

## REACTOR SAFETY SIGNALS NEGATED DURING TESTING

### DESCRIPTION OF CIRCUMSTANCES

On July 12, 1977, the Commonwealth Edison Company reported that while conducting a surveillance test at Zion Unit 2, test signals were simultaneously injected into several sensors which affected both protection and control systems. Injection of these test signals resulted in: (1) the loss of instrument indications for the affected protection and control systems, (2) the loss of automatic control capability for the affected control systems, and (3) the loss of automatic protection capability for the affected protection systems.

At the time of the event, the unit was in a hot shutdown condition and preparations for start-up were underway. Station management decided to perform a surveillance test of the reactor protection logic circuitry. A combination of test procedure inadequacies and the failure to follow prescribed administrative controls related to instrumentation testing led to the insertion of test signals which replaced the actual signals from three pressurizer water level sensors, three water level sensors in each of the four steam generators, four pressurizer pressure sensors and three flow sensors in each of the primary coolant loops. The test signals had been inserted for approximately 40 minutes when, due to unexpected indications of the main coolant pump seal flow rate and other anomalous indications, the operator requested that the test signals be removed. When the test signals were removed, it was observed that the pressurizer water level had dropped below the range of indication.

The drop in pressurizer water level resulted from the pressurizer water level test signal being slightly higher than the automatic pressurizer level control set point. In response to this condition the changing pump flow was automatically reduced to the minimum pump flow rate, which was maintained until the test signals were removed. During this forty minute period the letdown flow remained constant. Consequently, the rate at which coolant was being removed from the primary coolant system was approximately 75 gpm greater than the rate at which coolant was being returned to the system. Approximately 5300 gallons of water was required to bring the pressurizer water level back to its original level of twenty-two percent.

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As mentioned above, operator action, in response to other available instrumentation indications terminated the event. Subsequent investigation by the licensee revealed that no damage to plant equipment was sustained during or after the event.

This incident represents an example of an event which resulted from a series of errors involving lax management control and improper attention of plant personnel to established procedures.

All holders of operating licenses should be aware of the potential for adverse operational events which can occur during performance of particular surveillance tests. For example, if an excessive number of safety sensors are disabled simultaneously as was the case in this event, automatic action may not occur as intended. Care must be taken to assure that test signals do not negate automatic initiation of protection systems. It is recommended that the following considerations be incorporated in your reviews of this matter.

1. Facility procedures should specifically identify the limitations and restrictions which are required for each mode of operation during which testing or surveillance activities may be conducted such that required safety protection systems will remain operable in accordance with the facility Technical Specifications.
2. In order to provide additional assurance that required safety related capabilities of plant systems are not defeated during testing or surveillance activities, training programs for operations and craft personnel should include sufficient information to assure an indepth understanding of system functions, system interactions, and Technical Specification requirements.
3. Management controls should be strengthened as necessary to assure adherence to administrative procedures involving reviews, approvals, and communication between, plant supervision, operators and craft personnel performing testing and surveillance activities. Such controls should consider the "man-machine" interfaces, and should assure that the human component of this pair is not overburdened.

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No written response to this Circular is required. If you require additional information regarding this matter, contact the Director of the appropriate NRC Regional Office. IE inspectors will review this matter with licensees during future inspections.

Enclosure:  
List of IE Circulars:  
Issued in 1977

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IE Circular 77-13  
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LISTING OF IE CIRCULARS ISSUED IN 1977

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-01	Malfunctions of Limitorque Valve Operators	1-4-77	All holders of Operating License (OL) or Construction permit(CP)
77-02	Potential Heavy Spring Flooding	2-15-77	All affected holders of OLs
77-02A	Potential Heavy Spring Flooding	2-16-77	All affected holders of CPs
77-03	Fire Inside a Motor Control Center	2-28-77	All holders of OLs and CPs
77-04	Inadequate Lock Assemblies	3-17-77	Safeguard Group I, II, IV, V, Licensees
77-05	Liquid Entrapment in Valve Bonnets	3-24-77	All holders of OLs and CPs
77-06	Effects of Hydraulic Fluid on Electrical Cable	4-1-77	All holders of OL's and CPs
77-07	Short Period During Reactor Startup	4-12-77	Holders of BWR OLs
77-08	Failure of Feedwater Sample Probe	4-13-77	All holders of OLs
77-09	Improper Fuse Coordination In BWR Standby Liquid Control System Control Circuits	5-25-77	All holders of BWR OLs or CPs
77-10	Vacuum Conditions Resulting in Damage to	7-15-77	All holders of OLs

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LISTING OF IE CIRCULARS ISSUED IN 1977 (Continued)

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-11	Leakage of Con- tainment Isolation Valves with Resilient Seats	9-6-77	All holders of OLs and CPs
77-12	Dropped Fuel Assem- blies at BWR Facili- ties	9-15-77	All holders of BWR OLs or CPs