

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

December 18, 1991

NRC INFORMATION NOTICE 91-82: PROBLEMS WITH DIAPHRAGMS IN SAFETY-RELATED TANKS

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 of problems that could occur with diaphragms installed in safety-related tanks. 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

On June 14, 1991, while performing a quarterly inspection of the diaphragm in the condensate storage tank at the V. C. Summer Nuclear Station, the licensee found a tear in the diaphragm, across the diameter of the tank, which had caused a large section of the diaphragm to sink to the bottom of the tank. The diaphragm is attached to the perimeter of the tank and normally floats on top of the water to provide a barrier to oxygen. The Summer staff decided to remove the diaphragm to prevent it from clogging the emergency feedwater suction line. However, strips of material and small debris were stripped from the diaphragm as it was pulled through the manway at the top of the tank. This debris settled to the bottom of the tank where it presented a clogging hazard to the emergency feedwater flow control valves. This condition required the Summer staff to conduct a long and difficult cleaning process. The only other readily available supply of emergency feedwater, which is required for any shutdown, was untreated service water.

The Summer plant has several safety-related tanks with diaphragms. These tanks include the condensate storage tank, the boric acid tanks, and the reactor makeup water storage tank. The licensee for the Summer plant had previously had problems involving the diaphragms in each of these tanks.

In 1987, the licensee found 14 holes in the condensate storage tank diaphragm that had the recent failure. These were attributed to damage caused during the original installation. The licensee had patched these holes using a diaphragm repair kit.

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*Dispatched*  
*2/19/92*

In August of 1988, the licensee detected abnormal amounts of magnesium and sulphates in the "B" boric acid tank. The licensee investigated these chemistry problems and found that the binder material in the diaphragm was failing and allowing small particles to come off of the diaphragm and become suspended in the tank fluid.

In October of 1988, the "A" boric acid tank pump lost suction when the diaphragm ruptured and settled to the bottom of the tank, partially covering the pump suction line opening to the tank.

In December 1988, during an inspection to identify the cause of increased oxygen in the reactor makeup water storage tank, the licensee found a large tear in the diaphragm in this tank.

### Discussion

The Summer staff attributed the 1988 problems to the diaphragms having exceeded their service lifetimes. These diaphragms had all exceeded their estimated 10-year service lifetimes by about 3 years. A design engineering report, written before the recent condensate storage tank diaphragm failure, recommended that this diaphragm be replaced every 9 years, or more frequently if inspections so indicated.

The diaphragm fitted tanks were supplied by the Pittsburgh Des Moines Corporation. This supplier originally purchased the diaphragms from the Goodyear Company but now obtains them from the Lorel Corporation. A Pittsburgh Des Moines Corporation representative said that his company and its competitors supplied many tanks with diaphragms to nuclear power plants around 1979 and 1980. These diaphragms, if not already replaced, may now be reaching or exceeding their expected reliable service lifetimes.

Diaphragms in safety-related tanks have a finite service life and can cause various safety hazards if they fail. Consequently, the regular inspection and replacement of these diaphragms can be an important part of the plant's preventive maintenance program.

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.



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Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical contacts: L. A. Keller, Resident Inspector, V. C. Summer  
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Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
91-81	Switchyard Problems that Contribute to Loss of Offsite Power	12/16/91	All holders of OLs or CPs for nuclear power reactors.
91-80	Failure of Anchor Head Threads on Post-Tensioning System During Surveillance Inspection	12/11/91	All holders of OLs or CPs for nuclear power reactors.
91-79	Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials	12/06/91	All holders of OLs or CPs for nuclear power reactors.
88-92, Supp. 1	Potential for Spent Fuel Pool Draindown	11/29/91	All holders of OLs or CPs for nuclear power reactors.
91-78	Status Indication of Control Power for Circuit Breakers Used in Safety-Related Applications	11/28/91	All holders of OLs or CPs for nuclear power reactors.
90-57, Supp. 1	Substandard, Refurbished Potter & Brumfield Relays Represented as New	11/27/91	All holders of OLs or CPs for nuclear power reactors.
91-77	Shift Staffing at Nuclear Power Plants	11/26/91	All holders of OLs or CPs for nuclear power reactors.
91-76	10 CFR Parts 21 and 50.55(e) Final Rules	11/26/91	All holders of OLs or CPs and vendors for nuclear power reactors.
91-75	Static Head Corrections Mistakenly not Included in Pressure Transmitter Calibration Procedures	11/25/91	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

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