

# OAK RIDGE NATIONAL LABORATORY

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

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July 26, 2004

Mr. George J. Malosh  
ORNL Site Manager  
Department of Energy  
Oak Ridge National Laboratory  
Post Office Box 2008  
Oak Ridge, Tennessee 37831-6269

Dear Mr. Malosh:

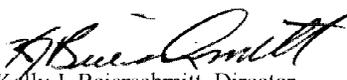
**Contract DE-AC05-00OR22725, Oak Ridge National Laboratory's (ORNL) Electrical Safety Action Plan**

Reference: Memorandum, Gerald G. Boyd to Jeff Wadsworth, "Department of Energy Safety Month," July 7, 2004

Enclosed is Oak Ridge National Laboratory's Action Plan for Electrical Safety in which site-specific actions and other elements are documented and submitted in accordance with the referenced memorandum. As requested, a schedule for correction of Occupational Safety and Health Administration instances has been included in the Action Plan. This Electrical Safety Action Plan has been coordinated with Doug Paul of your staff.

Please contact Jim Goodpasture at 576-8262 if you have any questions.

Sincerely,



Kelly J. Beierschmitt, Director  
Environment, Safety, Health and Quality

KJB:sd

Enclosure

c/enc: M. V. Branton, DOE-ORO  
H. L. Debban  
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J. D. Goodpasture

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J. W. Smith  
J. Wadsworth - RC

**UT-Battelle  
Oak Ridge National Laboratory  
Electrical Safety Action Plan  
July 2004**

**Introduction**

On May 3, the Department of Energy (DOE) declared May 2004 to be Electrical Safety Month, kicking off the Oak Ridge Operations Electrical Safety Campaign for May 2004 through May 2005. The purpose of this campaign is to improve awareness of the risks from electrical-related near misses and reduce electrical risks and related occurrences. The Office of Science (SC) laboratories were directed to take actions that would improve their performance in electrical safety by developing a plan of action based on each laboratory's electrical incident experiences and situation. These action plans are based on current operations, past lessons learned, and the results of the Occupational Safety and Health Administration (OSHA) site inspection.

This document contains the electrical safety action plan for Oak Ridge National Laboratory (ORNL) for the DOE Electrical Safety initiative.

**ORNL Electrical Event Analysis**

As part of the DOE Electrical Safety Campaign, UT-Battelle, LLC, conducted a review of electrical safety incidents that occurred at the Laboratory from January 2001 through May 2004. A total of 26 events were identified as electrical near misses as reported through the DOE Occurrence Reporting Database (ORPs).

**Events By Year**

<b>Year</b>	<b>Number of events</b>
2001	7
2002	11
2003	8
2004 YTD	0

### Events By Type

Event Type	Percent of all events
Construction	55 %
Non-electrical work	30 %
Electrical work	15 %
Vehicle related	0 %
Recordable injuries	<1 %

Definition of event types:

- 1) **Construction** includes intrusion, excavation, direct contact, lockout/tagout, and equipment failure.
- 2) **Non-electrical work** includes contact with energized sources during routine operations by non-qualified workers and identification of faulty equipment.
- 3) **Electrical work** is work conducted by qualified electricians.
- 4) **Vehicle related** are those incidents involving vehicles contacting energized power lines.
- 5) **Recordable injuries** are those injuries sustained during an electrical event that required medical attention beyond first aid.

Over a period of three years, the majority of events were identified as electrical intrusion incidents, such as contacting underground or concealed utilities within structures. Over 90 percent of these events were committed by construction contractors at the Spallation Neutron Source (SNS) Project or subcontractors performing work at ORNL. Electrical events involving UT-Battelle employees were identified as personnel errors or equipment failures.

#### ORNL OSHA Audit Findings

The OSHA audit conducted at ORNL during FY 2003 found a total of 1614 issues with 817, or 51 percent, non-construction related electrical safety issues. The most common compliance electrical issues found were temporary wiring being used as a substitute for fixed wiring, the absence of ground fault circuit interrupters in wet or damp locations, and blocked access to electrical equipment. Other findings included use of equipment in a manner inconsistent with its labeling, uncontrolled access to high-voltage areas, exposed live parts, and absence of labels on equipment.

### **ORNL Electrical Safety Action Plan**

Based on the nature of electrical-related events that have occurred at ORNL and the OSHA audit findings, the following action items are being implemented: 1) Developing, promoting and improving electrical safety awareness and training; 2) reducing electrical-related events; 3) correcting identified electrical deficiencies in facilities; and 4) providing an improved level of protection for employees.

#### **Employee Awareness and Training**

1. Promote electrical safety information campaign to raise awareness of staff and contractors to reduce electrical related incidents. Use available communication avenues such as the Safety 1<sup>st</sup> program and ORNL Today to publicize electrical safety lessons-learned and protective measures for electrical work. Completion: Ongoing.
2. Revise the ORNL Electrical Safety web page to allow posting of lessons learned, occurrences, recalls, and other electrical safety information. Completion Date: August 2004
3. Develop a revised training module, "Electrical Work Practices," to include workplace-specific electrical safety information for non-qualified electrical workers. Training is web-based and accessible for all employees. Completed: May 2004
4. Participate in Oak Ridge Business Safety Partnership forum. The forum is a partnership between the local business associations and DOE designed with the objective of raising safety awareness in the greater Oak Ridge business community. Completed: May 2004
5. Expand membership of ORNL Electrical Safety Committee to allow for greater participation from research and operational organizations. Conduct quarterly committee meetings to address electrical safety issues, review lessons learned, and recommend laboratory policy. Completed: June 2004
6. Develop a new training module for qualified electrical workers. Training shall be web-based and a requirement for employees identified by ORNL as qualified electrical workers. Completion Date: November 2004
7. Develop and present workshop at SNS on "Electrical Safety in Accelerators" for Office of Science laboratories with particle accelerators. Completed: June 2004
8. Conduct focused safety awareness seminar on electrical issues for SNS construction contractors. Completed: May 2004

### **Hazard Analysis and Employee Protection**

1. Formally appoint a replacement authority having jurisdiction (AHJ) for electrical code and safety issues at ORNL. Completed: May 2004

Duties and responsibilities of the ORNL AHJ include:

- Make interpretations of the National Electrical Code (NEC) and the National Electrical Safety Code (NESC);
  - Provide assistance to ORNL divisions and subcontractors to ensure electrical code compliance in installation, maintenance and construction activities;
  - Serve as Chairperson of the ORNL Electrical Safety Committee;
  - Grant the special permission, as appropriate, provided for in the NEC, where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety;
  - Authorize the use of new products, constructions, or materials that were not available at the time of the most recent edition of the NEC; and
  - Review and approve custom-built electrical equipment to be used at ORNL.
2. Using a task team develop program requirements based on NFPA 70E, "Standard for Electrical Safety in the Workplace." Completion Date: October 2004
  3. Determine proper application, selection, procurement, and use of arc-rated clothing by employees having exposure to potential electrical hazards in accordance with the standard. Completion Date: October 2004
  4. Initiate process for ORNL Facility Development Division electrical engineers to conduct monthly surveillance of construction projects. Walk downs will be documented and results shared with construction and service subcontractors. Surveillances will focus on appropriate use of devices and methods for identifying utilities prior to excavations and penetrations. Completion Date for Initiating Walk Downs: August 2004
  5. Initiate and complete an internal self-assessment of ORNL's Lockout/Tagout procedure/process and the manner of its effectiveness and use by employees. Completion Date: September 2004
  6. Revise and improve the site excavation/penetration procedure based on the results of the ORNL/DOE Site Office review of permit-required work. Completion Date: October 2004

**Improving Physical Conditions**

The OSHA audit non-construction electrical related instances have been identified, and 84 percent will be addressed by the end of FY 2004. Approximately 4 percent have been identified to be addressed by the Laboratory's ongoing modernization efforts, with the remaining 12 percent to be addressed by the end of FY 2005. The following table provides a status of the 817 non-construction electrical instances:

**OSHA Audit Electrical Instances**

Total number of electrical-related instances	817
Electrical instances addressed by end of FY 2004	687
Electrical instances to be addressed by ongoing modernization efforts	31
Remaining electrical instances to be addressed in FY 2005	99



## Department of Energy

Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831—

July 7, 2004

Mr. Jeff Wadsworth, Director  
Oak Ridge National Laboratory  
UT-Battelle, LLC  
Post Office Box 2008  
Oak Ridge, Tennessee 37831-6255

Dear Mr. Wadsworth:

### DEPARTMENT OF ENERGY SAFETY MONTH

In keeping with the Department of Energy's declaration of May as Electrical Safety Month, and the reduction of electrical incidents over the coming year, Milton D. Johnson, Chief Operating Officer of the Office of Science, has requested site specific plans for addressing the following recurring types of electrical safety occurrences:

- Personnel errors, including working on energized equipment without authorization or personal protective equipment, wiring mistakes coupled with failure to verify safe-energy conditions, and leaving unsafe conditions (e.g., improper grounding).
- Work control problems, primarily mistakes in establishing and clearing lockout/tagouts.
- Configuration management weaknesses, such as inaccurate drawings and failing to verify the as-built conditions.
- Electrical intrusion events, such as contacting underground utilities or concealed utilities within structures.
- Vehicles, such as dump trucks, excavators, and forklifts striking power lines.

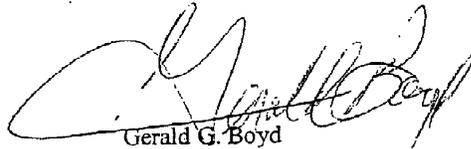
As a result of the site visits that were conducted by the Occupational Safety and Health Administration (OSHA), many electrical problems were identified. The most common instances were:

- Improper use of extension cords; for example, using metal boxes with duplex or double duplex outlets, using for higher than rated electrical load, and damaged wire attachments.

- Electrical equipment (e.g., breakers and disconnects) not labeled or labels illegible.
- Access to electrical panels, breakers, and disconnects blocked by other equipment or inappropriately stored items.
- Equipment not properly grounded; for example, no ground wire or ground pins missing.
- Flexible wiring (e.g., extension cords) used in lieu of required fixed wiring.
- Ground fault circuit interrupters not installed or inoperable in wet areas or near equipment using water (e.g., metal sinks).

The plan should be no more than ten pages long and briefly describe specific actions that will be taken to improve operations based on a careful review of the nature of the electrical safety occurrences at your site and available lessons learned. Plans should also include a summary-level schedule for correcting the previously mentioned OSHA instances. The plan needs to be in my office by July 30, 2004.

If you have any questions, please contact George Malosh at (865) 576-4523 or Robert Poe at (865) 576-0891.



Gerald G. Boyd  
Manager

cc:

George Malosh, LM-10  
Steve McCracken, EM-90  
Robert Poe, SE-30  
Harold Monroe, SE-31