

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

June 30, 1994

NRC INFORMATION NOTICE 94-48: SNUBBER LUBRICANT DEGRADATION  
IN HIGH-TEMPERATURE ENVIRONMENTS

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 to the possible degradation of the lubricant used in mechanical snubbers manufactured by Pacific Scientific (PSA) when the snubber is used in a high-temperature environment. 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

During the ninth refueling outage at the Joseph M. Farley Nuclear Plant, Unit 2 at the end of 1993, the Southern Nuclear Operating Company (the licensee) functionally tested a number of safety-related snubbers as prescribed by its technical specification surveillance requirements. From an original test sample of 88 mechanical snubbers, the licensee identified 8 failures. Two of these failures, a PSA-1/4 on a steam generator blowdown line and a PSA-10 on a pressurizer safety valve, led to the discovery of four additional snubbers that failed their functional tests for common causes (three more PSA-1/4s on steam generator blowdown lines and another PSA-10 on the pressurizer).

The licensee concluded that high environmental temperatures (ranging from 38 to 93 °C [100 to 220 °F]) for extended periods had degraded the internal lubricants used in these PSA snubbers. The licensee determined that the failure mechanism of the PSA-1/4s was a loss of lubricant, and for the PSA-10s it was a breakdown of lubricant viscosity. Elevated temperatures caused the PSA-1/4 snubber grease to bake and dry up, resulting in complete lockup when these snubbers were tested. For the PSA-10 snubbers, the high temperatures caused the grease to lose almost all viscosity, resulting in insufficient drag resistance during testing.

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The licensee subsequently replaced all failed snubbers, and conducted physical inspections and engineering evaluations to ascertain if any structural damage had occurred. No support damage or system operability concerns were identified by the licensee.

### Discussion

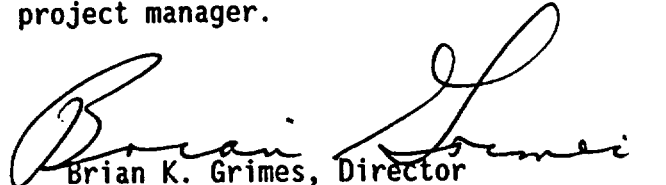
The licensee does not have the capability to overhaul mechanical snubbers. Consequently, unlike their hydraulic counterparts, mechanical snubbers are not part of any routine preventive maintenance program. PSA mechanical snubbers are purchased and installed with the expectation that they are maintenance free for the duration of their life in the plant. The physical conditions of all snubbers are examined by visual inspections which, depending on the number of unacceptable snubbers identified in the previous inspection interval, could be performed once in every 36 months. Although the operability of some snubbers is verified by functional testing each refueling outage, only a small sample of the snubber population is exercised and tested. Past industry experience with snubber failures has demonstrated that the failure modes of mechanical snubbers are not readily discernible by visual inspection or even physical strutting. Only functional testing under actual load conditions appears to confirm their operability. For example, of all the functionally tested mechanical PSA snubber failures identified by the licensee for both units since commercial operation, only one was discovered by visual inspection.

Depending on the size and distribution of the snubber population, sample selection techniques and failure rates, it may take decades before all plant snubbers are actually tested. In the case of Farley Unit 2, none of the failed PSA snubbers had been tested since the unit began commercial operation in 1981. The subject PSA-1/4 and PSA-10 snubbers were installed during original construction and were about 15 years old.

The licensee concluded that the failure of PSA snubbers as the result of lubricant degradation after extended exposure to high temperatures is a new issue. The Snubber Utility Group (SNUG), of which the licensee is a member, and PSA are aware of the issue. In December of 1993, PSA sent letters to all users of its snubbers, including Farley Unit 2, informing them of these grease-related problems. Although PSA snubbers are lubricated with a radiation-resistant grease (i.e., NRRG-159), recent test results from PSA and the industry also indicate there could be an adverse impact on the service life of snubbers in environments with elevated temperatures. PSA and the SNUG Lubrication Working Group have requested users to inspect and evaluate all PSA snubbers removed from service because of preventive maintenance or functional failure for possible lubrication degradation. SNUG also requested utilities to forward any relevant information using a standard data sheet.

PSA and SNUG are establishing a database to analyze and develop criteria based on time and temperature for a service life program to be used by all utilities. The NRC staff is following the above industry activities and will evaluate whether additional NRC actions are necessary.

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 Operating Reactor Support  
Office of Nuclear Reactor Regulation

Technical contacts: Floyd S. Cantrell, RII  
(404) 331-5534

Arnold J. H. Lee, NRR  
(301) 504-2758

Attachment:  
List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
94-13, Supp. 1	Unanticipated and Unintended Movement of Fuel Assemblies and other Components due to Improper Operation of Refueling Equipment	06/28/94	All holders of OLs or CPs for nuclear power reactors.
94-47	Accuracy of Information Provided to NRC during the Licensing Process	06/21/94	All U.S. Nuclear Regulatory Commission Material Licensees.
94-46	NonConservative Reactor Coolant System Leakage Calculation	06/20/94	All holders of OLs or CPs for nuclear power reactors.
94-45	Potential Common-Mode Failure Mechanism for Large Vertical Pumps	06/17/94	All holders of OLs or CPs for nuclear power reactors.
94-44	Main Steam Isolation Valve Failure to Close on Demand because of Inadequate Maintenance and Testing	06/16/94	All holders of OLs or CPs for nuclear power reactors.
94-43	Determination of Primary-to-Secondary Steam Generator Leak Rate	06/10/94	All holders of OLs or CPs for pressurized water reactors.
94-42	Cracking in the Lower Region of the Core Shroud in Boiling-Water Reactors	06/07/94	All holders of OLs or CPs for boiling-water reactors (BWRs).
94-41	Problems with General Electric Type CR124 Overload Relay Ambient Compensation	06/07/94	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

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**Original Signed by**  
**Brian K. Grimes**

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\*forwarded by JRJohnson memorandum to BKGrimes dated 3/8/94  
 see previous concurrence

OFFICE	*Region II	*Region II	*Region II	*OGCB/NRR
NAME	FSCantrell	DMVerrelli	JRJohnson	RJKiesel
DATE	3/ 8/94	3/ 8/94	3/ 8/94	4/19/94
OFFICE	*Tech Editor	*EMEB/NRR	*EMEB/NRR	*DE/NRR
NAME	MFMejac	AJHLee	JANorberg	BWSheron
DATE	4/19/94	4/21/94	4/22/94	5/17/94
OFFICE	OGCB/NRR	OGCB/NRR		
NAME	AJKugler*	BKGrimes		
DATE	5/25/94	06/24/94		

Document Name: 94-48.IN

PSA and SNUG are establishing a database to analyze and develop criteria based on time and temperature for a service life program to be used by all utilities. Both of these organizations recognize that high temperatures seem to be the leading cause of lubrication breakdown in snubbers. The NRC staff is following the above industry activities closely and will take appropriate regulatory actions deemed necessary.

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NAME	AJKugler <i>ajk</i>	BKGrimes		
DATE	5/25/94	5/ /94 <i>mkm</i>		

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