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

FEB 03 2010

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

Dear Dr. Chrisman:

SUBJECT: FERMI SITE OFFICE (FSO) ASSESSMENT PLAN REVIEW OF THE FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB) ENERGIZED ELECTRICAL WORK PROGRAM

Under our Oversight Program, the FSO prepared an Assessment Plan (AP) that addressed assessments for Fiscal Years (FYs) 2010-2012. Included in the schedule was a review of the Energized Electrical Work for the second quarter of the FY 2010.

The Criteria and Review Approach Documents (CRADs) are enclosed. The Laboratory needs to fill in the middle column of the CRADs including applicable documents and records that satisfy each of the Criteria. FSO recommends that the Laboratory look at the Lines of Inquiry that follow the sets of Criteria as a guide for what the reviewers will be looking to see. Please hyperlink as many of the documents and records as possible by close of business February 8, 2010, so we can have ample time to review them prior to starting the assessment. The review will focus on the Accelerator Division, Technical Division, and Facilities Engineering Services Section.

FSO staff have been coordinating the logistics of the review with the Laboratory's Environment, Safety, and Health (ESH) Section. The on site review will occur from February 22 through 25, 2010 with the opening meeting scheduled tentatively at 8:30 a.m. on Monday, February 22, 2010. The outbrief is scheduled for 10:00 a.m. on Wednesday, March 3, 2010. The locations of the opening and outbrief meetings will be coordinated with the ESH Section.

FSO will continue to coordinate with the Fermilab ESH Section to arrange interview times and locations. Mr. Karl Moro from the DOE-Chicago Integrated Support Center will be leading and conducting the review on behalf of the FSO.

As always, we appreciate your cooperation in affording Mr. Moro access to the appropriate documents, employees, and field activities required to complete this review. If you have any questions, please contact Ed Bucki who will be the FSO point of contact for the review at extension 4891.

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.
M. Michels, w/o encl.
D. Baird, w/encl.
R. Coll, w/encl.

Criteria and Review Approach Document for Fermi National Accelerator Laboratory

Energized Electrical Safety Assessment, February 22-25, 2010

Objective: Management has established an effective electrical safety program to ensure conformance with the requirements established by 10 CFR 851 for the performance of energized electrical work.		
Criteria	Laboratory Documents and Records	Observations
The Laboratory has established an electrical safety program based on the hazards and risks involving the work being performed. This program provides management and employee awareness of the potential hazards associated with electrical energy as part of the work performed, and promotes self-discipline for employees who might direct or perform work on or near exposed energized electrical conductors or circuit parts. This program identifies appropriate safety principles and controls based on work performed.	*The Laboratory should enter their management system documents that describe how the Laboratory satisfies the criteria and the records that demonstrate effective implementation.*	
Conclusions – *Provide an overall (on-balance) summary statement regarding the extent to which the Laboratory is satisfying the above objective and criteria.* **Strengths** – • • **Weaknesses** –		

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Findings / Recommendations –   •   •

Documents and Records Reviewed:

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Persons Interviewed:

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Supplemental Lines of Inquiry:

1. Does the program establish controls for working on or near live parts operating at 50 volts or more or where an electrical hazard exists before work is started?
2. Does the Laboratory's utilize a hazard/risk evaluation process before work is started on or near live parts operating at 50 volts or more or where an electrical hazard exists?
3. Does the Laboratory require job briefings be held before starting each job with all employees involved that covers the hazards associated with the work, the procedures to be followed, any special precautions, the energy source controls, and the personal protective equipment required?
4. Does the program establish appropriate safe work practices before any person approaches exposed live parts within the Limited Approach Boundary by using shock hazard analysis and flash hazard analysis?
5. Does the program require that live parts an employee might be exposed to be put in an electrically safe work condition before the employee works on or near them?
6. Does the Laboratory permit work on electrical conductors or circuit parts not put in an electrically safe work condition?

7. Does the Laboratory have administrative requirements established for work on energized electrical conductors or circuit parts?
8. Are requirements established to ensure test instruments and equipment is rated for the circuits and equipment it will be connected, designed for the environments it is expected to be used, and handled and maintained in manner that will not lessen its designed performance?
9. Are electrical safety performance expectations communicated to subcontractors and visitors?

Energized Electrical Safety Assessment, February 22-25, 2010

Objective: The Laboratory's training of employees, subcontractors, and visitors is effective at communicating the performance expectations established by Fermilab's electrical safety program requirements.		
Criteria	Laboratory Documents and Records	Observations
Training is provided to all employees who face a risk of electrical hazard that is not reduced to a safe level by the electrical installation requirements of the National Electrical Code. Employees understand the specific hazards associated with electrical energy, with safety-related work practices and procedural requirements as necessary to provide protection from the electrical hazards associated with their respective job, and they can identify and understand the relationship between electrical hazards and possible injury.	*The Laboratory should enter their management system documents that describe how the Laboratory satisfies the criteria and the records that demonstrate effective implementation.*	
Conclusions – *Provide an overall (on-balance) summary statement regarding the extent to which the Laboratory is satisfying the above objective and criteria.* **Strengths** – • • **Weaknesses** –		

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Findings / Recommendations –   •   •

Documents and Records Reviewed:

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Persons Interviewed:

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Supplemental Lines of Inquiry:

1. Has the Laboratory established training for both qualified and unqualified persons?
2. Is electrical safety training provided as classroom or on-the-job, or a combination of both?
3. Is risk utilized to determine the degree of training provided to employees?
4. Are unqualified persons trained in and familiar with any electrical hazards of their workplace and any associated safe work practices necessary to their duties?
5. Are qualified persons trained and knowledgeable of the construction and operation of equipment or a specific work method, and possess the knowledge to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method?
6. Are qualified persons trained in and familiar with the proper use of special precautionary techniques, personal protective equipment, including arc-flash, insulating and shielding materials, and insulated tools and equipment?
7. Are qualified persons working within the limited approach boundary of exposed live parts operating at 50 volts or more additionally trained in:

- The skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment;
- The skills and techniques to determine the nominal voltage of exposed live parts;
- The approach distances and corresponding voltages to which they may be exposed; and
- The decision-making process necessary to determine the degree and extent of the hazard and the personnel protective equipment and job planning necessary to perform the task safely?

8. Are all persons who could be exposed to energized electrical conductors or circuit parts trained to understand the established hazardous energy control procedure as applicable to their duties?
9. Are all persons working on or near exposed energized electrical conductors or circuit parts trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts?
10. If warranted by their duties, are persons regularly instructed in methods of first-aid and emergency procedures?
11. What are the qualification requirements for subcontractors?

Energized Electrical Safety Assessment, February 22-25, 2010

Objective: Work is carried out by qualified personnel using approved procedures, instructions, and equipment under administrative, technical, and ES&H controls to achieve a planned end result.		
Criteria	Laboratory Documents and Records	Observations
Procedures to prevent electrical related injuries require employees to completely remove the source of electrical energy by eliminating the possibility of its reappearance by identifying all possible sources of electricity and the disconnecting means of each source. Furthermore, these procedures call for use of protective clothing and personal protective equipment, visually verifying to the extent possible that these hazards have been eliminated and then tested to verify the absence of voltage, that applicable energy control practices are utilized, and finally that conductors and parts that might become energized while performing work be grounded.	*The Laboratory should enter their management system documents that describe how the Laboratory satisfies the criteria and the records that demonstrate effective implementation.*	
Conclusions – *Provide an overall (on-balance) summary statement regarding the extent to which the Laboratory is satisfying the above objective and criteria.* **Strengths** –		

•   •   **Weaknesses –**   •   •
Findings / Recommendations –   •   •

Documents and Records Reviewed:

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Persons Interviewed:

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Supplemental Lines of Inquiry:

1. Has the Laboratory established protective clothing and personal protective equipment requirements for work on or near exposed energized electrical conductors or circuit parts?
2. Are current as-built diagrammatic drawings available to employees to trace all possible sources of electricity and their disconnecting means?
3. Are circuit labels legible on electrical panel schedules and do they correctly identify existing circuits?
4. Does the Laboratory require the visual inspection of a disconnecting means (if possible) to ensure a physical break in all conductors?

5. Does the Laboratory require use of approved voltage testing device for zero-voltage checks phase-to-ground for each conductor, and phase-to-phase between each conductor of a disconnecting means? (Taking these measurements is to be considered working on or near exposed live parts.)
6. Does the Laboratory require after each zero-voltage check that the voltage detector be tested to determine if it's operating satisfactorily?
7. Has the Laboratory established a hazardous energy control program compliant with NFPA 70E and 29 CFR 1910 requirements?
8. Does the Laboratory require use of approved ground connecting devices (if possible) rated for the available fault duty between ground and the phase conductors or circuit parts before touching them?

Energized Electrical Safety Assessment, February 22-25, 2010

Objective: Work involving energized conductors and circuits is allowable by management only when it has been determined that establishing an electrically safe working condition is infeasible.		
Criteria	Laboratory Documents and Records	Observations
Work on energized conductors and circuits can occur only after all other opportunities for establishing an electrically safe work condition have been exhausted. Work on or near an energized conductor or circuit is performed by qualified employees. Laboratory management approves this increased risk of exposure.	*The Laboratory should enter their management system documents that describe how the Laboratory satisfies the criteria and the records that demonstrate effective implementation.*	

Conclusions – *Provide an overall (on-balance) summary statement regarding the extent to which the Laboratory is satisfying the above objective and criteria.*

Strengths –

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Weaknesses –

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Findings / Recommendations –

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Documents and Records Reviewed:

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Persons Interviewed:

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Supplemental Lines of Inquiry:

1. Has work on energized conductors and circuits occurred? If yes, were these circumstances justified by the understanding that to do otherwise would create an increased or additional hazard, or because of equipment design or operational limitations made de-energizing the equipment infeasible?
2. In those circumstances where work on energized conductors and circuits have occurred, were written work permits prepared? Was it approved by Laboratory management?
3. Is testing, troubleshooting, voltage measuring, etc., of energized conductors and circuits allowed? If yes, under what controls can this occur?
4. Have Shock Hazard Analyzes been prepared across the Laboratory?
5. Have Flash Hazard Analyzes been prepared across the Laboratory?
6. Do Laboratory employee's posses knowledgeable and understanding of Limited, Restricted, and Prohibited Approach Boundaries?
7. Have employees who are exposed to electrical hazards been provided appropriate protective clothing and personal protective equipment?

Energized Electrical Safety Assessment, February 22-25, 2010

Objective: An approve contractor assurance system exists, to promote continuous improvement.		
Criteria	Laboratory Documents and Records	Observations
Management systems have been institutionalized that will promote continuous improvement in the performance of electrical-related work to ensure compliance with 10 CFR 851 requirements.	*The Laboratory should enter their management system documents that describe how the Laboratory satisfies the criteria and the records that demonstrate effective implementation.*	
Conclusions – *Provide an overall (on-balance) summary statement regarding the extent to which the Laboratory is satisfying the above objective and criteria.* **Strengths –** • • **Weaknesses –** • •		
Findings / Recommendations – • •		

Documents and Records Reviewed:

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Persons Interviewed:

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Supplemental Lines of Inquiry:

1. Has the Laboratory conducted self-assessments and internal independent assessments of their energized electrical work program, and hazardous energy control program in the last three years to verify compliance with applicable requirements set forth by 10 CFR 851?
2. Have external assessments of the Laboratory's energized electrical work program, and hazardous energy control program been conducted in the last three years to verify compliance with applicable requirements set forth by 10 CFR 851?
3. Are corrective actions related to the Laboratory's energized electrical work program, and hazardous energy control program, tracked to closure? Are they verified as completed and effective? Is extent of condition evaluated?
4. Are lessons learned internal and external to the Laboratory energized electrical work communicated to employees?
5. Is there evidence of the Laboratory application of external lessons learned being put to use?
6. Is there evidence of the Laboratory generating lessons learned based on their own experiences, and sharing those with the DOE complex?