

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

February 10, 1995

NRC INFORMATION NOTICE 95-10, SUPPLEMENT 1: POTENTIAL FOR LOSS OF AUTOMATIC  
ENGINEERED SAFETY FEATURES  
ACTUATION

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 supplement to alert addressees to the problems encountered by the licensee for the Salem facility while attempting to modify an aspect of the design of the solid state-protection system (SSPS) for both units. The modifications were being performed to correct a design deficiency that had the potential for causing the loss of the automatic actuation function of engineered safety features (ESF) as a result of electrical faults in some non-class 1E input signals. 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Information Notice 95-10 informed licensees of a condition that could result in the failure of one or both trains of the SSPS during a seismic event or a main steamline break in the turbine building. The conditions were reported by the licensees for the Diablo Canyon and Salem facilities. The Diablo Canyon licensee postulated a complete break of a main steamline, with the steam impinging on an electrical junction box containing terminations for anticipatory trip (nonsafety) input signals to the SSPS. (The original information notice incorrectly stated that the junction box contains four circuits, two circuits for each SSPS train. The junction box contains four circuits, two circuits for each of two channels in a single SSPS train.)

Both licensees requested NRC enforcement discretion to allow the plants to remain at power while implementing the design modification. The NRC agreed to the requests.

The licensee for the Diablo Canyon facility implemented the design modification, including post-maintenance testing, without complication. However, the Salem licensee experienced difficulties. As part of the Salem

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design change package (DCP) implementation sequence for Unit 1, Train A, the front panel breaker on one of the 15V dc power supplies was manually tripped. This procedural step was in accordance with a surveillance procedure routinely performed during refueling outages (every 18 months). There are two 15V dc power supplies in each train. The power supplies are operated in parallel, separated by diodes, and each power supply is sized for 100 percent of the load requirements. When the circuit breaker for one of the 15V dc supplies was manually tripped, the circuit breaker for the second 15V dc supply tripped open. This was not the expected response. As a result of both supplies being tripped, all 15V dc loads were deenergized, including the source range High Voltage Block Signal. With the block signal deenergized, high voltage was applied to both source range detectors while the unit was at 100-percent power. (Westinghouse Nuclear Service Division Technical Bulletin, NSD.TB. 80-8, May 19, 1980, informs licensees of the possibility of damaging the source range detectors if high voltage is applied while at power.) After shutdown, the source range detectors were tested and declared operable. The procedure being used to conduct the surveillance had been modified to account for the fact that the unit was operating at power. However, the SRM power supply fuses apparently had not been removed.

The unexpected opening of the 15-V output breaker prompted an investigation by the licensee. The following additional anomalies were discovered during the licensee investigation:

- The output voltage of one of the Unit 1, Train A 15V dc power supplies was raised to 17.5V without tripping on overvoltage as designed.
- The ripple component of the output voltage of one Unit 1, 48V dc power supply was out of specification by 501 mV.
- A Unit 1 15V dc power supply tripped on overvoltage while the licensee was setting the overvoltage trip setpoint for the 48V dc power supply that is located in the same bay.
- Some dc power supply output circuit breakers in Unit 1, Train A, and Unit 2, Train B, were found to have no time delay marking.
- When the output voltage of one of the Unit 1, Train A, 48V dc power supplies was being lowered, the output of the redundant power supply followed.
- When the output voltage of one of the Unit 1, Train B 15V dc power supplies was being lowered, the output of the redundant power supply followed.
- One of the Unit 1, Train B, 48V dc power supplies tripped when its output breaker was closed because of internal component failures.
- When a 15V dc power supply in Unit 2, Train B, was being installed, the redundant power supply tripped.
- The output of several power supplies exhibited high ripple.

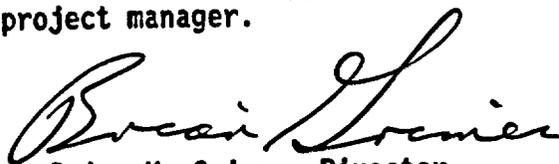
- The Diablo Canyon licensee found that the "R28" resistor used in the overvoltage protection circuitry in the SSPS 48V dc power supplies was undersized and was dissipating more heat than it was designed to dissipate. Failure of the resistor could cause the overvoltage setpoint to drift as much as 10 percent.
- The general warning alarm that provides local and control room annunciation of several failures within the SSPS, including failure of the 15V and 48V power supplies, will not be received for a power supply with adequate in-situ output voltage but with degraded capacity.

### Discussion

The enforcement discretion originally granted by NRC to the Salem licensee was rescinded, in part because the unexpected power supply problems changed the conditions under which the Notice of Enforcement Discretion was originally granted. Unit 1 was shut down in accordance with its Technical Specifications. (Unit 2 was at 0.5 percent power and also was shut down.) Subsequent investigation by the licensee identified several potential causes for the power supply anomalies. The voltage regulators in several power supplies were degraded. Installed capacitors were degraded, possibly due to aging. Dirt and metal filings were found on some power supplies. A wire from the rear of a 15V power supply was found to have shorted against a transistor metal heat sink. Several power supplies were more than 15 years old.

The maintenance program for these power supplies consists primarily of functional testing and calibration once every 18-months. The licensee is pursuing the development of a preventive maintenance program for the SSPS power supplies.

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.



Brian K. Grimes, Director  
Division of Project Support  
Office of Nuclear Reactor Regulation

Technical contacts: E. Nick Fields, NRR  
(301) 415-1173

Cliff Douth, NRR  
(301) 415-2847

Attachment:  
List of Recently Issued NRC Information Notices

*Attachment filed in Jacket*

**LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES**

<b>Information Notice No.</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued to</b>
95-10	Potential for Loss of Automatic Engineered Safety Features Actuation	02/03/95	All holders of OLs or CPs for nuclear power reactors.
95-09	Use of Inappropriate Guidelines and Criteria for Nuclear Piping and Pipe Support Evaluation and Design	01/31/95	All holders of OLs or CPs for nuclear power reactors.
95-08	Inaccurate Data Obtained with Clamp-On Ultrasonic Flow Measurement Instruments	01/30/95	All holders of OLs or CPs for nuclear power reactors.
95-07	Radiopharmaceutical Vial Breakage during Preparation	01/27/95	All USNRC medical licensees authorized to use byproduct material for diagnostic procedures.
95-06	Potential Blockage of Safety-Related Strainers by Material Brought Inside Containment	01/25/95	All holders of OLs or CPs for nuclear power reactors.
95-05	Undervoltage Protection Relay Settings Out of Tolerance Due to Test Equipment Harmonics	01/20/95	All holders of Construction Permits for nuclear power reactors.
95-04	Excessive Cooldown and Depressurization of the Reactor Coolant System Following a Loss of Offsite Power	01/19/95	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
CP = Construction Permit

Discussion

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Attachment: List of Recently Issued NRC Information Notices

DOCUMENT NAME: 9510SP1.IN

OFC	OECB:DOPS	SC/OECB:DOPS	PUB:ADM	C/OECB:DOPS
NAME	NFields*	EGoodwin*	Tech Ed*	AChaffee*
DATE	02/10/95	02/10/95	02/10/95	02/10/95
OFC	HICB:DRCH	C/HICB:DRCH	D/DRCH	D/DOPS
NAME	CDouth*	JWermiel*	BBoger*	BGrimes
DATE	02/10/95	02/10/95	02/10/95	02/10/95

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Attachments:

1. Figure 1
2. List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\NICK\IN95-10.SUP

OFC	OECEB:DOPS	SC/OECEB:DOPS	PUB:ADM <i>NFields</i>	C/OECEB:DOPS
NAME	NFields* <i>NFields</i>	EGoodwin <i>EGoodwin</i>	Tech Ed <i>for</i>	AChaffee <i>AChaffee</i>
DATE	02/10/95	02/10/95	02/10/95	02/10/95
OFC	HICB:DRCH	C/HICB:DRCH	D/DRCH <i>BBoger</i>	D/DOPS
NAME	CDouth <i>CDouth</i>	JWentzel <i>JWentzel</i>	BBoger <i>BBoger</i>	BGrimes
DATE	02/10/95	02/10/95	02/10/95	02/ /95

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