

**AEC DISTRIBUTION FOR PART 50 DOCKET MATERIAL**  
(TEMPORARY FORM)

CONTROL NO: 10226

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FROM: Northern States Pwr. Co. Minneapolis, Minn. 55401 Mr. L.O. Mayer			DATE OF DOC 10-1-74	DATE REC'D 10-3-74	LTR X	TWX	RPT	OTHER
TO: J.F. O'Leary			ORIG 1 signed	CC	OTHER	SENT AEC PDR <u>XXX</u> SENT LOCAL PDR <u>XXX</u>		
CLASS	UNCLASS XXX	PROP INFO	INPUT	NO CYS REC'D 40		DOCKET NO: 50-263		

**DESCRIPTION:**

Ltr re our 10-1-73 ltr....furn info concern  
Hydraulic Shock Suppressor Deficiencies...  
at the Monticello Nuclear facility....

9102120576 741C01  
PDR ADOCK 05000263  
S PDR

PLANT NAME: Monticello

**ENCLOSURES:**

*[Handwritten: JACKING]*

10-4-74 Jb

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**NSP** Regulatory Docket File  
NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

October 1, 1974

Mr. J F O'Leary, Director  
Directorate of Licensing  
Office of Regulation  
US Atomic Energy Commission  
Washington, DC 20545



Dear Mr. O'Leary:

MONTICELLO NUCLEAR GENERATING PLANT  
Docket No. 50-263 License No. DPR-22

Report of Final Resolution of Hydraulic Shock Suppressor Deficiencies

This report is submitted in accordance with Mr. Skovholt's letter of October 1, 1973, in which certain deficiencies with Hydraulic Shock Suppressors (snubbers) of a type installed at our Monticello Nuclear Generating Plant were discussed. We were directed by this letter to submit at an appropriate time, within one year, our proposed program to improve snubber service life and reliability and proposed changes to our Technical Specifications describing a snubber surveillance program.

Background

On July 27, 1973 Northern States Power Company was first notified by the Directorate of Regulatory Operations that potential seal failures were found in Bergen-Paterson snubbers installed at several other Boiling Water Reactors. Inspection of snubbers installed at Monticello on July 31, 1973 revealed several which had suffered oil loss through failure of the polyurethane seal materials. Table 1, "Monticello Hydraulic Shock Suppressors - Summary of Inspections and Reports," is a detailed summary of the subsequent action taken to improve snubber reliability and of the inspections conducted since the problem was identified. All corrective action has been described in detail in earlier reports.

The snubbers originally supplied to the Monticello plant were assembled with millable gum polyurethane O-rings and molded polyurethane U-cups. Analysis of the failed seals soon after the problem was identified indicated that the

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polyurethane was undergoing moisture attack at the elevated temperatures experienced in the drywell. A new seal material, ethylene propylene, was recommended by the vendor for BWR service and was subjected to extensive qualification testing. Replacement of all existing internal seals with ethylene propylene seals was recommended as soon as they could be made available.

On November 7, 1973 Northern States Power Company was informed by the General Electric Company of another potential problem with Bergen-Paterson snubbers. The oil-filler fitting on snubbers of the type installed at Monticello were originally supplied with a polyurethane flap. Although no leakage from these fittings was experienced at Monticello, at least one other BWR had experienced such failure. Immediate replacement of the oil-filler fittings with readily available Buna-N flap equipped fittings was recommended. Fittings with ethylene propylene flaps were being made available for future snubber maintenance.

#### Resolution of Deficiencies

Until the recommended ethylene propylene seal materials were available, on hand stocks of polyurethane seals were used to repair all snubbers found to be leaking oil. During a November, 1973 outage sufficient quantities of ethylene propylene seal materials were available to replace all internal seals on snubbers located inside the drywell. Oil-filler fittings with high temperature-high pressure Buna-N flaps were also installed. By mid February, 1974 all snubbers located outside the drywell were rebuilt using the recommended ethylene propylene internal seals and oil-filler fittings equipped with Buna-N flaps.

Thirty-four additional Bergen-Paterson snubbers were installed in the drywell during the 1974 Spring outage. All of these snubbers were equipped with ethylene propylene seals and oil-filler fittings having ethylene propylene flaps.

All storeroom supplies of the older seal materials and oil-fillers at Monticello have been replaced with the recommended ethylene propylene seals and oil-filler fittings having ethylene propylene flaps.

Table 2, "Status of Monticello Hydraulic Shock Suppressors," lists all snubbers installed in Safety Related Systems at Monticello and the seal materials used in each. All snubbers have the recommended ethylene propylene internal seals. Snubbers now equipped with oil-filler fittings having Buna-N flaps will receive oil-filler fittings having ethylene propylene flaps the next time they are disassembled for maintenance. The oil-filler fittings now in use with Buna-N flaps have proven entirely satisfactory, however, and no failure or degradation of those installed has been observed.

Except in one instance, no significant oil leakage has been experienced from any snubber rebuilt according to the vendor's recommendations using the ethylene propylene internal seals. The one instance of seal leakage was attributed to damage during previous snubber maintenance. Inspections have been conducted as noted in Table 1 and results have been reported to the Directorate of Licensing or Regulatory Operations, Region III.

NORTHERN STATES POWER COMPANY

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Proposed Programs of Snubber Reliability Improvement and Preventive Maintenance

Qualification testing by the snubber vendor and in-plant experience to date have demonstrated that replacement of the seal material with ethylene propylene will prevent future seal deterioration.

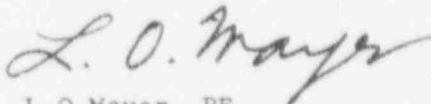
In addition to the seal replacement already completed, we will implement an extensive program of snubber preventive maintenance. At least once each refueling cycle the following inspections and maintenance will be performed:

1. The linear extension of the main cylinder piston shaft of each snubber will be measured and compared to accumulator level indication. Each unit will be inspected for signs of significant external leakage. Any snubber showing significant oil loss will be repaired.
2. Approximately ten snubbers will be overhauled. All snubbers will therefore be rebuilt over a 10-year period. All seals replaced will be examined for damage or abnormal degradation. If degradation or damage is detected, the number overhauled each year will be adjusted accordingly.

Because the solution to long term reliability of these components is a well executed program of preventive maintenance, we do not believe a Technical Specification change is appropriate.

The corrective actions we have taken and the programs we have proposed for snubber surveillance and preventive maintenance provide a high level of assurance that these components will remain trouble free in the future. We intend to fully implement these programs commencing with our next refueling outage. In addition, snubbers located in the drywell will be reinspected during a short outage planned for November. We will continue to report all required corrective snubber maintenance in the Monticello Semi-annual Reports.

Yours truly,



L O Mayer, PE  
Director of Nuclear Support Services

Attachments

LOM/DMM/yb

cc: J G Keppler  
G Charnoff  
Minnesota Pollution Control Agency  
Attn. E A Pryzina

Table 1. Monticello Hydraulic Shock Suppressors  
Summary of Inspections and Reports

<u>Date</u>	<u>Event</u>	<u>Remarks</u>
July 27, 1973	NSP notified by Directorate of Regulatory Operations of potential problems with Bergen-Paterson hydraulic shock suppressors and restraints. NSP was directed to: a) Report if the subject snubbers are used in safety systems at Monticello b) Inspect each such device installed for proper fluid level c) Report by telephone to the Region III Regulatory Operations office the results of these actions and all repairs accomplished or planned and all surveillance scheduled for snubbers. d) Confirm in writing within 10 days the report in (c) above.	DRO Bulletin 73-3
July 30, 1974	Plant shutdown commenced for snubber inspection	
July 31, 1973	Inspection of all snubbers completed. 37 of total of 54 snubbers were found to have low oil levels. 32 of the units were disassembled and repaired using Buna-N and polyurethane seal materials. Oil was added to five of the snubbers which were not rebuilt.	Results reported by letter dated August 9, 1973, from Mr. L J Wachter, NSP, to Mr. B H Grier, DRO Region III. All information required by DRO Bulletin 73-3 was supplied.

Table 1 (cont)

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<u>Date</u>	<u>Event</u>	<u>Remarks</u>
July 31, 1974 (cont)	All snubbers located outside of the containment were placed on a weekly inspection schedule. Snubbers located inside containment were to be inspected during the planned October 1973 shutdown.	
August 17, 1973	NSP ordered by the Directorate of Regulatory Operations to schedule reinspection of snubbers used in safety related systems within 45 to 90 days of the initial inspection. The results of this inspection were to be reported by telephone and in a written report within 10 days of completion. A description of modifications to assure proper operation was to be included.	DRO Bulletin 73-4
September 17, 1973	Vendor identified improper seal material as source of snubber oil leakage. Ethylene propylene material recommended for O-rings and U-cups.	
September 28 to October 5, 1973	Reinspection of snubbers located inside containment was completed. Of the 34 snubbers located in the drywell, 5 were found to have lost a slight amount of oil, but not enough to affect their performance. All other snubbers, including the 25 located outside the drywell, experienced no oil loss.  The five snubbers showing slight oil loss and five others were removed and	Results reported by letter dated October 9, 1973 from Mr. L J Wachter, NSP, to Mr. J G Keppler, DRO Region III. All information required by DRO Bulletin 73-4 was supplied.

Table 1 (cont)

- 3 -

<u>Date</u>	<u>Event</u>	<u>Remarks</u>
	rebuilt using Buna-N and polyurethane seal materials. Snubbers located within the drywell were scheduled to be inspected during the 1974 Spring outage and during any drywell entry. Snubbers located outside containment were placed on a biweekly inspection schedule.	
October 5, 1973	Vendor tests of ethylene propylene snubber seal materials in drywell environment completed. Preliminary test data confirms initial recommendation of this seal material.	
October 8, 1973	NSP ordered by letter from Mr. D J Skovholt USAEC-DL, dated October 1, 1973, to replace snubber seal material in accordance with vendor recommendations. Inspections at 120 day intervals if improved seal materials are installed, or 30 day intervals if they are not, were ordered for snubbers located in containment. Inspections at 30 day intervals for snubbers accessible during operation were ordered. Results of all inspections to be reported to the Directorate of Licensing within 15 days of the inspection. A final report of the resolution of the problem to be submitted within one year.	
	Snubber temperature and radiation environmental data was requested to be submitted within 60 days after the next shutdown.	



Table 1 (cont)

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<u>Date</u>	<u>Event</u>	<u>Remarks</u>
November 14 to November 17, 1973	All snubbers located inside containment were inspected. All snubbers, including those located outside the drywell were found operable and no oil loss was detected.	Results of inspection reported by letter dated November 30, 1973, from Mr. L O Mayer, NSP, to Mr. D J Skovholt, USAEC-DL. This letter included results of the snubber temperature and radiation environment results.
	All snubbers located in the drywell were disassembled and rebuilt using ethylene propylene O-rings and U-cups. In addition, the oil-fill fittings were replaced with high temperature, high pressure leakproof fittings having Buna-N seals. No indication of deterioration of the previously installed oil-fill fittings equipped with polyurethane flaps was found.	Replacement of the oil-fill fittings was recommended by telegram from the vendor on November 7, 1973.
	Inspection of snubbers located outside the drywell continued on a monthly basis based on experience to date.	
December 28, 1973	Final laboratory report on snubber seal material qualification testing issued by the vendor. Ethylene propylene found suitable for BWR service.	
February 11, 1974	NSP advised by letter from Mr. D J Skovholt, USAEC-DL, dated February 11, 1974, to inspect and renew as appropriate all snubber oil addition fittings.	
February 17, 1974	All snubbers located inside containment were inspected. These snubbers continued to perform satisfactorily with no significant oil loss.	Reported by letter dated February 25, 1973, from Mr. L O Mayer, NSP, to Mr. D J Skovholt, USAEC-DL.



Table 1 (cont)

- 5 -

<u>Date</u>	<u>Event</u>	<u>Remarks</u>
February 17, 1974 (cont)	All snubbers located outside the drywell were disassembled and rebuilt since the last outage using ethylene propylene O-rings and U-cups. Oil-fill fittings were renewed with fittings having high temperature, high pressure leakproof Buna-N seats. Prior to rebuilding, slight oil loss was noted from two of the snubbers located outside containment.	
March 13, 1974 & March 16, 1974	<p>Inspection of snubbers located outside the drywell was completed March 13, 1974. No oil loss was found.</p> <p>Inspection of snubbers located inside the drywell was completed during an outage on March 16, 1974. One unit was noted with oil loss and repaired. Leakage was found to be due to an O-ring damaged during previous maintenance.</p> <p>Inspection of snubbers located outside the drywell to be continued on a semi-annual basis based on experience to date.</p>	Reported by letter dated March 28, 1974, from Mr. L O Mayer, NSP, to Mr. D J Skovholt, USAEC-DL.
March 15 to May 20, 1974	<p>All snubbers inspected. No evidence of oil leakage noted.</p> <p>An additional 34 snubbers were installed in the drywell during the outage as part of modifications to the over-pressure relief system.</p>	<p>Annual outage inspection.</p> <p>Described in detail in a report entitled, "Permanent Plant Changes to Accomodate Equilibrium Core Scram Reactivity Characteristics," submitted by Mr. L O Mayer, NSP, to USAEC-DL on January 23, 1974.</p>

Table 1 (cont)

- 6 -

<u>Date</u>	<u>Event</u>	<u>Remarks</u>
March 15 to May 20, 1974 (cont)	Of the new snubbers installed, all seals, including the oil-fill fitting flaps, were constructed of ethylene propylene.  Two drywell snubbers were rebuilt during the outage. All seals, including the oil-fill fitting flaps, were constructed of ethylene propylene.  All seal materials in storage were purged of polyurethane and Buna-N materials. Only ethylene propylene materials were retained for use in future maintenance.	
June 7, 1974	All snubbers inside containment were inspected, with the exception of seven excluded due to accessibility problems. No oil leakage or other indication of deterioration was noted.	Reported in a letter dated June 17, 1974, from Mr. L O Mayer, NSP, to Mr. D J Skovholt USAEC-DL.
September 27, 1974	Vendor recommendations received for program of snubber surveillance and planned maintenance.	
October 1, 1974	Submittal to the Directorate of Licensing of proposed program to improve snubber service life and reliability and proposed snubber surveillance program.	

Table 2. Status of Monticello Hydraulic Shock Suppressors

Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
SS-1	Drywell-Main Steam 953' AZ 279°	EP	BN	
SS-2	Drywell-Main Steam 953' AZ 81°	EP	BN	
SS-3	Drywell-Main Steam 950' A 212°	EP	BN	
SS-4	Drywell-Main Steam 950' AZ 148°	EP	BN	
SS-7	Drywell-Main Steam 953' AZ 240°	EP	EP	
SS-8	Drywell-Main Steam 953' AZ 120°	EP	BN	
SS-11	Drywell-Feedwater 952' AZ 302°	EP	BN	
SS-12	Drywell-Feedwater 952' AZ 58°	EP	BN	
SS-13	Drywell-Feedwater 952' AZ 258°	EP	BN	
SS-14	Drywell-Feedwater 952' AZ 96°	EP	BN	
SS-17A	Drywell-RHR 964' AZ 72°	EP	BN	
SS-17B	Drywell-RHI 964' AZ 72°	EP	BN	
SS-18A	Drywell-RHR 964' AZ 288°	EP	BN	
SS-18B	Drywell-RHR 964' AZ 288°	EP	BN	
SS-19	Drywell-RHR 964' AZ 341°	EP	BN	

Table 2 (cont)

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Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
SS-20	Drywell-RHR 964' AZ 19°	EP	BN	
SS-1AR	Drywell-Recirc 922' AZ 315°	EP	BN	
SS-1BR	Drywell-Recirc 922' AZ 135°	EP	BN	
SS-2AR	Drywell-Recirc 927' AZ 302°	EP	BN	
SS-2BR	Drywell-Recirc 927' AZ 122°	EP	BN	
SS-3AR	Drywell-Recirc 927' AZ 328°	EP	BN	
SS-3BR	Drywell-Recirc 927' AZ 148°	EP	BN	
SS-4AR	Drywell-Recirc 934' AZ 302°	EP	BN	
SS-4AR	Drywell-Recirc 934' AZ 323°	EP	BN	
SS-4BR	Drywell-Recirc 934' AZ 120°	EP	BN	
SS-4BR	Drywell-Recirc 934" AZ 149°	EP	BN	
SS-5AR	Drywell-Recirc 941' AZ 315°	EP	BN	
SS-5BR	Drywell-Recirc 941' AZ 135°	EP	BN	
SS-6AR	Drywell-Recirc 953' AZ 261°	EP	BN	
SS-6BR	Drywell-Recirc 953' AZ 99°	EP	BN	
SS-7AR	Drywell-Recirc 953' AZ 323°	EP	BN	
SS-7BR	Drywell-Recirc 953' AZ 32°	EP	BN	
SS-8AR	Drywell-Recirc 927' AZ 270°	EP	EP	

Table 2 (CONT)

- 3 -

Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
SS-8BR	Drywell-Recirc '927' AZ 90°	EP	BN	
PS1-H2	Drywell-Main Steam 953' AZ 71°	EP		Note 4
PS1-H3	Drywell-Main Steam 950' AZ 148°	EP	EP	Note 4
PS2-H2	Drywell-Main Steam 950' AZ 120°	EP	EP	Note 4
PS3-H2	Drywell-Main Steam 950' AZ 240°	EP	EP	Note 4
PS4-H3	Drywell-Main Steam 950' AZ 212°	EP	EP	Note 4
RV24-H3	Drywell-Safety Relief 950' AZ 110°	EP	EP	Note 4
RV24-H4	Drywell-Safety Relief 935' AZ 100°	EP	EP	Note 4
RV24-H4A	Drywell-Safety Relief 935' AZ 100°	EP	EP	Note 4
RV24A-H5	Drywell-Safety Relief 935' AZ 110°	EP	EP	Note 4
RV24A-H4A	Drywell-Safety Relief 947' AZ 48°	EP	EP	Note 4
RV24A-H7	Drywell-Safety Relief 935' AZ 115°	EP	EP	Note 4
RV24A-H8	Drywell-Safety Relief 939' AZ 32°	EP	EP	Note 4
RV25-H1	Drywell-Safety Relief 935' AZ 180°	EP	EP	Note 4
RV25-H1A	Drywell-Safety Relief 953' AZ 180°	EP	EP	Note 4
RV25-H2	Drywell-Safety Relief 948' AZ 190°	EP	EP	Note 4
RV25-H2A	Drywell-Safety Relief 948' AZ 190°	EP	EP	Note 4

Table 2 (cont)

- 4 -

Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
RV25-H3	Drywell-Safety Relief 934' AZ 180°	EP	EP	Note 4
RV25A-H2	Drywell-Safety Relief 945' AZ 120°	EP	EP	Note 4
RV25A-H2A	Drywell-Safety Relief 945' AZ 120°	EP	EP	Note 4
RV25A-H7	Drywell-Safety Relief 953' AZ 135°	EP	EP	Note 4
RV26-H1	Drywell-Safety Relief 953' AZ 200°	EP	EP	Note 4
RV26-H1A	Drywell-Safety Relief 953' AZ 200°	EP	EP	Note 4
RV26-H2	Drywell-Safety Relief 947' AZ 200°	EP	EP	Note 4
RV26-H2A	Drywell-Safety Relief 947' AZ 200°	EP	EP	Note 4
RV26A-H2	Drywell-Safety Relief 940' AZ 250°	EP	EP	Note 4
RV26A-H2A	Drywell-Safety Relief 935' AZ 250°	EP	EP	Note 4
RV27-H1	Drywell-Safety Relief 950' AZ 320°	EP	EP	Note 4
RV27-H1A	Drywell-Safety Relief 950' AZ 230°	EP	EP	Note 4
RV27-H5	Drywell-Safety Relief 945' AZ 270°	EP	EP	Note 4
RV26-H6	Drywell-Safety Relief 945' AZ 270°	EP	EP	Note 4
RV27-H7	Drywell-Safety Relief 945' AZ 270°	EP	EP	Note 4
RV27A-H2A	Drywell-Safety Relief 953' AZ 290°	EP	EP	Note 4

Table 2 (cont)

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Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
RV27A-H3	Drywell-Safety Relief 953' AZ 290°	EP	EP	Note 4
RV27A-H9	Drywell-Safety Relief 938' AZ 290°	EP	EP	Note 4
SS-21	Torus Floor Level-RHR, South Wall	EP	BN	
SS-22	Torus Floor Level-RHR, South Wall	EP	BN	
SS-23	"B" RHR Room-RHR, Floor Level	EP	BN	
SS-24	"A" RHR Room-RHR, Floor Level	EP	BN	
SS-25	RHR Discharge-Southeast Wall Just Below Torus Catwalk	EP	BN	
SS-26	"B" RHR Room-Core Spray, Floor Level	EP	BN	
SS-27	"B" RHR Room-Core Spray, Floor Level	EP	BN	
SS-28A	"A" RHR Room-Core Spray, Floor Level	EP	BN	
SS-28B	"A" RHR Room-Core Spray, Floor Level	EP	BN	
SS-29	Overhead 954' Elevation by N <sub>2</sub> Analyzer - RHR	EP	BN	
SS-30	Overhead 954' Elevation by N <sub>2</sub> Analyzer - RHR	EP	BN	
SS-31	Torus Catwalk - RHR Discharge	EP	BN	
SS-32A	"A" RHR Room - RHR, 916' Behind Heat Exch.	EP	BN	
SS-32B	"A" RHR Room - RHR, 916' Behind Heat Exch.	EP	BN	
SS-33	Above Torus on Side Sloping Towards RHR Disch.	EP	BN	



Table 2 (cont)

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Snubber Identification	Location	O-ring and U-cup Material	Oil-Filler Seal Material	Remarks
SS-34	Above Torus On Side Sloping Towards Drywell-RHR Disch.	EP	BN	
SS-35	HPCI Room, 912' on North Wall HPCI Pump Disch.	EP	BN	
SS-36A	HPCI Room, Floor Level - Turbine Exhaust	EP	BN	
SS-36B	HPCI Room, Floor Level - Turbine Exhaust	EP	BN	
SS-37	HPCI Room, 905' on West Wall - Turbine Exch.	EP	BN	
SS-38A	RCIC Room, West Wall 906' - Turbine Exhaust	EP	BN	
SS-38B	RCIC Room, West Wall 906' - Turbine Exhaust	EP	BN	
SS-40	Main Steam Chase - HPCI Steam Supply	EP	BN	
SS-41	Above Torus Catwalk 927' - Core Spray Disch.	EP	BN	
SS-42	Above Torus Ring Header NW Wall 906' - HPCI Steam Exhaust	EP	BN	
SS-43	Off Gas 917' Southeast Condenser Area	EP	EP	Note 5
SS-44	Off Gas 91 Southeast Condenser Area	EP	EP	Note 5
SS-9	Feedwater 927' RFP Area	EP	EP	Note 5
SS-9A	Feedwater 924' East Condenser Area	EP	EP	Note 5
SS-9B	Feedwater 924' East Condenser Area	EP	EP	Note 5
SHP-101-SS1	Off Gas 945' West Turbine Mezzanine Area	EP	EP	Note 5

Notes:

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1. Azimuth is clockwise from the airlock as zero reference.
2. The main steam lines and their associated S/R discharge lines are as below:
  - A - 24 & 24A
  - B - 25 & 25A
  - C - 26 & 26A
  - D - 27 & 27A
3. Seal material codes:
  - BN - Buna N, high temperature - high pressure
  - EP - Ethylene propylene
4. Snubber installed during 1974 refueling outage as part of modifications to the over-pressure relief system.
5. Snubber installed on non-safety related system.