

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

February 16, 1989

NRC INFORMATION NOTICE NO. 89-16: EXCESSIVE VOLTAGE DROP IN DC SYSTEMS

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from unexpected large voltage drops in cables between the batteries and circuit breakers. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Nine Mile Point Unit 1 was shut down in December 1987 for refueling. During this shutdown, the licensee made modifications to its 125-Vdc power system. A subsequent review of these modifications led the licensee to conclude that there was a voltage supply problem associated with the operation of battery charger (MG set) circuit breakers. The manufacturer of these circuit breakers stated that the minimum voltage for operation of the circuit breakers was 90 volts. The technical specifications require a minimum of 106 Vdc at the battery terminals for the batteries to be considered operable. However, studies showed that with 114 Vdc at the battery terminals, the calculated voltage at the breaker would be less than 90 Vdc because of line losses due to current demand during breaker closure. A battery voltage of less than 114 Vdc could exist at the time ac emergency power is required to be reconnected to the battery chargers. Thus, if a loss of site ac power were to occur, the dc voltage at the battery charger circuit breakers may not be adequate for the battery chargers to be reconnected to emergency ac power. This situation would cause the batteries to discharge. The decreasing dc voltage would lead to degraded dc control power and a subsequent trip of the emergency diesel generators. Therefore, a loss of normal ac power could lead to a loss of dc power and the subsequent loss of emergency ac power.

Discussion:

Problems with electrical systems at commercial power reactors have been identified with increasing frequency. These problems led to the issuance


8902100283 ZA

IDTR-11C

of Generic Letter 88-15, "Electric Power Systems - Inadequate Control Over Design Processes," on September 12, 1988. The above-described event is a unique illustration of one of the types of problems presented in the generic letter.

The Nine Mile Point Unit 1 licensee is not aware of any testing that could be used to establish the adequacy of the original design, nor has the licensee found documentation of the original design basis. The voltage drop could be attributed to an inadequate original estimate of load, hence cable sizing; load creep over the years without assessment of the consequences; or use today of a potentially more conservative power profile as determined by current practice for battery sizing. After identifying the problem, the licensee assessed the actual loads and plans to replace the undersized cable to improve the system's operability.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: J. Carter, NRR
(301) 492-1194

J. Lazevnick, NRR
(301) 492-0814

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-15	Second Reactor Coolant Pump Shaft Failure at Crystal River	2/16/89	All holders of OLs or CPs for nuclear power reactors.
89-14	Inadequate Dedication Process for Commercial Grade Components Which Could Lead to Common Mode Failure of a Safety System	2/16/89	All holders of OLs or CPs for nuclear power reactors.
89-13	Alternative Waste Management Procedures in Case of Denial of Access to Low-Level Waste Disposal Sites	2/8/89	All holders of NRC specific licenses.
89-12	Dose Calibrator Quality Control	2/9/89	All NRC medical licensees.
89-11	Failure of DC Motor-Operated Valves to Develop Rated Torque Because of Improper Cable Sizing	2/2/89	All holders of OLs or CPs for nuclear power reactors.
89-10	Undetected Installation Errors in Main Steam Line Pipe Tunnel Differential Temperature-Sensing Elements at Boiling Water Reactors.	1/27/89	All holders of OLs or CPs for BWRs.
89-09	Credit for Control Rods Without Scram Capability in the Calculation of the Shutdown Margin	1/26/89	All holders of OLs or CPs for test and research reactors.
89-08	Pump Damage Caused by Low-Flow Operation	1/26/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
 CP = Construction Permit

of Generic Letter 88-15, "Electric Power Systems - Inadequate Control Over Design Processes," on September 12, 1988. The above-described event is a unique illustration of one of the types of problems presented in the generic letter.

The Nine Mile Point Unit 1 licensee is not aware of any testing that could be used to establish the adequacy of the original design, nor has the licensee found documentation of the original design basis. The voltage drop could be attributed to an inadequate original estimate of load, hence cable sizing; load creep over the years without assessment of the consequences; or use today of a potentially more conservative power profile as determined by current practice for battery sizing. After identifying the problem, the licensee assessed the actual loads and plans to replace the undersized cable to improve the system's operability.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.


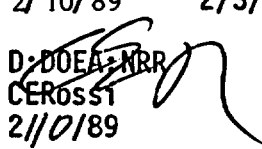
Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: J. Carter, NRR
(301) 492-1194

J. Lazevnick, NRR
(301) 492-0814

Attachment: List of Recently Issued NRC Information Notices

*SEE PREVIOUS PAGE FOR CONCURRENCE

 EAB:NRR JCarter 2/10/89	*EAB:NRR PBaranowsky 2/3/89	*ESB:NRR FRosa 2/6/89	*TECH:ED BCalure 2/8/89	*C:EAB:NRR WDLanning 2/3/89	*C:OGCB:NRR CHBerlinger 2/9/89
D:DOEA:NRR CERoss1 2/10/89 					

The licensee is not aware of any testing that could be used to establish the adequacy of the original design, nor has the licensee found documentation of the original design basis. The voltage drop could be attributed to an inadequate original estimate of load, hence cable sizing, or load creep over the years without assessment of the consequences, or use today of a potentially more conservative power profile as determined by current practice for battery sizing. After identifying the problem, the licensee assessed the actual loads and plans to replace the undersized cable to improve the system's operability.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact a technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: J. Carter, NRR
(301) 492-1194

J. Lazevnick
(301) 492-0814

Attachment: List of Recently Issued NRC Information Notices

EAB:NRR*	EAB:NRR*	ESB:NRR*	TECH:ED*	C:EAB:NRR*	C:OGCB:NRR
JCarter	PBaranowsky	FRosa	BCalure	WDLanning	CHBerlinger
/ 1/89	/ 1/89	/ 1/89	/ 1/89	/ 1/89	2/9/89

D:DOEA:NRR
CERossi
/ 1/89

* See previous enclosure.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact a technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: J. Carter, NRR
(301) 492-1194

J. Lazevnick
(301) 492-0814

Attachment: List of Recently Issued NRC Information Notices

EAB:NRR <i>JC</i> JCarter:db 1/13/89	EAD:NRR <i>PWB</i> PBaranowsky 2/13/89	ESB/NRR <i>FR</i> FRosa 2/6/89 <i>concur with comments as noted based upon own review.</i>	TECH:ED <i>28</i> 1/8/89	C:EAB:NRR <i>WDL</i> WDLanning 2/13/89	C:OGCB:NRR CHBerlinger 1/89
D:DOEA:NRR CERossi 1/89					