

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

June 10, 1997

NRC INFORMATION NOTICE 95-36, Supplement 1: POTENTIAL PROBLEM WITH POST-FIRE EMERGENCY LIGHTING

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to potential problems regarding emergency lighting for plant areas needed for operation of post-fire safe-shutdown equipment and in the access and egress routes. It is expected that recipients will review the information for applicability to their facilities and consider actions as appropriate. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Background

The NRC previously issued Information Notice (IN) 95-36 to alert addressees regarding problems with the maintenance and operability of emergency lighting and, in some cases, the failure to install emergency lighting units (ELUs). Since IN 95-36 was issued, additional problems with ELUs have been identified. This supplement discusses problems associated with failure to follow procedures by engineering personnel, failure to take corrective actions, and failure to follow vendor recommendations, which resulted in degraded or inoperable ELUs.

Description of Circumstances

NRC fire protection inspections have identified problems with post-fire ELUs at several nuclear facilities. Although some of these problems were documented in surveillance tests by licensee personnel, the problems remained uncorrected because of ineffective engineering involvement, lack of corrective actions, and poor root cause evaluations. In addition, some licensees have failed to include ELUs within the scope of the maintenance rule. This supplement describes some of these issues.

Quad Cities

In 1995, an NRC inspection of the ELU surveillance records revealed that the licensee had not taken prompt corrective action to repair or replace 19 ELUs that had been inoperable since December 1994 (Inspection Report 50-245/95-05 and 50-265/95-05 dated August 25, 1995 [Accession No. 9509080140]). The licensee had determined that the inoperability was

9706040320

updated on
7/7/97

PDR I+E NOTICE 95-036 970610



DFOL 1/1
IDBR-11C

caused by failure to switch the ELUs off when taking electrical busses out of service during an outage. This failure caused some batteries to fully discharge and resulted in weak batteries that failed to meet the licensee's 8-hour discharge test. The licensee also had not evaluated the significance of operating without the 19 ELUs required by Section III, J., "Emergency lighting," of Appendix R to Part 50 of Title 10 of the Code of Federal Regulations. In addition, a licensee walkdown inspection found that approximately 70 percent of the ELUs used to light access pathways were not properly positioned or directed.

Clinton

During a 1995 inspection, the NRC inspector identified a number of ELUs with low-voltage and low-electrolyte levels (Inspection Report 50-461/95-09 dated July 14, 1995 [Accession No. 9507240437]). A low-battery voltage reading had been recorded by the licensee; however, the licensee did not evaluate or identify these problems as adverse performance trends. In addition, the monthly surveillance functional test of safe-shutdown ELUs, required by the licensee's procedures, was not performed for three months.

Zion

In 1995, NRC inspectors and the licensee identified a number of issues that indicated numerous problems with ELUs (Inspection Report 50-295/95-22 and 50-304/95-22 dated December 19, 1995 [Accession No. 9601020271]). The inspectors also found that the licensee had not performed adequate corrective actions or root cause evaluations. The following is a summary of some of the findings, which resulted in a civil penalty:

- Surveillance data indicated repeated battery failures and addition of water to batteries. However, the licensee failed to determine the root causes or take adequate corrective actions until the NRC inspector brought these issues to the licensee's attention.
- Surveillance inspections performed between May 10 to September 6, 1994, documented that two emergency lights were on continuous fast charge (indicating a low-battery voltage condition or an unchargeable battery).
- Lights were not illuminating, thus indicating bulbs had burned-out or batteries were weak.
- At least 40 batteries had final voltages lower than the recommended manufacturer's standard of 5.25 volts (1.75 volts per cell) for a nominal 3-cell, 6-volt battery. The surveillance procedures had not established final voltage acceptance criteria, for determining whether the battery failed, following an 8-hour battery discharge test.
- The accuracy of the voltmeter used to record final terminal voltages was questionable. The voltmeters were not calibrated and the readings were accurate only to the nearest 0.5 volt, although readings were recorded to the nearest 0.1 and 0.05 volt.
- The electrical maintenance staff did not follow the procedural requirements to replace ELU batteries when the electrolyte levels were found below the cell plates or when at least two hydrometer discs were not floating.

- After the 8-hour discharge surveillance performed in 1995, electricians took the final voltage readings of the batteries with the ELU lamps turned off or with the ELU connected to the 120V-ac outlet. In either case, the electricians took the voltage reading of the battery charger and not of the battery. This practice resulted in final ELU discharge voltages that were equal to or higher than the initial voltage reading.
- Emergency lighting surveillance data were not available for inspectors' review because the licensee had discarded all surveillance records prior to March 1994.
- Some of the available emergency lighting surveillance records included questionable data. Some 6-volt battery readings were recorded as being 12-volt, and some 12-volt battery readings were recorded as being 6-volt.
- Other problems identified by the inspectors during the plant tours included dirty lamps that decreased the output of emergency lights, lights that were improperly aimed, and loose lamp pivot connections that resulted in incorrectly aimed lights.
- A previous NRC inspection report had already identified problems with low ELU battery voltage conditions and low electrolyte levels (Inspection Report 50-295/94-19 and 50-304/94-19 dated October 19, 1994 [Accession No. 9411010020]).

Monticello

In 1996, the NRC inspectors noted that the licensee had not established final voltage acceptance criteria for determining the value of 6-volt ELU batteries that would provide adequate 8-hour lighting (Inspection Report 50-263/96-02 [Accession No. 9604250264]). The licensee's procedures stated that an automatic switching device would disconnect the emergency lights when the battery voltage dropped to 2.9 volts, plus or minus 10 percent, and that the lights would be considered functional if the light continued to illuminate the intended area or had not been shut off by the automatic switch. The licensee did not have supporting data to show that a voltage of about 2.9 volts would sufficiently illuminate an access or egress route. The licensee subsequently changed the acceptance criterion to 5.25 volts.

Dresden

During an inspection in 1996, the NRC inspectors found that the licensee had not performed the 8-hour discharge surveillance test of 47 ELUs required by the licensee's procedures (Inspection Report 50-010/96-02, 50-237/96-02, and 50-249/96-02 dated May 20, 1996 [Accession No. 9605290171]).

Hatch

During an inspection in 1996, the NRC inspectors found that the licensee had not included ELUs required by Appendix R within the scope of the maintenance rule (Inspection Report 50-321/96-12 and 50-366/96-12 dated November 22, 1996 [Accession No. 9612020172]). A violation of 10 CFR 50.65 was issued because this system was relied upon to mitigate accidents or transients during performance of abnormal or emergency procedures.

Millstone

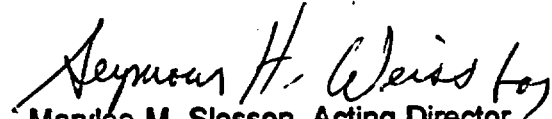
During an inspection in 1996, the NRC inspectors found that the ELUs used in the licensee's emergency operating procedures (EOPs) was inappropriately left out of the scope of the maintenance rule implementation program (Inspection Report 50-245/96-09, 50-336/96-09, and 50-423/96-09 dated February 24, 1997 [Accession No. 9703070183]).

Discussion

The ELUs at nuclear plants usually consist of a 6- or a 12-volt battery, bulb lamps, and a battery charger. NRC requirements and guidelines for emergency lighting in the event of a fire are contained in various documents including Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to 10 CFR Part 50; Appendix to Branch Technical Position Auxiliary Power Conversion Systems Branch, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976"; and NUREG-0800, Standard Review Plan." The extent to which these requirements or guidelines are applicable to a specific nuclear power plant depends on plant age, commitments established by the licensee in developing its fire protection plan, the staff safety evaluation reports and supplements, and the license conditions pertaining to the fire protection plan. In addition, 10 CFR 50.65(b) established the scoping criteria for structures, systems, or components (SSCs) to be included within the maintenance rule program. The scoping criteria include nonsafety-related SSCs that are relied upon to mitigate accidents or transients, or are used in the plant EOPs, or whose failure could prevent safety-related SSCs from fulfilling their safety-related function. Furthermore, NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," which has been endorsed by the nuclear industry and the NRC, states that nonsafety-related SSCs used in EOPs are within the scope of the maintenance rule.

The objective of these requirements and guidelines for emergency lighting is to ensure that in the event of a fire, plant personnel can access and operate equipment and components that must be manually operated to effect safe plant shutdown. Because such activities may extend over a considerable period of time both during and after the fire, 8-hour battery emergency lighting capability is specified to allow sufficient time for normal lighting to be restored, with a margin for unanticipated events.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.


Marylee M. Slosson, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
(630) 829-9745
E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
(630) 829-9741
E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

Attachment filed in Packet

**LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES**

Information Notice No.	Subject	Date of Issuance	Issued to
97-32	Defective Worm Shaft Clutch Gears in Limitorque Motor- Operated Valve Actuators	06/10/97	All holders of OLs or CPs for nuclear power reactors
97-31	Failures of Reactor Coolant Pump Thermal Barriers and Check Valves in Foreign Plants	06/03/97	All holders of OLs or CPs for pressurized-water reactor plants
97-30	Control of Licensed Material During Reorgan- izations, Employee- Management Disagreements, and Financial Crises	06/03/97	All material and fuel cycle licensees
97-29	Containment Inspection Rule	05/30/97	All holders of OLs or CPs for nuclear power reactors
97-28	Elimination of Instrument Response Time Testing Under the Requirements of 10 CFR 50.59	05/30/97	All holders of OLs or CPs

OL = Operating License
CP = Construction Permit

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

original signed by S.H. Weiss for
Marylee M. Slosson, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
(630) 829-9745
E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
(630) 829-9741
E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

* See previous concurrence

Tech Editor has reviewed and concurred.

DOCUMENT NAME: 9536SUP1

To receive a copy of this document, indicate in the box: "C" = Copy w/o attachment/enclosure "E" = Copy w/attachment/enclosure "N" = No copy

OFFICE	TECH CONT	C/PECB:DRPM	AD/DRPM				
	TGreene*	AChaffee*	MSlosson <i>Shu</i>				
DATE	03/10/97	05/23/97	06/4/97 <i>for</i>				

OFFICIAL RECORD COPY

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Marylee M. Slosson, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
(630) 829-9745
E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
(630) 829-9741
E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

OFC	PECB:DRPM	C/DSSA:SPLB	D/DSSA	C/PECB:DRPM
NAME	TGreene*	TMarsh*	GHolahan*	A. Chaffee*
DATE	03/10/97	05/19/97	05/22/97	05/23/97
OFC	AD/DRPM			
NAME	MSlosson			
DATE	/ /97			

mem 5/30/97

* See previous concurrence

[OFFICIAL RECORD COPY]
DOCUMENT NAME: G:\TAG\INLIGHT.N3

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Marylee M. Slosson, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
(630) 829-9745
E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
(630) 829-9741
E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

OFC	PECB:DRPM	C/DSSA:SPLB	D/DSSA	C/PECB:DRPM
NAME	TGreene*	TMarsh*	GHolahan*	A. Chaffee <i>at</i>
DATE	03/10/97	05/19/97	05/22/97	5/21/97 <i>√SL</i>
OFC	(A)D/DRPM			
NAME	MSlosson			
DATE	/ /97			

* See previous concurrence

[OFFICIAL RECORD COPY]
DOCUMENT NAME: G:\TAG\INLIGHT.N3

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Thomas T. Martin, Director
 Division of Reactor Program Management
 Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
 (630) 829-9745
 E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
 (630) 829-9741
 E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

OFC	PECB:DRPM	C/DSSA:SPLB	D/DSSA	C/PECB:DRPM
NAM E	TGreene*	TMarsh <i>TM</i>	GHolahan <i>GH</i> #156	A. Chaffee
DATE	03/10/97	5/19/97	5/12/97	1/197
OFC	D/DRPM	<i>w/ changes to signature, as shown</i> <i>RJD</i>		
NAM E	T. Martin			
DATE	1/197			

* See previous concurrence

[OFFICIAL RECORD COPY]
 DOCUMENT NAME: G:\TAG\NLIGHT.N3

Other problems found during the fire protection inspections involved the failure to adequately maintain the ELU battery. The Zion facility had ELUs with adjustable battery chargers. Some of the battery chargers were constantly on the high-charge-rate, which was an indication that the batteries were no longer functional or that battery chargers were set at a higher charge rate than required. However, the licensee did not evaluate the constant addition of water to the battery and did not verify that the battery trickle charge and high-charge-rate voltages were set correctly (the vendor manual should have been consulted or the vendor should have been contacted for this information). Other licensees had not established the final voltage criteria following a battery discharge test or did not have supporting data to demonstrate a final voltage that would provide sufficient illumination for plant personnel on an access or egress route. Additionally, licensees did not have backup power supplies to the ELUs in the event the normal supply voltage was unavailable or down for maintenance. The loss of normal ac power can exhaust the battery if the ELU is not equipped with a low-voltage cutoff device that will automatically disconnect the battery from the lights. This device prevents complete discharge of the battery and protects against reverse polarity damage.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Thomas T. Martin, Director
 Division of Reactor Program Management
 Office of Nuclear Reactor Regulation

Technical contacts: Rogelio Mendez, RIII
 (630) 829-9745
 E-mail: rxm@nrc.gov

Darrell L. Schrum, RIII
 (630) 829-9741
 E-mail: dls3@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

OFC	PECB:DRPM	C/DSSA:SPLB	D/DSSA	C/PECB:DRPM
NAM E	TGreene <i>mg</i>	TMarsh	GHolahan	A. Chaffee
DATE	3/10/97	1/197	1/197	1/197

OFC	D/DRPM
NAM E	T. Martin
DATE	1/197