that would not increase the width of the transported dimensions. The cryostat rings would be held in place using a ridged fixture, mounted on a dual lane trailering vehicle capable of adjustments for shifting loads during transport. The load is expected to be 50-60ft. in width requiring special transportation permits.

II. **Description of Affected Environment:**

This document provides information for the Long Island portion of the move which starts at Brookhaven National Laboratory and ends at the barge slip at the Shoreham Power Plant in Wading River, NY. The exact onsite route at BNL has not been determined. Currently there are four options for moving the device to the William Floyd Parkway. The offsite route involves transport north on the William Floyd Parkway to State Route 25A; east on Rte 25A to LILCO Rd; then north on LILCO Rd ending at the Barge Slip. The three onsite routes require trucking the device from building 919 on internal roads to the intersection of Michelson and Upton Road from that point the route options are as follows:

1) North on Upton Road to north gate then out to William Floyd Parkway (WFPkwy). This route would require some tree trimming along route and clearing a swath of trees around the north gate guard booth, leveling earthen berms, possibly removing/replacing guard booth, light poles, and electric service. Tree removal, ground disturbance may trigger requirement to seek Scenic River Permit from the NY State Department of Environmental Conservation. Additional wetland permits would be required if tree cutting takes place within 100 ft. of the Peconic River located just north of the north gate fence. Other considerations that have to be made concerning this route: Disruption to operations if the guard booth were to be removed/replaced. Operations at BNL would require exit readiness review before removing guard booth, and an entry readiness review before putting it back into operation. Without a Guard Station the north gate may become unavailable to traffic for an extended period of time before and after the transport of the G-2 magnet.

2) Front Gate Route. This route would require a turn south on Upton Road then west on Princeton Ave. past the front gate and out to WF Pkwy. This route would require tree cutting/trimming, lifting or temporary removal of traffic lights and street lights along Upton Rd., removal/replacement of trees along the center of Princeton Ave., tree cutting/trimming to pass to one side or the other of the front gate. This route may also require temporary hardening of the center median on Princeton if the transport trailer has to cross over the median. The Front Gate is operational 24 hrs/day. Movement of the G-2 magnet may disrupt operation of the gate.

3) South Gate Route. This route would require the same actions as the front gate route up to the 5-way intersection at Upton and Princeton. From that point south the project may need to lift or temporarily remove traffic lights, remove/replace fencing to S. Upton Rd., cut/replace trees at the intersection, cut/trim trees north of the south fire break. From the south fire break south the route is more than 60 ft. wide. At the south gate the route can go straight to the WFPkwy ramp by temporarily removing, then replacing a fence and berm. The South Gate route would require disruption of Front Gate traffic for a short period of time as the trailer moves across Princeton Avenue, but would likely have less impact on operations as this gate is only open for exiting traffic on weekdays.

III. **Potential Environmental Effects:** (In Section IV, document an explanation for each "yes" and "no" response if additional information is available and could be significant in the decision-making process.)

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

		Yes/No
1.	Threatened/Endangered Species and/or Critical Habitats	No
2.	Other Protected Species (e.g., Burros, Migratory Birds)	No
3.	Wetlands	Yes
4.	Archaeological/Historic Resources	No
5.	Prime, Unique, or Important Farmland	No
6.	Non-Attainment Areas	No
7.	Class I Air Quality Control Region	No
8.	Climate Change (e.g., greenhouse gases)	No
9.	Special Sources of Groundwater (e.g., Sole Source Aquifer)	No
10.	Navigable Air Space	No
11.	Coastal Zones	Yes
12.	Areas with Special National Designation (e.g., National Forests, Parks, Trails)	Yes
13.	Floodplain	No

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

		Yes/No
14.	Clearing or Excavation	No
15.	Dredge or Fill (under Clean Water Act section 404; indicate if greater than 10 acres)	No
16.	Noise (in excess of regulations)	No
17.	Asbestos Removal	No
18.	PCBs	No
19.	Import, Manufacture, or Processing of Toxic Substances	No
20.	Chemical Storage/Use	No
21.	Pesticide Use	No
22.	Hazardous, Toxic, or Criteria Pollutant Air Emissions	No
23.	Liquid Effluent	No
24.	Underground Injection	No
25.	Hazardous Waste	No
26.	Underground Storage Tanks	No
27.	Radioactive (AEA) Mixed Waste	No
28.	Radioactive Waste	No
29.	Radiation Exposures	No
30.	Surface Water Protection	No
31.	Ozone Depleting Substances	No

C. Other Relevant Disclosures. Will the proposed action involve the following?

		Yes/No
32.	A threatened violation of ES&H regulations/permit requirements	No
33.	Siting/Construction/Major Modification of Waste Recovery, or TSD Facilities	No
34.	Disturbance of Pre-existing Contamination	No
35.	New or Modified Federal/State Permits	Yes
36.	Public controversy (e.g., Environmental Justice Executive Order 12898 consideration and other related public issues)	No
37.	Action/involvement of Another Federal Agency (e.g., license, funding, approval)	No

38.	Action of a State Agency in a State with NEPA-type law. (Does the State Environmental Quality Review Act Apply?)	Yes
39.	Public Utilities/Services	Yes
40.	Depletion of a Non-Renewable Resource	No
41.	Adverse visual impacts	No
42.	Targets for Intentional Destructive Acts	No
43.	Opportunity for environmental sustainability (energy usage, green buildings, native vegetation, etc.)	No
44.	Connected Action (To other actions with significant effects)	No
45.	Extraordinary Circumstances (affecting significance of environmental effects)	No

IV. Additional Information:

A3 The final leg of the G-2 cryostat move on Long Island occurs near regulated wetlands near Wading River. Modifications to the pad and dock, if needed, may require permits.

A11, A12 The barge slip and adjacent wetlands are within the area of the Long Island Sound which has been designated an Estuary of National Significance. Any actions altering the area of the barge slip or affecting the adjacent wetlands may require permits and/or a Wetland Assessment per 10 CFR 1022. Action would not be implemented until obtained or completed.

C35, 38 See above for potential permit requirements. New York State permits utilize the State Environmental Quality Review Act requirements for reviewing environmental impacts.

C39 Power lines may have to be moved or raised during the transport of the cryostats.

Limited tree trimming or cutting may be required along the route, primarily along the private LILCO Rd.