

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

September 24, 1997

**NRC INFORMATION NOTICE 97-74: INADEQUATE OVERSIGHT OF CONTRACTORS
DURING SEALANT INJECTION ACTIVITIES**

Addressees

All holders of operating licenses for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the consequences of inadequate oversight of contractors during sealant injection activities. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. Suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Beaver Valley

The head vent system (HVS) at Beaver Valley Unit 2 removes noncondensable gases from the reactor vessel head and is designed to mitigate the consequences of inadequate core cooling or impaired natural circulation resulting from the accumulation of noncondensable gases in the reactor coolant system (RCS).

In November 1996, with Unit 2 in Mode 5 (cold shutdown) near the end of an extended refueling outage, operators noted a leak at a blind flange downstream of a normally shut 1-inch flow-gauge isolation valve located in a dead-leg portion of the HVS. The leak measured approximately 15 drops per minute. On December 2, 1996, sealant was injected into an upstream valve to temporarily stop the leakage. Following the sealant injection, the reactor was restarted on December 3, 1996. Subsequently, as a result of concerns raised by the NRC regarding the leaktightness of several valves upstream of the valve where sealant was injected, Unit 2 was shut down and the valves were tested for leaks. During this post-maintenance testing, it was discovered that some sealant had migrated to other portions of the HVS, clogging two HVS flow control valves and causing one of these valves to become bound and unable to fully stroke.

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As a result of this event, the plant manager issued a stop-work order and also ordered (1) a review of the leak repair process at the plant, (2) a check of all existing leak repairs, and (3) a review of vendor oversight practices.

Several factors contributed to the event at Beaver Valley Unit 2:

- (1) Licensee engineering provided improper information to the vendor performing the repair. Engineering specified normal RCS operating pressure and temperature conditions (610°F and 2235 psia) to the vendor instead of the actual conditions under which the repair would be made (close to ambient). As a result, the wrong sealant material was used.
- (2) The licensee did not review vendor procedures adequately and did not exercise sufficient monitoring and control of vendor activities. Specifically, there was no monitoring of the quantity of sealant injected, the injection pressure of the sealant, or the location of the injection port.
- (3) Significant weaknesses were found in work instructions, quality assurance and quality control involvement, sealant material selection, injection port location, and direct vendor oversight. Work instructions, prebriefings, and overall vendor oversight were inadequate.

As a result of inadequate licensee control of the injection of sealant material into the HVS at Unit 2, twice as much sealant was injected into the valve as was specified in the maintenance work package. The sealant failed to harden properly, migrated to unintended portions of the HVS, and degraded the HVS flow control valves when it accumulated on the valve seats. One of the valves became bound and was unable to fully stroke. Because the valves were inoperable, the HVS would not have been able to perform its gas-removal function".

LaSalle

On June 19, 1996, with both units operating at 100 percent power, nonessential service water (SW) system discharge pressures began to decrease because of the high differential pressures across the in-line strainers. The operators backwashed the strainers, restoring the normal discharge pressures. On June 24, 1996, the problem recurred, causing high temperature in a diesel fire pump during routine surveillance testing.

The licensee's root cause determination following the initial event focused on material generated from sandblasting performed on the exterior of the lake screenhouse. The licensee initially believed that some of the sandblasting material had become entrained in the

SW, fouling the strainers. After the June 24 event, the licensee determined that both events had been caused by the injectable sealant that had been used to repair cracks in the floor of the service water building, which is also the roof of the SW intake tunnel. The tunnel provides a common water source for both the SW and emergency service water (ESW) systems of Unit 1 and Unit 2. As a result of the crack repair activities, a large amount of sealant entered the tunnel and a portion of it was drawn into the SW strainers.

Following the June 19 and June 24 events, the licensee erroneously concluded that the material that fouled the SW system strainers could not affect the ESW systems. On June 28, 1996, during operations to clean the SW intake tunnel, divers found sealant in the tunnel in a place that could compromise the operability of the ESW systems. Subsequently, the licensee declared the ESW system inoperable and shut down both reactors.

An Augmented Inspection Team (AIT) was sent to the site to investigate the sealant injection event. It concluded that the root cause of the strainer fouling was poor control of work on a safety-related structure. The licensee staff responsible for assigning and controlling this work did not know enough about the facility to appreciate the potential consequences of this work. Therefore, a contractor, who was permitted to seal cracks in the safety-related SW intake tunnel structure, had no knowledge of the potential impact of the work, no approved procedures, and inadequate licensee oversight. The AIT also concluded that an inadequate assessment of the root cause of the June 19 and June 24 events, as well as the failure to develop an initial inspection and recovery plan that was comprehensive and thorough, permitted repeated challenges to key safety systems and threatened the availability of the ultimate heat sink (UHS). Loss of the function of these safety systems, and the resultant loss of the UHS, would have significantly affected the licensee's ability to respond to analyzed accidents. Had the root cause for the initial event been thoroughly evaluated, the event of June 24 could have been avoided, reducing the time that the ESW system for both units was threatened.

Conclusion

These events illustrate the consequences and the possible safety impact of inadequate oversight of contractors during sealant injection activities. Such activities can adversely impact on the ability of safety-related systems to perform their intended safety function if called upon.

Related Generic Communications

U.S. Nuclear Regulatory Commission, Information Notice (IN) 82-06, "Failure of Steam Generator Primary Side Manway Closure Studs," dated March 12, 1982.

U.S. Nuclear Regulatory Commission, IN 85-90, "Use of Sealing Compounds in an Operating System," dated November 19, 1985.

U.S. Nuclear Regulatory Commission, IN 93-90, "Unisolatable Reactor Coolant System Leak Following Repeated Applications of Leak Sealant," dated December 1, 1993.

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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LIST OF RECENTLY ISSUED
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Information Notice No.	Subject	Date of Issuance	Issued to
97-73	Fire Hazard in the Use of a Leak Sealant	09/23/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-72	Potential for Failure of the Omega Series Sprinkler Heads	09/22/97	All holders of OLs or CPs for nuclear power reactors and fuel cycle facilities
97-71	Inappropriate Use of 10 CFR 50.59 Regarding Reduced Seismic Criteria for Temporary Conditions	09/22/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-70	Potential Problems with Fire Barrier Penetration Seals	09/19/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel

OL = Operating License
CP = Construction Permit

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Tech Editor has reviewed and concurred on 9/3/97

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