




## Department of Energy

Washington, DC 20585

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### MEMORANDUM FOR DISTRIBUTION

FROM: MILTON D. JOHNSON   
DEPUTY DIRECTOR FOR OPERATIONS  
OFFICE OF SCIENCE

SUBJECT: Energized Electrical Power Lines Struck During Excavation  
Activities

I am concerned about the number of recent incidents involving energized electrical lines being severed during excavation activities at Office of Science (SC) laboratories. Please review these incidents with respect to the operations at your laboratory to ensure the safety of the employees.

In your review, consider the circumstances, root causes, corrective actions, and lessons learned from these incidents and similar incidents in the past. Also review the analyses provided in the advisories and lessons learned. A list of these incidents and advisories is attached.

These incidents raise concern because of the potential for serious injury and the frequency in which they have occurred. An employee at the Los Alamos National Laboratory lapsed into an extended coma and will never fully recover from a severe electrical shock. There were near misses at two SC laboratories this year and three incidents at three SC laboratories during a 2-month period last year.

Should you have any questions, please contact Jay Larson, of my staff, at 301-903-9869.

Attachment

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**References for Excavation Safety**

**Recent Occurrences**

1. ORNL/SNS, February 12, 2002  
Near Miss-Construction Subcontractor dug into a temporary 120/240 volt line  
ORO—ORNL-X10SNS-2002-0001
2. TJNAF, January 30, 2002  
Energized Electrical Line Severed During Excavation Activities  
ORO—SURA-TJNAF-2002-0001
3. ANL-E, October 4, 2001  
Buried Electrical Utility Contact Causes Loss of Power to Building  
CH-AA-ANLE-ANLEPFS-2001-0019
4. ORNL/SNS, September 21, 2001  
Near Miss – Construction Subcontractor Dug into 120/240 volt Line  
ORO—ORNL-X10SNS-2001-0001
5. PNNL, August 7, 2001  
Subcontractor Backhoe Operator Severs Underground 120 Volt Power Line  
RL—PNNL-PNNLBOPER-2001-0011

**Advisories and Lessons Learned**

1. Lessons Learned on Electrical Intrusion Events  
HQ-EH-2002-01, February 26, 2002  
[http://tis.eh.doe.gov/ll/db/detail.CFM?Lessons\\_IdentifierIntern=HQ%2DEH%2D2002%2D01](http://tis.eh.doe.gov/ll/db/detail.CFM?Lessons_IdentifierIntern=HQ%2DEH%2D2002%2D01)
2. Operating Experience Weekly Summary 2001-09, November 2001  
Numerous Unexpected Electrical Line Intrusions (Article 4)  
<http://tis.eh.doe.gov/ocssummary/>
3. Lessons Learned Issue No. 98-02, December 1998  
Penetrating Hidden Utilities  
<http://tis.eh.doe.gov/oeaf/ll.html>
4. Energy Research ES&H Bulletin, February 1997  
Energized Electrical Power Lines Struck During Excavation Activities  
(copy attached)

The purpose of these bulletins is to foster ES&H improvement in operations at Energy Research facilities. The bulletins draw attention to topics that are applicable to Energy Research operations and can have a significant impact on ES&H.

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### **Energized Electrical Power Lines Struck During Excavation Activities**

There have been numerous recent instances of energized electrical power lines being struck during excavation activities within the DOE complex and also at Energy Research facilities. The consequences of contacting an energized electric power line during excavation activities can be as severe as death by electrocution. The most recent serious incident occurred on January 17, 1996, at Los Alamos National Laboratory. A mason tender struck an energized 13.2-kV electrical line with a jackhammer. The mason is still in the hospital and is not expected to fully recover.

An article in the *Operating Experience Weekly Summary 96-37* described another recent occurrence and identified seven previous articles describing six similar occurrences in 1996. More detailed information on this topic is available in DOE Safety Notice 96-06, *Underground Utilities Detection and Excavation*, December 1996.

These occurrences were caused by breakdowns in work control practices including:

- electric power lines not present on drawings used in job planning packages,
- workers incorrectly assuming electrical power lines are deenergized, and
- workers not fully implementing work control processes.

Common corrective actions and lessons learned from these occurrences were:

- the use of magnetometers or other detection devices prior to excavation,
- additional review and approvals prior to excavation,
- improvements to work planning processes and job hazard analyses, and
- additional training for both excavation workers and work planning personnel.

Recent occurrences at Energy Research facilities include the following:

1. An energized electrical conduit buried in a concrete floor was struck with a jackhammer. The conduit was supplying the power to the jackhammer. Power to the jackhammer was lost but the worker was not injured. (11/14/96, CH-BII-BNL-PE-1996-0027).
2. Workers were stopped from unauthorized drilling within a few feet of an unmarked 2.4-kV electric line. The workers were about to start drilling before the digging permit process had been completed. (9/24/96, CH-BH-BNL-PE-1996-0019).
3. A trench containing 13.2-kV conductors was backfilled with sand while the conductors were energized. This occurrence was a violation of the site's dig permit and lockout/tagout procedures. Workers and managers were retrained in the site's lockout/tagout procedure. (6/10/96, CH-AA-ANLE-ANLEPFS-1996-0007).
4. A six-foot metallic fence post contacted a 220-V conductor while being set manually in a shrubbery bed. A permit was not obtained but would have led to the underground utilities being marked (10/4/95, CH-AA-ANLE-ANLEPFS-1995-0004).
5. A backhoe struck a 13.8-kV electrical conduit. Drawings contained errors regarding the location of the proposed excavation and the location of the electrical line. Corrective actions included a training session regarding the importance of checking the accuracy of drawings. (4/4/95, CH-BH-BNL-PE-1995-0005).

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Energy Research ES&H Bulletins are issued by the Office of ES&H Technical Support (ER-8). We would like your feedback on this bulletin and on topics for future bulletins. Please contact DeVaughn Nelson at 301-903-5608 or via e-mail at [devaughn.nelson@oer.doe.gov](mailto:devaughn.nelson@oer.doe.gov).