CERTIFICATION

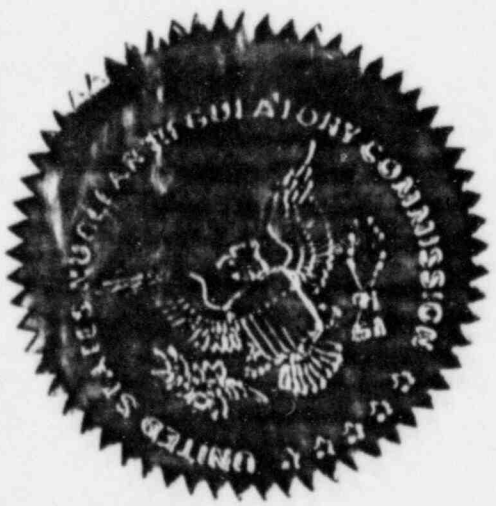
I, Richard C. DeYoung, am the Director, Office of Inspection and Enforcement (OIE) and, as such, am responsible for the custody and control of IE records. This responsibility includes the dissemination of IE Bulletins.

I certify that the document enclosed and identified as IE Bulletin 81-01 is a true and exact copy of the official IE Bulletin as it was distributed to licensees and permit holders.

Signed this 7 day of November 1982
in Bethesda, Maryland

Director, Office of Inspection
and Enforcement
U.S. Nuclear Regulatory Commission

I hereby certify and attest that Richard C. DeYoung whose signature appears above, is the Director, Office of Inspection and Enforcement and, as such, is the official custodian of the Inspection and Enforcement record to which certification is made, and was such official custodian at the time of executing the certificate.



Samuel J. Chilk

Secretary of the United States
Nuclear Regulatory Commission

November 10, 1982
Date

SSINS No.: 6820
Accession No.:
8005050075
IEB 81-01

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

January 27, 1981

IE Bulletin No. 81-01: SURVEILLANCE OF MECHANICAL SNUBBERS

Description of Circumstances:

Several instances of failures of mechanical snubbers supplied by International Nuclear Safeguards Corporation (INC) have been identified that indicate possible deficiencies in these snubbers. A summary of the failures that have occurred is provided below:

1. On August 9, 1974, the Tennessee Valley Authority submitted event report BFAO-50-260/741W identifying 11 of 14 INC Model MSVA-1A snubbers that were found inoperable on Browns Ferry Nuclear Power Station Unit 2 and subsequently identified 5 of 14 inoperable units on Browns Ferry Nuclear Power Unit No 3. All of these units were found to be frozen, and the cause was attributed to a failure to lubricate the parts during assembly. The failed snubbers were replaced with new units produced by the same manufacturer.

2. On April 12, 1976, the St. Lucie Plant Unit 1 facility of Florida Power and Light Corporation submitted event report No. 50-335-76-9 wherein five INC Model MSVA-1 snubbers were identified as inoperable because they were found to be frozen. The failures were caused by oxidation on the internals and by improper assembly. All INC mechanical snubbers were replaced with units produced by another manufacturer.

3. On April 8, 1977, Iowa Electric Light and Power Company submitted event report No. 77-23 for the Duane Arnold Energy Center facility that identified 13 INC Model 1MSVA-1 Type AS snubbers to be frozen; the cause of failure was attributed to large amounts of interior oxidation. The units were replaced with those produced by another manufacturer.

4. On December 5, 1979, personnel from the Nuclear Regulatory Commission visited Department of Energy (DOE) facilities at Richland, Washington, to obtain information on DOE experience with INC snubbers at the Fast Flux Test Facility (FFTF). The DOE-owned FFTF was equipped with more than 4,000 mechanical pipe restraints (snubbers) supplied by INC. In 1978, FFTF examined more than 800 of these mechanical snubbers by removing them from their installation and found that 43, or about 5% of those examined, were frozen. The plant was still under construction so the snubbers had seen no service and had been subjected to only normal construction environments for 1 to 2 years.

Tests were conducted on three operable snubbers by installing them on a Hanford Engineering and Development Laboratory (HEDL) process line. The three snubbers were subjected to flow-induced low-amplitude vibration (0.003 inches or less). These snubbers were of both the combined carbon steel and stainless steel construction and the all stainless steel construction. Detailed test data are not available to the NRC at this time. However, all three snubbers froze after being subjected to the vibration for periods of 3 to 30 days.

The failure modes on all units inspected and tested involved a number of different mechanisms leading to the freezing of the snubbers. Following disassembly of some of the snubbers, inspections showed the failures were caused by improper assembly; overheating of internal components caused by welding (during fabrication); and sensitivity of the design to dirt, corrosion, and inadequate or excessive lubrication. DOE concluded that there were generic deficiencies in the design of the snubbers of this specific manufacturer for application to the FFTF facility and for pipes subjected to vibration. All INC mechanical snubbers in FFTF have been replaced with snubbers produced by another manufacturer.

5. On May 31, 1980, Georgia Power Company reported eight INC snubbers located on instrument and drain lines at Edwin I. Hatch Nuclear Plant Unit 1 were identified as inoperable (LER 321-80-55). The cause of the failures was identified as internal corrosion that caused a frozen condition. In an attempt to free a snubber (750-pound capacity), forces up to 1500 pounds were applied in both the "extend" and "retract" directions and the snubber did not move. The inspection of INC snubbers was completed at the Hatch facility and, on June 30, 1980, NRC received a supplemental report that 45 of the 61 snubbers that had been inspected on Unit 1 had been identified as inoperable and three of the 42 snubbers that were inspected on Unit 2 were inoperable. All inoperable snubbers were replaced prior to startup of the affected unit. Some were replaced with mechanical units produced by another manufacturer, some were replaced with later-model INC snubbers, and three were replaced with rigid restraints. Plans are being made to replace all INC snubbers during upcoming refueling outages. Analyses are also being performed on the piping affected by the locked up snubbers.

In addition to INC snubber failures, failures of mechanical snubbers by another manufacturer are identified below:

1. On September 7, 1979, Public Service Electric and Gas Company reported the failure of three Model PSA-3 mechanical snubbers manufactured by Pacific Scientific Company that were located on a main feedwater line of Salem Nuclear Generating Station Unit 1 (LER 79-54). These three snubbers could not be rotated around their spherical rod end bearings. The snubbers were removed and inspection revealed that the lead screw and traveling nut assembly, which translates linear to rotational motion, had failed. The snubbers no longer provided seismic shock restraint under this condition. These snubbers are directly upstream of the nuclear Class II piping boundary and are included in the stress calculations for the seismic analysis of the nuclear portion of the main feedwater piping. Failure of the snubbers

appeared to result from a force many times greater than the design load of the snubbers. This force was either an extreme shock load or occurred when the snubber was in the fully retracted condition. The snubbers were replaced with units produced by the same manufacturer.

2. On April 10, 1979, Consumers Power Company reported a failure of eight Model PSA-3 Pacific Scientific snubbers at their Big Rock Point Nuclear Plant facility (LER 79-017/03L-0). The cause of the failure was improper installation in that a spherical washer was omitted from the transition tube.

3. On March 15 and June 11, 1979, Florida Power and Light reported failures of Pacific Scientific Company mechanical snubbers on main steam and feedwater systems at Turkey Point Plant Units 3 and 4 (LER 79-006/03L-0 and 79-009/03L-0 respectively). The cause in both cases was attributed to excessive loading.

The nature of the above mechanical snubber failures is to prevent the piping systems, to which they are attached, from moving freely during the normal thermal heat up and cool down associated with plant operations. Restraining this thermal motion results in higher than normal stresses which, if high enough and repeated frequently enough, can lead to a premature fatigue failure of the piping system.

These mechanical snubbers have been installed for a number of years without any NRC requirements for periodic surveillance to determine their condition. As a result, their current condition is unknown to NRC and therefore NRC is requesting a prompt examination of all mechanical snubbers installed to date. Because of the high percentage of failures discovered with the INC snubbers, the time frame for their examination is the shortest and additional operability tests are called for.

Actions to be Taken by Licensees of Operating Reactors:

1. Within 30 days of the issuance date of this bulletin, all normally accessible* INC mechanical snubbers installed on safety-related systems or in storage shall be visually examined and tested as follows:

   a. Perform a visual examination for damage and, without causing the system to be inoperable except as permitted by the facility technical specifications, verify that the snubbers have freedom of movement by performing a manual test over the range of the stroke in both compression and tension.

   b. Perform an operability test to confirm that (1) activation (restraining action) occurs in both compression and tension and (2) the drag forces are within the specified range in both compression and tension. The tests shall be performed on all snubbers in storage and on a representative sample (10% of the total of this type of snubber in use in the plant or 35, which ever is less) of the

*"Normally accessible" refers to those areas of the plant that can be entered during reactor operation.

normally accessible snubbers that are in service and can be individually removed without causing the system to be inoperable, except as permitted by the facility technical specifications. For each snubber that does not meet the test acceptance criteria, an additional representative sample (as defined above) of this type of snubber shall be tested. For each of these additional snubbers that do not meet the test acceptance criteria, another representative sample of this type of snubber shall be tested. This cycle shall be repeated until no more failures have been found or until all snubbers of this type have been tested. The samples should be made up of snubbers representing the various sizes.

c. Snubbers which have been examined and tested in a manner comparable to Items 1a and 1b above within the last six months may be exempted.

d. If any failures are identified in Items 1a or 1b above, take corrective action and evaluate the effect of the failure on the system operability pursuant to the facility technical specifications for continued operation.

e. If failures are identified in Items 1a and 1b above, and if INC snubbers are known to be located in any inaccessible areas, a plant shutdown shall be performed within 30 days after the discovery of the first inoperable snubber and inspections conducted in accordance with Item 2a and 2b below, unless justification for continued operation has been provided to the NRC.

2. Visually examine and test all inaccessible INC mechanical snubbers installed on safety related systems at the next outage of greater than five days duration as follows:

a. Visually examine and manually test all inaccessible snubbers as described in Item 1a above.

b. Perform an operability test on a representative sample of inaccessible snubbers as described in Item 1b above.

c. Snubbers which have been examined and tested in a manner comparable to Items 2a and 2b above within the last six months may be exempted.

d. If any failures are identified in Items 2a or 2b above, take corrective action to evaluate the effect of the failure on system operability pursuant to the facility technical specifications for resuming operation.

3. Provide a schedule for an inspection program covering mechanical snubbers produced by other manufactures. As a minimum, this inspection program shall:

a. Include all snubbers installed on safety-related systems;

b. Include the visual examination and manual test described in Item 1a above for all snubbers;

c. Snubbers which have been examined and tested in a manner comparable to Item 3b above within the last twelve months may be exempted:

d. Require the corrective action and evaluations described in Items 1d and 2d above; and

e. Be completed prior to the completion of the next refueling outage. Plants which are currently in a refueling outage should perform the visual examination and manual tests of inaccessible mechanical snubbers before resumption of operations unless some other basis for assurance of snubber operability is provided to the NRC.

4. Submit a report of the results of the inspections, testing and evaluation requested in Item 1 to NRC within 45 days of the issuance date of this bulletin. Report the results of the inspections, testing and evaluation requested in Item 2 within 30 days after the inspection and testing have been completed. The response to Item 3 shall be submitted within 60 days of the issuance date of this Bulletin. The results of the inspections performed for Item 3 shall be submitted within 60 days after the completion of the inspection.

   The reports shall contain the following:

   a. A description of the visual examinations and tests performed.

   b. Number of snubbers examined and tested. Grouping by manufacturer name, model number, and size is acceptable.

   c. Number of failures identified; manufacturer name, model number, size, mode of failure, cause of failure, corrective action, snubber location, effect of failure on plant and system safety, and justification for continuing or resuming operation.

   d. The above information shall also be provided for the snubbers exempted by Items 1c, 2c, and 3c above.

Actions to be Taken by the Following Licensees Holding Construction Permits:

Diablo Canyon Nuclear Power Plant Unit 1; San Onofre Nuclear Station Unit 2; Watts Bar Nuclear Plant Units 1 and 2; and Virgil C. Summer Nuclear Station Unit 1.

1. After preoperational and/or hot functional testing and preceding fuel loading, visually examine and test the mechanical snubbers installed on safety-related systems as follows:

   a. For all snubbers perform a visual examination for damage and verify that the snubbers have freedom of movement by performing a manual test over the range of the stroke in both compression and tension.

b. For INC snubbers, perform an operability test to confirm that (1) activation (restraining action) occurs in both compression and tension and (2) the drag forces are within the specified range in both compression and tension. The tests shall be performed on a representative sample (10% of the total of this type of snubber in use in the plant or 35, which ever is less). For each snubber that does not meet the test acceptance criteria, an additional representative sample (as defined above) of this type of snubber shall be tested. For each of these additional snubbers that do not meet the test acceptance criteria, another representative sample of this type of snubber shall be tested. This cycle shall be repeated until no more failures have been found or until all snubbers of this type have been tested. The samples should be made up of snubbers that represent the various sizes.

c. If any failures are identified in Items a or b above, take corrective action prior to fuel loading.

2. The schedule for the inspections and tests requested in Item 1 above, shall be submitted within 60 days of the issuance date of this bulletin. The results of the inspections, testing, and evaluation requested in Item 1 shall be reported to NRC within 30 days after the inspection and testing have been completed.

The reports shall contain the following:

a. A description of the visual examinations and tests performed.

b. Number of snubbers examined and tested. Grouping by manufacturer name, model number, and size is acceptable.

c. Number of failures identified; manufacturer name, model number, size, mode of failure, cause of failure, corrective action, and snubber location.

Reports, signed under oath or affirmation, under the provisions of Section 182a of the Atomic Energy Act of 1954, shall be submitted to the Director of the appropriate NRC Regional Office and a copy shall be forwarded to the Director of the NRC Office of Inspection and Enforcement, Washington, D. C. 20555.

If you desire additional information regarding this matter, please contact the IE Regional Office.

Approved by GAO B-180225 (S81003) expires December 31, 1981.

RECENTLY ISSUED
IE BULLETINS

Bulletin No.	Subject	Date Issued	Issued To
80-25	Operating Problems with Target Rock Safety-Relief Valves at BWRs	12/19/80	All BWR facilities with OL & specified near term OL BWR facilities & all BWRs with a CP
Supplement 4 to 80-17	Failure of Control Rods to Insert During a Scram at a BWR	12/18/80	To specified BWRs with an OL & All BWRs with a CP
80-24	Prevention of Damage Due to Water Leakage Inside Containment (October 17, 1980 Indian Point 2 Event)	11/21/80	All power reactor facilities with OL or CP
80-23	Failures of Solenoid Valves Manufactured by Valcor Engineering Corporation	11/14/80	All power reactor facilities with OL or CP
80-22	Automation Industries, Model 200-520-008 Sealed-Source Connectors	9/11/80	All radiography licensees
80-21	Valve yokes supplied by Malcolm Foundry Company, Inc.	11/6/80	All light water reactor facilities with OLs or CPs
Supplement 3 to 79-01B	Environmental Qualification of Class 1E Equipment	10/24/80	All power reactor facilities with an OL
Supplement 2 to 79-01B	Environmental Qualification of Class 1E Equipment	9/30/80	All power reactor facilities with an OL
80-22	Automation Industries, Model 200-520-008 Sealed-source Connectors	9/11/80	All radiography licensees
79-26 Revision 1	Boron Loss from BWR Control Blades	8/29/80	All BWR power facilities with an OL

OL = Operating License
CP = Construction Permit