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Analysis of Abnormalities of Snubbers in Nuclear-Reactor Service

(Report 1)

J. H. Butler F. M. O'Hara, Jr.

Prepared for the
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Under Interagency Agreement ERDA 40-495-7

MASTER

OAK RIDGE NATIONAL LABORATORY

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ANALYSIS OF ABNORMALITIES OF SNUBBERS
IN NUCLEAR REACTOR SERVICE
(Report 1)

J. H. Butler
F. M. O'Hara, Jr.

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ANALYSIS OF ABNORMALITIES OF SNUBBERS IN NUCLEAR-REACTOR SERVICE

J. H. Butler P. M. O'Hara, Jr.

ABSTRACT

An investigation was conducted of malfunctions of snubbers (seismic-shock arrestors) in service in nuclear power plants. The construction and use of snubbers is summarized here, and the history of snubber problems in nuclear service is reviewed. Reports of many hundreds of snubber malfunctions were found in the abnormal-occurrence reports of the isocket literature. The great majority of these abnormal occurrences consisted of hydraulic snubbers whose hydraulic fluid had leaked out because of deteriorated seals; snubbers that were damaged in manufacture, shipping, installation, refitting, or use; and snubbers whose performance did not match service requirements. Additional information about the failures was obtained from the reactor operations, snubber manufacturers, reactor vendors, and independent laboratories. The abnormal occurrences were classified into 12 categories. Analyses of the causes of the individual abnormalities are presented, and preliminary comments on the current state of snubber manufacture and use are made.

Key words: Snubbers, shock absorbers, shock arrestors, seismic shock, pipe supports, restraints, earthquakes, nuclear power plants, impact shock, nuclear piping, failure, support structure, bibliography.

1. INTRODUCTION

The purpose of this report is to document the results of an investigation of malfunctions of snubbers in service in nuclear reactors.

A rash of such abnormal occurrences in 1973 caused the AEC NRC to issue a series of Regulatory Operations (RO) bulletins requiring reactor operators to inspect and rebuild certain hydraulic snubbers used in their piping systems. After this response to the immediate concern, the Engineering Standards Branch of the NRC decided to perform a comprehensive analytical review of the performance of seismic-shock arrestors used in

reactor facilities in the U.S. The Engineering Technology Division of ORNL has been contracted to carry out this survey and evaluation.

The scope of the overall NRC program will be to review and evaluate snubbers and eventually to develop a regulatory guide for these devices. The ASME, at the same time, is developing rules for the design and use of snubbers, which rules are to be incorporated into Subsection NF of the ASME Boiler and Pressure Vessel Code, Sect. III.² The NRC program will study present designs and alternatives, considering material compatibility with service environments and loading conditions, and the effectiveness of design criteria for snubber lock-up rates, free-flowing rates, and bleed rates will be evaluated.

A meeting of ORNL and NRC personnel was held on September 15, 1975, to discuss the snubber problem and to initiate a plan of investigation. It was decided that the initial and primary consideration should be a thorough review of available information, as supplied by NRC, regarding snubber malfunction and design. The information provided by NRC has been reviewed, and a plan of investigation has been formulated.

Activities in FY 1976 include the comprehensive review of service-condition abnormalities of both hydraulic and mechanical snubbers with emphasis on failure-mode determination. Also, a review of the adequacy of methods used by architectural and engineering firms and reactor vendors to determine snubber specifications will be performed, and the design practices of snubber manufacturers will be investigated. The review and evaluation of snubber performance will be continued into FY 1977.

Completion of the above investigation should pinpoint design-practice deficiencies and inadequacies, as related to snubber failures. This information will set the focus for a thorough evaluation of analytical methods and their correlation with experimental data in order to determine the role of the functional variables in snubber design. The feasibility of data extrapolation from small- to large-capacity snubbers will also be investigated. It should be noted that, as it stands, this phase of the investigation relies solely on available test data but that successful completion of this work may require rather extensive experimentation by independent investigators.

The cumulated results of the preceding research should provide a reliable means of developing recommended test procedures for snubbers to be performed by the manufacturer, user, or independent sources. The ultimate objective for this program is to develop information to contribute to the development of regulatory guides, codified standards, quality-assurance practices, and in-service inspection procedures regarding snubbers.

The plans for scheduling, conducting, and reporting these activities are outlined in Table 1.

Table 1. Snubber-evaluation outline and schedule

PHASE I	
<u>Objective</u>	Evaluation of design practice and adequacy as related to snubber specifications, as requested by the user and supplied by the manufacturer.
<u>Plan</u>	
FY 1977	Report 1: A thorough review and categorization of failure histories using A.I.A. Abnormal Occurrence reports supplied by NRC and test reports supplied by the manufacturer.
	Report 2: A review and report on the adequacy of methods used by utilities and reactor vendors for determining snubber specifications.
	Evaluation of the following snubber manufacturers' design practices for meeting specification requirements:
	Report 3: Analytical analyses performed.
FY 1977	Report 4: Experimental analyses performed, including environmental-compatibility testing.
	Report 5: Quality Assurance procedures.
	Report 6: Construction and assembly procedures.
PHASE II	
<u>Objective</u>	Correlation of analytical criteria and test data to determine the role of specific design variables in snubber performance and to examine the possibility of extrapolating data from small-load-capacity snubbers to large-load-capacity snubbers.
<u>Plan</u>	
FY 1977	Report 7: A comprehensive review and analysis of available test data as supplied by snubber manufacturers related to meeting design requirements.
	Report 8: If necessary, a research proposal indicating required experimentation for data deficiencies.
PHASE III	
<u>Objective</u>	Recommend test procedures for all snubbers to ensure proper performance and to formulate these into a regulatory guide.
<u>Plan</u>	
FY 1977	Report 9: Synthesis of Phases I and II to formulate a regulatory guide including:
	1) performance requirements and specifications,
	2) preoperational tests required,
	3) quality-assurance guidelines,
	4) installation procedures, and
	5) in-service inspection procedures.

*If independent research is necessary at this point, the subsequent planning schedule will be expanded accordingly.

2. SNUBBERS IN GENERAL

Functional Requirements

Snubbers are devices that would absorb the shock of an earthquake for pipes or for piping components in a nuclear-reactor system yet still freely allow the smaller and slower movements caused by heating and cooling of such pipes or components. Snubbers are designed to be attached to a piping component that is considered vulnerable to earthquake damage and to allow that component to move freely within certain limits of rate and extent of movement. If these limits are exceeded, the snubber locks up and temporarily provides rigid support for the component until the force acting on it ceases.

Picture a length of straight pipe rigidly attached at both ends. If the pipe and its supports were rapidly and cyclically accelerated by, say, the ground motion of an earthquake, the pipe would bend under the dynamic load, and the stresses in the pipe might exceed the yield strength of the material, causing gross deformation or rupture. A snubber installed at the midpoint of the pipe would, upon locking up, halve the harmonic-response length of the pipe and essentially double the amount of energy needed to produce gross deformation or rupture of the pipe.

If seismic restraint for such a pipe were provided by rigid supports, the thermal behavior of the pipe and the frequency-response level of the piping system would be altered. This would also generate stresses that could damage the piping system.

Snubbers, then, must accommodate movements of a component resulting from thermal expansion or system vibration but at the same time be capable of rigidly restraining that component in case of seismic shocks. Moreover, they must allow for superposition of these two modes of motion, as, for example, in the case of a dynamic displacement force followed by a rapid thermal transient in the same direction. This necessity requires the snubber to be designed to release rapidly from the locked-up mode or at least to override the lock-up rigidity to accommodate subsequent thermally induced motion.

There are two basic types of snubbers that fulfill these requirements, hydraulic and mechanical snubbers. The remainder of this chapter will discuss the various designs of each of these types of snubbers.

Hydraulic Snubbers

Hydraulic snubbers absorb shocks by compressing a fluid and forcing it through a flow-restraining device. A prototypic hydraulic snubber consists of a rod attached to the piping component to be controlled with the other end of the rod attached to a piston in a piston chamber full of fluid. Under compression, the fluid exits from the chamber through a flow-restraining valve and goes to an accumulator/reservoir or back to the piston chamber on the back side of the piston. The body of the snubber is securely anchored. The basic design of a hydraulic snubber can be seen in Fig. 1. Snubbers can have single- or double-ended piston rods, depending on the application (see Fig. 2). The advantage of the double-ended piston is that the volume evacuated on one side of the piston is the same as the volume displaced on the other as the piston travels through the chamber. This lessens the role of a reservoir or an accumulator to simply accommodating the thermal expansion of the hydraulic fluid and making up fluid lost through leaks. A photograph of an actual snubber is shown in Fig. 3.

The flow-restraining valve is designed to close the fluid passages when the flow rate exceeds a given limit. In the design of Fig. 1, this closure is accomplished with a poppet valve. Lock-up occurs when the pressure caused by the fluid flow exceeds the spring force and the valve seats. With the valve closed, travel of the piston is limited by the compressibility of the fluid and the magnitude of the dynamic-displacement force. When the force on the piston rod is removed, the pressure on the valve is relieved, and the spring-loaded poppet valve opens again, returning the unit to its normal condition. Another poppet valve prevents rapid flow of fluid in the opposite direction. Such snubbers handle cyclic loads of up to about 30-Hz frequency.

In case there is an extended loading on the piston rod, a slow pressure-relief capability is built into the snubbers. This might consist of grooves in the seating surface of the poppet valve or an auxiliary orifice.

ORNL-DWG 76-16880

Fig. 1. Schematic illustration of a hydraulic shock absorber in operation. Drawing courtesy of ITT-Grinnell.

ORNL-DWG 76-4452

Fig. 2. Illustration of (a) single- and (b) double-ended pistons.

PHOTO 5775-76

Fig. 3. A hydraulic snubber with hydraulic-fluid reservoir on top, mounting assembly to the left, piston rod extending on the right, and hydraulic cylinder in the center. The valve assembly is seen on the right front of the device. Photo courtesy of ITT-Grinnell.

Very slowly, this allows the snubber to bleed off the pressure within the hydraulic cylinder and to absorb the force on the supported piping component. The bleed rate is variable, and the maximum travel of the piston is limited, of course.

The majority of a hydraulic snubber is of steel construction, seals are generally of polymeric material, and the hydraulic fluid is usually a silicone oil that has been selected for its resistance to temperature and radiation.

Mechanical Snubbers

Mechanical snubbers adjust to thermal motions by telescoping, and they contain devices that lock up when the telescoping action occurs too quickly. A variety of mechanical devices (e.g., springs, ball screws, rotating masses) are used to translate the axial telescoping into angular acceleration and to control (that is, to limit) that axial velocity. Four of these design concepts will be discussed here.

The simplest device is just an inertia mass (flywheel) attached to a screw. The freely rotating screw is attached at one end of the snubber, while a ball unit is rigidly attached at the other (see Fig. 4). Slow telescoping of the snubber accelerates the mass, whereas the device would not have time to react to a transitory and rapid axial compressive force, acting instead as a rigid structure.

Fig. 4. Simple inertia-mass-snubber design.

A second device that uses a ball nut and screw to accelerate a rotating component employs an element with a low coefficient of friction between the rotating component and the (stationary) snubber housing. At low rates of axial compression, this friction element will allow the rotating member to slide over it; at high rates, it will not, and the snubber will lock up.

A more sophisticated version of the latter device employs a spring-loaded friction plate attached to the central rotating member (the ball nut). Upon rotation, this friction plate expands outward by means of an adapter (see Fig. 5). When the centrifugal force of the rotating friction plate exceeds the force of the centering springs, the friction plate contacts the snubber housing, and the unit locks up. If the axial load is unidirectional, the act of locking up eliminates the centrifugal force, allowing the snubber to release and re-engage cyclically until the long-term force is accommodated.

The final design concept to be discussed here is illustrated in Fig. 6. In this design, the telescoping action of the unit accelerates a drum assembly that is coupled to an inertia mass by a resilient capstan spring. When the drum assembly moves, it turns the inertia mass by twisting the spring. If the inertia mass's resistance is too great, the spring tightens around a mandrel, stopping the rotation of the drum and locking up the

Fig. 5. Snubber design utilizing spring-loaded friction clutch.

Fig. 6. Schematic illustration of a mechanical shock arrestor.
Drawing courtesy of Pacific Scientific.

snubber. Due to symmetry, the same capstan spring will brake the drum/screw under both tensile and compressive loads. Once the device has locked up, the freely turning inertia mass will slowly accelerate and relieve the torque on the spring, releasing the mechanism and allowing it to recycle if need be. Again, the net effect is an iterative throttling and braking that limits and controls the axial acceleration. The limiting factor is, of course, the stiffness of the capstan spring, which is chosen so that the unit can provide normal thermal compensation without tightening the capstan brake.

The materials used in the construction of all mechanical (as well as hydraulic) snubbers must conform to the ASME Code,¹ Sect. III, Appendix I, and Code Case 1644 (Ref. 2). The Code does not cover seals, springs, wear shoes, lubricants, retaining rings, and bearings there. Such items must be designed to withstand the effects of the environmental temperatures, humidity, and radiation doses encountered in reactor service.

Typical Characteristics of Snubbers

Off-the-shelf snubbers are available with load ratings from 2.2×10^2 to 8.9×10^6 newtons (50 to 2,000,000 lb). These are the maximum forces that the snubbers themselves will withstand. If a strut assembly is used, column strength must also be considered along with the properties of attachment devices.

The stroke or travel length of a snubber can be of any reasonable magnitude, and the length will vary from manufacturer to manufacturer. A proposed rule³ is that the minimum stroke length should be the maximum calculated thermal movement plus 20% or 2.54 mm (1 in.), whichever is greater.

Snubbers typically lock up when the axial acceleration exceeds a limit set between 2.54 and 25.4 cm (1 and 10 in.) per min². Furthermore, iterative travel of the piston rod upon cyclic loading (3 to 30 Hz) is generally limited to less than 1.5 mm (0.06 in.). This acceleration limit corresponds to an imposed force of less than 2% of the unit's load rating. Relief of extended-term loads typically proceeds at the rate of 12.7 cm (5 in.) per min² depending on the applied load and operating temperature,

although high-capacity units may have rates as low as 0.1270 cm (0.050 in.) per min².

Load ratings of snubber components (relief valves, screws, etc.) typically exceed their snubber's load rating by 120 to 230%.

3. REVIEW OF SNUBBER PROBLEM

Concern about the safety and dependability of snubbers in general can be traced back to the malfunction of a number of hydraulic snubbers in the Millstone-1 unit. The finding that 51 of 112 hydraulic snubbers were defective because of a loss of hydraulic fluid was reported in an abnormal occurrence (AO) report in July 1973. This AO report is abstracted in citation No. 118 in Appendix A.* The Millstone-1 incident resulted in the issuance of Regulatory Operations (RO) Bulletin 73-3, which is included here as Appendix C. This RO bulletin asked reactor operators to survey the status of any and all Bergen-Patterson hydraulic shock absorbers at their installations. The response to RO 73-3 indicated that similar problems were occurring in many reactors, and RO Bulletin 73-4 was issued requesting operators to make detailed inspections and analyses to determine and rectify the causes of the problems. Appendix D shows RO 73-4, and the replies to RO 73-3 and 73-4 are included in the summary table presented later in this report.

The reactor-operators' investigation showed a high rate of seal deterioration and failure in the hydraulic snubbers. This prompted Bergen-Patterson to perform an investigation of the performance and design of the seals in their snubbers. They issued a report⁴ of their findings in October of 1974, including the recommendation that the millable-gum seals, which were the original equipment in the Bergen-Patterson snubbers, be replaced with seals made of ethylene propylene.

An AO report (printout No. 15) issued by Metropolitan Edison Co. for its Three Mile Island 1 reactor indicated that eight snubbers were found that would not lock up at the specified rate. In response to the Three Mile Island incident, RE Bulletin 75-05 was issued, and it is included

*Hereafter, citations listed in Appendix A will be referred to by the numbers associated with them in that printout.

here as Appendix E. In response to RO 75-05, Grinnell evaluated the lock-up problem and issued a report in April 1975 (Ref. 5). Their report indicated that the problems were caused by the wrong hydraulic fluid being installed in the snubbers and by the presence of contaminants in the fluid. Grinnell recommended that a specific fluid be used in the snubbers.

The American Society of Mechanical Engineers organized a Task Force on Snubbers. This Task Force issued a preliminary report in May 1975 (Ref. 3) that provides initial-draft material designed to form the basis for specific recommendations for changes to the ASME Code, Sect. III,¹ Subsect. NF. This draft covers definitions and descriptions of snubbers, loads to be sustained by snubbers, application and installation of snubbers, start-up and testing procedures, specifications, and in-service inspection of snubbers. Other sections of the draft are still in preparation. It is expected that the codification of snubber design, specification, analysis, use, and inspection will obviate any problems with snubbers.

The Nuclear Regulatory Commission also felt some concern with the manufacture and use of snubbers and contracted with ORNL to investigate snubber performance criteria. The rest of this report deals with the initial results of that evaluation of snubber performance.

It should be emphasized that the purpose here is not to make specific recommendations about preventing or correcting any failure of snubbers in nuclear service. Rather, this report is concerned primarily with the determination of the frequency of failure and modes of failures of snubbers in nuclear service and with the provision of a comprehensive evaluation of those failures. The word "failure" here does not necessarily mean that the snubber was found to be inoperable, but possibly that some deviation from normal operating conditions was found.

The investigation and evaluation of abnormal occurrences involving snubbers were accomplished by searching the literature for descriptions of malfunctions of snubbers in nuclear service, analyzing those incidents to determine what different modes of failure occurred, acquiring fuller information about snubber abnormal behavior from reactor vendors and operators and snubber manufacturers, breaking the list of snubber malfunctions down into the various categories of abnormality, and evaluating the situation from the overview thus gained.

The method employed to gather the information about snubber failures is described under "documentation." The method of categorizing the dysfunctions is then explained, and a table of recorded abnormal occurrences (categorized by operator, reactor, date, failure mode, and manufacturer) is presented and summarized. The results and conclusions of the investigations are then presented in a "Summary" section.

The table of recorded abnormal occurrences along with the abstracts listed in Appendices A and B should provide a valuable reference for future investigations as well as document the major areas of concern regarding snubber performance.

Documentation

A multiphasic documentation effort was carried out (1) to assess the magnitude of the problem of deficient snubbers in the nuclear-power industry, (2) to obtain an overview of the results from RO Bulletins 73-3 and 73-4,* and (3) to determine what response the nuclear-power industry has made to the problem.

The first phase of the effort was a search of the AEC (ERDA) dockets from 1966 to 1975. This was performed by searching the computerized file of the Nuclear Safety Information Center at ORNL under the combined terms of "failure" and "shock absorber" and of "failure" and "support structure." The first combination yielded 131 references to items about failures of shock absorbers, and the second produced 173 additional references to items about failures of support structures not specifically referred to as "shock absorbers" in the indexing system. The great majority of the pertinent references was generated by the use of the index term "shock absorbers." Better than 90% of the references thus found were of interest to and of use in the study. Less than 5% of the references generated under "support structures" (other than shock absorbers) were of interest. The bibliography on shock-absorber failures generated by the NSIC search is reproduced here as Appendix A.

*See Appendices C and D.

The NSIC search was replicated and expanded by searching Nuclear Science Abstracts from 1964 through 1975 using the RECON system based at ORNL. The following index terms were selected for use in this search by noting the cross indexing used for pertinent articles turned up in a preliminary run:

shock absorbers	failures	leaks
seals	supports	specifications
testing	reactor maintenance	earthquakes
seismic effects	impact shock	defects
kinetic energy	shock	restraints
performance testing	damping	inspection
hydraulics		

Appropriate combinations of these terms (e.g., "seismic effects" and "damping") were searched, and printouts were obtained when the number of references generated seemed to indicate that such a search might be worthwhile. The descriptions used and the respective number of citations generated are shown in Table 2. Again, the great majority of useful citations came from searching under the index term "shock absorbers;" these are listed in Appendix B.

Engineering Index was searched for the years 1973 and 1974 on the RECON system. After a preliminary search, the file was searched under appropriate combinations of the terms:

shock absorbers	inspection	shock waves
nuclear reactors	insulation	standards
nuclear power plants	maintenance	stresses
earthquake effects	pipng systems	testing
earthquake resistance	reliability	vibrations
failure	seals	welding

No entries specifically about nuclear-reactor shock absorbers were found in the open literature by this means.

The government-report literature was searched for the period 1964 to 1976 using the Government Reports Announcements file compiled by NTIS on the DIALOG system at Lockheed in Palo Alto, California. This search printed out all citations with the description "snubber" (6), all items with the terms "shock absorber" or "shock absorbers" combined with "reactor" (15), all items with "shock absorber" or "shock absorber" combined with "nuclear" (23), and all items with the descriptions "reactor seismic

Table 2. Number of Citations Generated by
Searching Nuclear Science Abstracts
from 1964 to 1976

Description	Citations
Shock absorbers	31
Restraints	7
Seismic effects plus damping	33
Seals plus leaks	119
Supports plus specifications	48
Supports plus performance testing	22
Impact shock plus damping	5
Seals plus performance testing	45
Seals plus failures	45
Seals plus defects	13
Seals plus inspection	27
Testing plus supports	73
Damping plus testing	11
Kinetic energy plus damping	3
Supports plus defects	11
Supports plus inspection	21
Impact shock plus damping	5
Restraints plus specifications	1
Restraints plus inspection	1

effects" or "power plants seismic effects." A total of 120 citations were generated, including several citations to the docket literature and to the non-AEC (-ERDA) government-report literature that had not been picked up previously.

The machine searches were supplemented with a manual search of the indices to the docket literature. Several items were uncovered by that means; no mention of snubbers or shock absorbers was found in the printed indices prior to 1972.

A review of the abstracts generated by these searches led to the selection and inspection of some 150 docket reports on snubber failures in nuclear reactors. These reports provided the basic information for the summary table of faulty snubbers presented later in this report.

The last phase of the initial documentation effort was comprised of writing letters to the various reactor operators who were identified in the docket literature as having had problems with snubbers. These letters asked if the operators had performed any tests or evaluations or had received any test results on snubbers from snubber manufacturers or independent laboratories. They also requested copies of any data generated by such tests or inspections. A copy of a typical inquiry is included here as Appendix F. The returns from these inquiries often explained more fully the mode and cause of in-service insufficiencies of snubbers, pointed to possible solutions to problems with snubbers, and/or led to additional literature available about the subject.

Follow-up contacts with snubber manufacturers, regulatory personnel, reactor operators, reactor designers, and snubber-component suppliers provided information about snubbers, their design, and their use that had not been supplied by the previous documentation efforts.

Abnormality Analysis

The snubber malfunctions reported in the docket literature were studied extensively, and a scheme of categorizing them was developed. Twelve categories were found to be needed to typify all of the failures reported. Each category was assigned a letter designation; those designations and the faults they stand for are as follows:

- A. Hydraulic-snubber reservoir low or empty because of leaky seals
- B. Hydraulic-snubber reservoir low or empty (cause undetermined)
- C. Failed mechanical restraints (springs; either cracked or broken)
- D. Failed hydraulic snubber resulting from damage during installation or subsequent construction
- E. Failed hydraulic snubber caused by improper loosening or tightening of attachment locknuts and subsequent snubber dislocation during installation

- F. Mechanical malfunction (i.e., bent piston, failed rod end, etc.)
- G. Inability of hydraulic snubber to function properly because of system-attachment failure (pipe clamp, etc.)
- H. Hydraulic-snubber performance did not match service requirements
- I. Hydraulic-snubber performance not acceptable (i.e., inappropriate lockup rates, bleed rates, etc.)
- J. Improper reassembly or installation (after on-site disassembly and/or rebuilding)
- K. Snubber dimensional specifications found out of tolerance
- L. Contamination of hydraulic-snubber fluid.

The results of the analysis of snubber abnormal occurrences are given in Table 3. The number of deficient snubbers is listed under each fault-category letter designation. When the actual number of snubbers involved was not specified, the symbol "?" was entered. Docket reports that found no failures or that consisted of AEC-issued RO bulletins are noted as such. The products of only two manufacturers have been specifically studied in-service and therefore account for all of the reported failures. They are noted in Table 2 as manufacturers A (ITT-Grinnell) and B (Bergen-Patterson). The last column in the table provides a reference to the abstract of the docket report as listed in Appendix A. The deficiency totals are summarized in Table 4.

Summary

In this section, each fault category is considered separately with comments from the principal investigator and selected experts familiar with the snubber problem.

Category A. Hydraulic-snubber reservoir low or empty because of leaky seals (513 cases)

This category, by far, illustrates the most common problem with hydraulic snubbers. As described earlier, evidence of leakage of hydraulic fluid due to seal failure prompted RO Bulletins 73-3 and 73-4 which instigated the Bergen-Patterson investigation⁴ of seal materials. It was

Table 1. Abnormal-occurrence analysis summary

Utility	Reactor	Docket No.	Date(s)	Failure category												Manufacturer				Computer printout No.
				A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	
Northern States Power Co.	Monticello Unit 1	50-263	Feb. 27, 1973										3			X				22
			Feb. 28, 1974										2			X				79
			Oct. 9, 1973	5												X				90
			Aug. 3, 1973		37											X				99
			Mar. 28, 1974										1			X				
Omaha Public Power District	Fort Calhoun Station Unit 1	50-285	Aug. 17, 1973																	23
			July 19, 1974													X				52
			June 14, 1974	3												X				57
			Nov. 27, 1973	4												X				88
			Aug. 3, 1973	20												X				141
Nebraska Public Power	Cooper	50-298	July 27, 1973																	
			Dec. 26, 1974	4												X				27
			Jan. 31, 1975													X				32
TVA	Browns Ferry 1	50-259	Nov. 29, 1974										4				X			55
			Oct. 3, 1974	15												X				
				4													X			
			Nov. 28, 1973	2												X				
			Aug. 17, 1973	1												X				92
Philadelphia Electric Co.	Peach Bottom 2	50-277	Oct. 28, 1974	1																102
Wisconsin Electric Power Co.	Point Beach	50-266	Aug. 10, 1973																	40
																				97
Commonwealth Edison Co.	Dresden, Quad-Cities, and Zion	50-10	Aug. 39, 1973																	101
			July 27, 1973																	119
Pacific Gas and Electric Co.	Humboldt Bay	50-133	Sept. 25, 1973																	107
Boston Edison Co.	Pilgrim	50-293	Oct. 4, 1974	4	10											X				41
			Mar. 28, 1974													X				71
			Oct. 9, 1973	1												X				93
			Aug. 17, 1973																	111
			July 27, 1973																	115

Table 3. Continued

Utility	Reactor	Docket No.	Date(s)	Failure category												Manufacturer				Computer printout No. ^a
				A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	
Commonwealth Edison Co.	Dresden 2	50-237	Oct. 31, 1974	3												X				37
			Aug. 30, 1974	2	1											X				47
			June 20, 1974		6											X				58
			Feb. 21, 1974	12	8											X				81
			Oct. 15, 1973		Inspection revealed snubbers operable															91
TVA	Brown's Ferry 2	50-260	Jan. 31, 1975	2									2			X				33
			Oct. 25, 1974	1												X				39
			Aug. 9, 1974	7												X				50
					14 failed mechanical snubbers due to improper lubrication															
Metropolitan Edison Co.	Three Mile Island 1	50-289	Apr. 15, 1975	3												X				13
			Apr. 2, 1975										3	8		X				15
			Dec. 24, 1974	1									1			X				28
			Dec. 6, 1974	5												X				31
			Feb. 2, 1975	1												X				34
			Nov. 30, 1974	1				2					1			X				
			Nov. 8, 1974					1					1			X		X		36
			Aug. 28, 1974	1									1			X				44
								1												
Duke Power Co.	Oconee Unit 1	50-269	Apr. 14, 1975																	10
			July 27, 1973																	100
			Aug. 17, 1973																	114
Connecticut Yankee Atomic		50-213	June 30, 1975																	7
			Aug. 17, 1973																	112
Consumers Power Co.	Palisades	50-255	Mar. 27, 1975																	16
			Mar. 17, 1975																	19
			July 19, 1974											1						51
Philadelphia Electric Co.		50-171	July 27, 1973																	116
Northeast Nuclear Energy Co.	Millstone 1	50-245	May 28, 1975	3												X				11
			Jan. 2, 1975		1											X				26

Table 3. Continued

Utility	Reactor	Docket No.	Date(s)	Failure category												Manufacturer				Computer printout ^a No.
				A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	
Millstone Point Co.	Millstone Point		July 5, 1974	{ 3	2											X				56
			Mar. 8, 1974	{ 3												X				76
			Sept. 25, 1973	{ 6												X				87
			July 18, 1973	{ 19												X				98
			July 27, 1973	{ 51												X				118
			July 31, 1973																	120
Commonwealth Edison Co.	Dresden 3	50-249	May 8, 1975									2								12
			Mar. 3, 1975										1			X				20
			Jan. 16, 1975										8			X				25
			May 15, 1974																	62
			Mar. 25, 1974			9										X				73
			Nov. 2, 1973	{ 5	4											X				77
Philadelphia Electric Co.	Peach Bottom 3	50-278	Aug. 16, 1973	{ 1							1					X	X			108
			Aug. 4, 1975				1													3
			Mar. 4, 1975		1															21
			Dec. 17, 1974	{ 1				2												29
			Oct. 25, 1974	{				1	3											38
			Sept. 28, 1974	{				1		3										42
Iowa Electric Light and Power Co.	Arnold	50-331	June 5, 1974								1					X				61
			May 24, 1974								136					X				61
			July 21, 1975								1									5
			July 10, 1974	1																54
			Mar. 21, 1974																	72
Niagara Mohawk Power Corp.	Fitzpatrick	50-333	July 25, 1975								1									6
			June 24, 1975	2																8
			May 29, 1975																	9
			Mar. 26, 1975																	17
Florida Power and Light Co.	Turkey Point 3	50-250	Aug. 5, 1975				25													2
			Dec. 11, 1973	2												X				86
			Oct. 31, 1973	5												X				89
Commonwealth Edison Co.	Quad-Cities 2	50-265	Sept. 3, 1975	{ 1												X				1
			July 31, 1975	{ 1												X				4
			Sept. 10, 1974	{ 1	3											X	X			45
			Apr. 3, 1974	{ 1												X				70
			Feb. 19, 1974	{ 4												X				75

^aNumbers in this column refer to numbered citations in Appendix A.

Table 4. Failure-mode compilation

Failure categories														Manufacturers ^a				Total No. of failures
No. of failures														A	B	C	Unknown	
A	B	C	D	E	F	G	H	I	J	K	L	Other ^b		A	B	C	Unknown	
513	117	6	26	9	5	10	137	6	40	4	?	14		242	562	1	82	887

^aA, Grinnell; B, Bergen-Patterson; C, McDowell Wellman.

^bImproper lubrication.

determined in this report that polyurethanes were not compatible with service conditions or with the hydraulic fluid. It was recommended that ethylene propylene (EP) materials, such as Parker E652-90 or E529-65, be substituted, and for even greater life expectancy, Parker E740-70 or Stillman 57-723-70 should be used. Units used in radiation areas will be charged with GE 1154 fluid and those in nonradiation areas will be charged with GE SF 96 (200). Also, it was determined in the Bergen-Patterson report that the maximum permissible radiation dosage for the EP seals is 10^7 rads at room temperature.

The polyurethane-EP seal-replacement program has been going on since November 1973, and therefore selected snubbers with EP seals have seen a maximum of approximately 2 years service. Although a great number of snubbers have been changed to EP seals, it is not clear at this time what percentage of snubbers still contain polyurethane materials. At this point, the authors have not discovered one incident of loss of hydraulic fluid due to seal degradation in snubbers fitted with EP seals. However, fluid has been found leaking out of snubbers fitted with EP seals for other reasons. These occurrences will be discussed in more detail under categories J and K.

Although the EP seals seem to be performing adequately from a material standpoint, it is important to consider the following:

1. Data from service-condition performance of snubbers with EP seals are incomplete from the standpoint of longevity related to failure due to wear and environmental effects.
2. The relationship between EP-seal degradation and radiation coupled with other environmental conditions has not clearly been established. A quotation from the Bergen-Patterson report⁴ reaffirms this statement:

Note that one of the tests reported here shows the effects of radiation, while the other shows the effects of temperature and fluid. We have not tested the combined effect of all three, but we anticipate that the loss in physical properties may be greater than a simple addition of the separate effects.

Category B. Hydraulic-snubber reservoir low or empty (caused undetermined) (117 cases)

It would seem that many snubbers in this category were leaking fluid due to faulty seals. But a lack of a formal evaluation procedure and resulting documentation obscured the failure mode. Nevertheless, there were a number of low reservoirs that definitely could not be attributed to seal failure and resulting leakage. These low reservoirs can be attributed to the following: improper filling at the factory, leakage of fluid during shipping, and/or improper filling at the installation site. Improper filling includes incomplete bleeding of the snubber cylinder and reservoir to eliminate the possibility of air being trapped in the system.

Category C. Failed mechanical restraints (springs; either cracked or broken) (6 cases)

There was only one location where this occurred (Turkey Point 4). The cause of failure was not determined, but the occurrence does indicate a possible need for inspection of spring restraints and for a study of performance requirements.

Category D. Failed hydraulic snubber resulting from damage during installation or subsequent construction (26 cases)

Failures in this category cannot be attributed to any particular cause since they are largely accidental and random in nature. But the chance of snubber damage due to construction activities can be minimized by the following considerations.

1. Special care should be taken by the utilities to install the snubbers at the best time to minimize subsequent construction damage.
2. A number of snubbers were rendered inoperable by damage to the extended piston rod. The surface finish of the piston rod is important to eliminate seal damage, and presently there is no protective covering for this part of the snubber. Special care in handling the snubber is indicated.

Category E. Failed hydraulic snubber caused by improper loosening or tightening of attachment locknuts and subsequent snubber dislocation during installation (9 cases)

There exists a definite problem with snubbers located in areas that experience high-frequency system vibration. Although the installation instructions do not recommend the use of any materials or devices for the prevention of loosening of the bolts by vibration, it would seem that some method should be employed to ensure that such loosening will not occur.

Category F. Mechanical malfunction (i.e., bent piston rod, failed rod end, etc.) (5 cases)

The number of failures in this category was small, and they can probably be attributed to improper installation or lack of proper design analysis by the utility in regard to thermal expansion and subsequent snubber loading.

Category G. Inability of hydraulic snubbers to function properly because of system-attachment failure (pipe clamp, etc.) (10 cases)

Although this investigation is primarily concerned with the proper operation of the snubber itself, the performance of the associated attachment mechanism is certainly crucial. It seems that the snubber manufacturers leave the design and installation of the attaching mechanism to the utility. Since failures of attaching mechanisms have been noted, there definitely needs to be a coordination of effort among the utilities, pipe-clamp manufacturers, and snubber manufacturers in order to produce a complete restraint system that will function properly under all types of service loading.

Category H. Hydraulic-snubber performance did not match service requirements (137 cases)

A thorough investigation of the 136 snubbers at Peach Bottom 3 whose performance did not match service requirements revealed that the bleed rate was not fast enough. An adjustment of the bleed orifice eliminated the problem. One snubber's bleed orifice was closed.

Category I. Hydraulic-snubber performance not acceptable (i.e., inappropriate lock-up rates, bleed rates, etc.) (6 cases)

The Three Mile Island incident instigated RO Bulletin 75-05. Careful evaluation of the snubbers involved revealed that loss of lock-up ability could be attributed to contaminants in the hydraulic fluid building up on the poppet-valve springs. This incident may well be categorized as snubber failure due to hydraulic-fluid contaminants. Nevertheless, it was felt that the requests for performance evaluation of snubbers as required by RO 75-05 are warranted and that significant accumulation of data of this nature is necessary.

Category J. Improper reassembly on installation (after on-site disassembly and/or rebuilding) (40 cases)

The changing of snubber seals from polyurethane to EP revealed a number of problems with seal-replacement procedures and seal design. Certain O-ring replacements are almost impossible to perform in the field without damage to the rings that would result in eventual loss of hydraulic fluid. These problems can best be described by personnel familiar with the seal-replacement procedures that have actually attempted to rebuild a snubber. Their comments were received in response to the questionnaire sent out to reactor operators identified in the docket literature.

The apparent cause of loss of oil in the three Bergen-Patterson arrestors is twofold. The arrestor on the RHR system outside the drywell had an unacceptable low amount of oil because the inner lip of the piston rod packing ring was torn. The packing ring contains an O-ring inside a U-cup. This O-ring stiffens the packing ring to such a degree that during the installation and operation of the packing ring, the inner lip of the U-cup is subject to tearing permitting oil to leak out of the arrestor unit. The packing ring must be installed blind, preventing deterioration of any tears on the inner lip of the packing ring until the arrestor unit is placed in service. - TVA

The piston rod seal is a U-cup seal with a spreader piece inserted into the cup. During the rebuilding effort, it was noticed that extreme care had to be exercised in installation of this seal to prevent the spreader piece from becoming separated from the main cup seal. Most of the leaking snubbers found on the first inspection after rebuilding were found to have piston rod seals that had the spreader piece separated from the U-cup. Leakage was attributed to the separated pieces allowing some

deformation of the U-cup seal during assembly of the snubber, and thus loss of sufficient sealing effectiveness to allow slow leakage. - Florida Power and Light

Category K. Snubber dimensional specifications found out of tolerance
(2 cases)

Although there was only one reported incident in this category and it involved only four snubbers, it should be noted that no other investigations of dimensional specifications are known to have been performed by the utilities. As a result of this, there may be a need for a more-comprehensive investigation of design practices related to dimensional specifications and tolerances.

Category L. Contamination of hydraulic-snubber fluid (7 cases?)

There were two reported instances involving contaminated hydraulic fluid. It is not evident at this point whether the foreign material was introduced at the installation site or was present in the snubber before shipment. In one reported case (Three Mile Island 1) the fluid contaminants rendered the snubbers inoperable, and the incident was categorized under failure category I.

4. COMMENTS AND CONCLUSIONS

Although it is premature at this point to make specific recommendations regarding snubber evaluation, a number of important points need to be recognized.

1. There is insufficient information regarding EP-seal integrity under the combined effects of radiation, temperature, and wear.
2. Service data on EP seals are incomplete at this time.
3. Proper fill-and-bleed procedures have not been described clearly to the utilities. Possibly, there is a need for a personnel-training program in this area. Quality control in regard to air trapped in hydraulic cylinders charged at the factory should be reviewed.
4. There may be a need for an inspection-surveillance program of mechanical restraints (springs).

5. Inadequate protection is provided for the extended snubber piston rod.

6. Bolt loosening of snubbers seeing significant system vibration is a definite problem.

7. It is felt that stress analysis of snubber components, as might be described in ASME, Sect. III, Subsection NF, will reveal most design problems related to component over-stress.

8. Coordination among the utilities, the pipe-clamp and pipe-hanger manufacturers, and the snubber manufacturers is important in order to assure an adequate attachment method for the snubber.

9. Snubber specifications, as prescribed by the utilities, may need to be reviewed more carefully. (This topic will be dealt with in detail in a future report.)

10. Data on snubber performance related to lock-up velocity and seal integrity should be accumulated on units that are in service.

11. Ethylene-propylene-seal installation procedures need to be reviewed and improved by the snubber manufacturers.

12. Ethylene-propylene-seal design should be evaluated for wear in snubbers that experience system vibration.

13. Quality control of snubber dimensional and performance specification and inspection should be reviewed.

14. Contaminated hydraulic fluid is a definite problem, and a careful review of all phases of control of fluid purity is necessary.

This investigation has attempted to pinpoint problem areas related to snubber performance. A subsequent report will be concerned with the adequacy of methods used by the reactor vendors and operators for determining snubber specifications.

5. REFERENCES

1. ASME Boiler and Pressure Vessel Code, Sect. III, "Nuclear Power Plant Components," American Society of Mechanical Engineers, New York, 1974.
2. "Additional Materials for Component-Supports Section III, Subsection NF Class 1, 2, 3, and MC Construction," Case 1644-2 in Cases of ASME Boiler and Pressure Vessel Code, American Society of Mechanical Engineers, New York, 1975.

3. R. E. Keener et al., Committee Report - Task Group on Scrubbers, ASME Working Group on Component Supports (draft revision, May 8, 1975).
4. M. R. Erikson, Bergen-Patterson Pipe Support Corp. Hydraulic Shock and Sway Arrestors Fluid-Seal-Temperature Incompatibilities, Bergen-Patterson Pipesupport Corp., report to AEC, Operating Reactors (October 7, 1974).
5. Paul Milman, ITT Grinnell Corp., personal communication to Donald Knuth, USNRC (April 14, 1975).

APPENDICES

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APPENDIX A

**NSIC BIBLIOGRAPHY OF FAILURE OF SHOCK ABSORBERS AND
OTHER SUPPORT STRUCTURES (FAILURE ABSTRACTS)**

1
HYDRAULIC SHUDDERS FOUND INOPERABLE AT QUAD CITIES 2
COMMONWEALTH EDISON COMPANY, CORDEVA
4 PGS. LTR TO NRC DIR. OF OFFICE OF NUCLEAR REACTOR REGULATION, SEPT. 3, 1975. DOCKET 50-205. TYPE--BWR. NRC--
G.E., AE--SGT & LUNDY

CAUSE - LEAKS IN FITTINGS. DURING ROUTINE SURVEILLANCE OF HYDRAULIC SHUDDERS WITH THE UNIT
SHUTDOWN, ONE GRINNELL AND ONE BERGIN PATERSON SHUDDER WERE FOUND TO HAVE EMPTY OIL RESERVOIRS.
THE SHUDDERS HAD LEAKING FITTINGS AND ACCUMULATORS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

QUAD CITIES 2 (BWR) + REACTOR, BWR + FAILURE + #SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + SURVEILLANCE
PROGRAM + FAILURE, MAINTENANCE ERROR + OLEA + LUBRICATION + FAILURE, EQUIPMENT

2
LATERAL RESTRAINTS FOR SPENT FUEL RACKS BROKEN AT TURKEY POINT 3
FLORIDA POWER & LIGHT COMPANY, MIAMI
2 PGS. LTR TO NRC OFFICE OF NUCLEAR REACTOR REGULATION, AUG. 5, 1975. DOCKET 50-250. TYPE--PWR. NRC--WEST.. AF--
BECHTEL

CAUSE - DESIGN ERROR. IN EARLY MARCH, SEVERAL STAINLESS STEEL SEISMIC RESTRAINT SPRINGS
INSTALLED ON UNIT 4 SPENT FUEL RACKS WERE FOUND BROKEN. ALL HAVE BEEN REPLACED. INSPECTION OF
70 SPRINGS ON UNIT 3 FOUND 18 CRACKED AND 7 POSSIBLY CRACKED. ALL UNIT 3 SPRINGS WILL BE
REPLACED ALSO.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

TURKEY POINT 3 (PWR) + REACTOR, PWR + FAILURE + #SUPPORT STRUCTURE + #FUEL STORAGE + FAILURE, DESIGN ERROR +
SURVEILLANCE PROGRAM

3
HYDRAULIC SHUDDER FAILS AT PEACH BOTTOM 3
PHILADELPHIA ELECTRIC COMPANY, PA.
2 PAGES. LETTER TO NRC DIVISION OF REACTOR LICENSING, AUG. 4, 1975. DOCKET 50-270. TYPE--BWR. NRC--G.E., AE--
BECHTEL

CAUSE - LOOSE FITTING. A ROUTINE INSPECTION OF HYDRAULIC SHUDDERS OUTSIDE THE DRYWELL FOUND ONE
TO BE INOPERABLE. IT APPEARS THAT DURING PLACEMENT OF SCAFFOLDING OR CONTACT DURING SUBSEQUENT
CONSTRUCTION ACTIVITY, AN ELBOW CONNECTING THE SHUDDER TO THE RESERVOIR WAS DAMAGED. ALSO, THE
RESERVOIR RETAINING BOLTS APPEAR TO HAVE LOOSENED BECAUSE OF VIBRATION. THE SHUDDER WAS REPAIRED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

PEACH BOTTOM 3 (BWR) + REACTOR, BWR + FAILURE + #SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + SURVEILLANCE
PROGRAM + FAILURE, INSTALLATION ERROR + DAMAGE

4
HYDRAULIC SHUDDERS FOUND WITH EMPTY OIL RESERVOIRS AT QUAD CITIES 2
COMMONWEALTH EDISON COMPANY, CORDEVA, ILL.
3 PGS. LTR N/AOR 75-25 TO NRC OFFICE OF NUCLEAR REACTOR REGULATION, JULY 31, 1975. DOCKET 50-265. TYPE--BWR.
NRC--G.E., AE--SGT & LUNDY

CAUSE - LEAKS. DURING SURVEILLANCE WHILE THE UNIT WAS IN COLD SHUTDOWN FOR MAINTENANCE, 2
HYDRAULIC SHUDDERS WERE FOUND TO HAVE EMPTY OIL RESERVOIRS. A GRINNELL SHUDDER WAS REPAIRED BY
TIGHTENING THE FITTINGS THAT ALLOWED THE OIL TO LEAK OUT. A BERGIN-PATERSON SHUDDER WAS REPLACED
WITH A REBUILD UNIT. IT WILL BE REPAIRED IN THE FUTURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

QUAD CITIES 2 (BWR) + REACTOR, BWR + FAILURE + #SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + SURVEILLANCE
PROGRAM + FAILURE, EQUIPMENT + OLEA

5
SEISMIC SHUDDER ON NPCT TURBINE STEAM LINE INOPERABLE AT ARNOLD
IONA ELECTRIC LIGHT & POWER COMPANY, CECAR RAPIDS
3 PAGES. LETTER WITH AOR 75-18 TO NRC OFFICE OF INSPECTION & ENFORCEMENT, REGION 3, JULY 21, 1975. DOCKET 50-
331. TYPE--BWR. NRC--G.E., AE--COMMONWEALTH ASSOC.

CAUSE - IMPROPER INSTALLATION. DURING ROUTINE INSPECTION, THE STEM ON A NPCT TURBINE STEAM
EXHAUST LINE THERMAL GROUT LOOP SEISMIC SHUDDER WAS FOUND TO BE BROKEN. THE MOUNTING BRACKET
WAS INSTALLED 90 DEGREES FROM THE CORRECT ORIENTATION SO THAT WHEN THE LINE MOVED THE STEM
CONTACTED THE BRACKET AND BROKE. THE BRACKET WAS INSTALLED PROPERLY AND A NEW SHUDDER INSTALLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

ARNOLD (BWR) + REACTOR, BWR + FAILURE + #SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + NPCT + TURBINE +
FAILURE, INSTALLATION ERROR + SURVEILLANCE PROGRAM

6
DAMAGED PIPE RESTRAINT FOUND ON RHP STEAM SUPPLY LINE AT FITZPATRICK
NIAGARA MOHAWK POWER CORP., SYRACUSE, N.Y.

2 PAGES, LTR D/ADR 75-03 TO NRC DIR. OF LICENSING, JULY 29, 1975, DOCKET 50-333, TYPE--BWR, NRC--G.E., AE--STONE & REISTER

CAUSE - WATER HAMMER. DURING AN INSPECTION, A PIPE RESTRAINT ON RHR STEAM SUPPLY TO HEAT EXCHANGER A WAS FOUND PULLED FROM THE BUILDING WALL. SOME WATER HAMMER HAD BEEN EXPERIENCED WHILE DRAINING UP NPCL STEAM SUPPLY TO NPCL TURBINE. THE RHR STEAM SUPPLY TAPS OFF NPCL STEAM PIPING. THE PIPE RESTRAINT WAS REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FITZPATRICK (BWR) + REACTOR, BWR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + SURVEILLANCE PROGRAM + FAILURE, EQUIPMENT + HYDRAULIC EFFECT + SHUTDOWN COOLING SYSTEM

7
SEISMIC RESTRAINTS NOT INSTALLED AS DESIGNED AT CONNECTICUT YANKEE
CONN. YANKEE ATOMIC POWER COMPANY
1 PAGES, LETTER TO NRC DIVISION OF INSPECTION & ENFORCEMENT, REGION 1, JUNE 30, 1975, DOCKET 50-215, TYPE--BWR, NRC--NRC, AE--STONE & REISTER

CAUSE - INSTALLATION ERROR. DURING THE JUNE 1975 REFUELING OUTAGE, THE PRESSURIZER SEISMIC RESTRAINTS WERE EXAMINED AS REQUESTED BY RD BULLETIN 74-3. EXAMINATION REVEALED THAT ONLY 1 OF THE 4 TOP GUIDES WAS INSTALLED PROPERLY. THE OTHERS DID NOT LINE UP PROPERLY WITH THE EMBEDDED PLATE SO THAT ONLY 6 OF THE 8 BOLTS AND 1 OF 2 DOWEL PINS WERE INSTALLED. ON THE BOTTOM RING GINGER, 16 OF THE 20 BOLTS WERE NEVER TIGHTENED ENOUGH TO COMPRESS THE LOCK WASHERS. ANALYSIS SHOWED THAT SEISMIC RESTRAINT CAPACITY WOULD BE ADEQUATE BY ADDING THE MISSING DOWELS AND TIGHTENING THE LOWER SUPPORT RCTING.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

CONNECTICUT YANKEE (BWR) + REACTOR, BWR + BACKFIT + FAILURE + SEISMIC DESIGN + SUPPORT STRUCTURE + PRESSURIZER + FAILURE, INSTALLATION ERROR + FASTENER + REFUELING + SURVEILLANCE PROGRAM + MAIN COOLING SYSTEM

9
HYDRAULIC SHOCK SUPPRESSORS FAIL AT FITZPATRICK
NIAGARA MOHAWK POWER CORP., N.Y.
2 PAGES, LETTER WITH ADR 75-52 TO NRC DIRECTORATE OF LICENSING, JUNE 24, 1975, DOCKET 50-333, TYPE--BWR, NRC--G.E., AE--STONE & REISTER

CAUSE - SEAL FAILURE. FOLLOWING A REACTOR SCRAM, AN INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS IN THE CRDWELL INDICATED THAT SUFFICIENT FLUID WAS PRESENT IN ALL. HOWEVER, WHEN FITTINGS WERE TIGHTENED AND FLUID ADDED 2 DAYS LATER, 2 UNITS WERE OBSERVED TO HAVE FAILED SEALS. THE SEALS WERE REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FITZPATRICK (BWR) + REACTOR, BWR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + FAILURE, COMPONENT + SEAL + SEAL + FAILURE, DESIGN ERROR + SURVEILLANCE PROGRAM

CONTAINMENT SPRAY PIPE RESTRAINTS AND SNUBBER DAMAGED AT FITZPATRICK
NIAGARA MOHAWK POWER CORP., N.Y.
2 PAGES, LETTER WITH ADR 75-48 TO DIRECTORATE OF LICENSING, MAY 29, 1975, DOCKET 50-333, TYPE--BWR, NRC--G.E., AE--STONE & REISTER

CAUSE - WATER HAMMER. INVESTIGATION OF REPORTED PIPE MOVEMENT OF CONTAINMENT SPRAY HEADER B DURING A COLD SHUTDOWN PERIOD REVEALED DAMAGED PIPE SUPPORTS, DAMAGED SEISMIC RESTRAINTS, AND A BACKED HYDRAULIC SNUBBER. DAMAGE RESULTED FROM A WATER HAMMER. REPAIRS WILL BE MADE. NONDESTRUCTIVE TESTING AND STRESS ANALYSIS WILL BE PERFORMED ON THE AFFECTED PIPE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FITZPATRICK (BWR) + REACTOR, BWR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + CONTAINMENT SPRAY + HYDRAULIC EFFECT + DAMAGE + FAILURE, DESIGN ERROR + REACTOR STARTUP EXPERIENCE

11
11 BULLETIN 75-05, OPERABILITY OF CATEGORY I HYDRAULIC SHOCK AND SWAY SUPPRESSORS
NUCLEAR REGULATORY COMMISSION, REGION 2
2 PAGES, LETTER WITH ATTACHMENT TO DUKE POWER CO., APRIL 14, 1975, DOCKET 50-269, TYPE--BWR, NRC--G.E., AE--DUKE

REPORTS THAT EIGHT HYDRAULIC SHOCK SUPPRESSORS ON THE MAIN STEAM LINES AT THREE MILE ISLAND 1 WERE FOUND INOP; ONE IN THAT SUPPRESSOR LOCKUP COULD NOT BE ACHIEVED. APPROPRIATE ACTION IS REQUESTED TO PREVENT A SIMILAR RECURRENCE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

THREE MILE ISLAND 1 (BWR) + REACTOR, BWR + FASTENER + SUPPORT STRUCTURE + STEAM + FAILURE + AGENCY, NRC + PIPES AND PIPE FITTINGS + 11 BULLETIN

11
MIRREN-MATERNSON SNUBBERS FOUND WITH NO FLUID LEVEL INDICATION AT HILLSTOWN 1
NORTHEAST NUCLEAR ENERGY COMPANY, CORP.

1 PAGES, LETTER WITH AQ 75-10 TO NRC DIV. OF REACTOR LICENSING, MAY 20, 1975, DOCKET 50-245, TYPE--BOR, NRC--G.E., AE--EASCC

CAUSE - O-RING PINCHED DURING ASSEMBLY. DURING AN UNSCHEDULED MAINTENANCE OUTAGE, INSPECTION OF BERGEN-PATERSON SHUTTERS IN THE CRYWELL REVEALED 2 UNITS WHICH SHOWED NO FLUID LEVEL INDICATIONS AND A THIRD UNIT WHICH WAS LOW. NO DEGRADATION OF EITHER O-RING OR SEAL MATERIAL WAS REVEALED. THERE WAS SOME EVIDENCE OF O-RING SPLITTING WHICH APPEARED TO BE A RESULT OF IMPROPER REASSEMBLY. O-RINGS APPEARED TO HAVE BEEN PINCHED DURING REASSEMBLY. ALL 3 UNITS WERE OVERHAULED AND REINSTALLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

HILLSTONE POINT 1 (BOR) + REACTOR, BOR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + FAILURE, MAINTENANCE ERROR + SURVEILLANCE PROGRAM + SEAL + LEAK + FAILURE, EQUIPMENT

12

HYDRAULIC PIPING RESTRAINTS FOUND TO BE INOPERABLE AT ONSHORE 3
COMMONWEALTH EDISON COMPANY, ILLINOIS

3 PAGES, LETTER TO NRC DIV. OF REGULATORY OPERATIONS, REGION 3, MAY 8, 1975, DOCKET 50-249, TYPE--BOR, NRC--G.E., AE--SGT ELLROY

CAUSE - UNKNOWN. DURING AN INSPECTION WHILE THE REACTOR WAS SHUTDOWN FOR REFUELING, 7 HYDRAULIC PIPING RESTRAINTS WERE FOUND TO BE INOPERABLE. THE CAUSE HAS NOT BEEN DETERMINED. THE INOPERABLE UNITS WILL BE REPLACED WITH REBUILT ONES PRIOR TO STARTUP.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

ONSHORE 2 (BOR) + REACTOR, BOR + FAILURE + PIPES AND PIPE FITTINGS + FAILURE, EQUIPMENT + SURVEILLANCE PROGRAM + REFUELING + SUPPORT STRUCTURE

13

HYDRAULIC SHOCK SUPPRESSORS (INOPERABLE AT THREE MILE ISLAND)
METROPOLITAN EDISON COMPANY, PA.

3 PAGES, LETTER TO NRC DIRECTORATE OF REACTOR LICENSING, APRIL 15, 1975, DOCKET 50-289, TYPE--BOR, NRC--B&W, AE--GILBERT ASSOC.

CAUSE - DESIGN ERROR AND MATERIAL DEFECT. DURING AN INSPECTION OF THE HYDRAULIC SHOCK SUPPRESSOR WITH TWO UNIT IN HOT SHUTDOWN, 3 SHUTTERS WERE FOUND WITH LOW FLUID AND 3 WITH THE DEFECTIVE VALVES MODEL DV-1228 (DESCRIBED EARLIER). THE LOSS OF FLUID IS BELIEVED TO BE DUE TO MATERIAL FAILURE ALTHOUGH NO SPECIFIC DEFECTS WERE FOUND. THE VALVE PROBLEM IS A DESIGN DEFICIENCY. FIVE VALVS WERE REPLACED REBUILT UNITS AND ONE WAS REPAIRED AND REFILLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, P + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + THREE MILE ISLAND 1 (BOR) + VALVE + PIPES AND PIPE FITTINGS

14

NO BULLETIN 75-05 - OPERABILITY OF CATEGORY 1 HYDRAULIC SHOCK AND SURV SUPPRESSORS
U.S. NUCLEAR REGULATORY COMMISSION, REGION 3

7 PAGES, LETTER WITH RE BULLETIN 75-05 TO SACRAMENTO MUNICIPAL UTILITY DISTRICT, APRIL 16, 1975, DOCKET 50-312, TYPE--BOR, NRC--B&W, AE--BECHTEL

AT THREE MILE ISLAND 1, SUPPRESSORS WERE REMOVED FOR SEAL REPLACEMENT AND TESTING. TESTS SHOWED THAT SOME SUPPRESSORS FAILED TO ACHIEVE LOCKUP AT A VELOCITY NOT EXCEEDING 10 IN./SEC AS REQUIRED. THESE UNITS REPRESENT EQUIPMENT ORIGINALLY INSTALLED. THE SPECIFIC CAUSE OF FAILURE HAS NOT BEEN DETERMINED. ALL POWER REACTOR FACILITIES ARE REQUESTED TO REVIEW THE DESIGN AND INSTALLATION OF HYDRAULIC RESTRAINT SYSTEMS AND PROVIDE THE FOLLOWING INFORMATION: (1) THE DESIGN REQUIREMENTS, (2) DESCRIBE THE TESTING OF SUPPRESSORS PRIOR TO INSTALLATION, AND (3) DESCRIBE THE SURVEILLANCE PROGRAMS NOW UNDERWAY OR PLANNED TO ASSURE CONTINUED OPERABILITY.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE, EQUIPMENT + FAILURE + REACTOR, P + REACTOR, POWER + RESPONSE TIME + SUPPORT STRUCTURE + THREE MILE ISLAND 1 (BOR) + RANCHO SECO (BOR) + BACKFIT + SEISMIC DESIGN + AGENCY, NRC + NO BULLETIN + PIPES AND PIPE FITTINGS

15

GREENBEL HYDRAULIC SHOCK SUPPRESSOR INOPERATIVE AT THREE MILE ISLAND 1
METROPOLITAN EDISON COMPANY, PA.

3 PAGES, LETTER TO NRC DIVISION OF REACTOR LICENSING, APRIL 20, 1975, DOCKET 50-289, TYPE--BOR, NRC--B&W, AE--GILBERT ASSOC.

CAUSE - DESIGN AND INSTALLATION ERRORS. DURING ROUTINE INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS, ONE WAS FOUND INOPERATIVE IN THAT THE PISTON WAS UNABLE TO MOVE WITHIN THE CYLINDER. DURING INSTALLATION, THE PISTON ROD HAD BEEN PAINTED IN VIOLATION OF INSTRUCTIONS. THE PAINT CHIPPED OFF AS THE ROD MOVED THROUGH ITS BUSHING. THE CHIP AND ROUGHENED PAINT LOCKED THE PISTON TO THE BUSHING. DURING THE SEAL REPLACEMENT PROGRAM THAT IS IN PROGRESS, 4 UNITS WERE FOUND THAT HAD PISTON VELOCITIES IN EXCESS OF THE 8 INCHES/SEC LIMIT. THIS RESULTED FROM A DESIGN DEFICIENCY IN THE SHUTTER VALVE. ALL NINE UNITS WERE REPLACED WITH REBUILT UNITS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • REACTION, PWR • RESPONSE TIME • SURFACE, PAINTED • FAILURE, DESIGN ERROR • SUPPORT STRUCTURE •
FAILURE • INSTALLATION ERROR • SURVEILLANCE PROGRAM • THREE MILE ISLAND 1 (PWR) • PIPES AND PIPE FITTINGS

16
ADDITIONAL INFORMATION OF SEISMIC RESTRAINTS ON PIPING AT PALISADES
CONSUMERS POWER COMPANY, MICHIGAN
2 PAGES, LETTER WITH AD REPORT 4/75 TO NRC DIVISION OF REACTOR LICENSING, MARCH 27, 1975, DOCKET 50-255, TYPE--
PWR, NPG--CMB.. AF--DECHTEL

CAUSE - DESIGN DEFICIENCY. AS REPORTED EARLIER, DEFICIENCIES WERE FOUND IN SEISMIC RESTRAINTS ON
PIPING SYSTEMS. THE REVIEW IS NOW COMPLETE. IT WAS DETERMINED THAT 102 NEW RESTRAINTS, 12
RESTRAINT REPLACEMENTS, AND 74 RESTRAINT MODIFICATIONS WERE REQUIRED OR ADDED FOR ADDITIONAL
CONSERVATISM. OF THE 100 TOTAL, 66 WERE ON LINES 2-5 INCHES AND LARGER. INSTALLATION WILL BE
COMPLETED PRIOR TO RESTARTING THE REACTOR.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

FAILURE • REACTION, PWR • MODIFICATION • FAILURE, DESIGN ERROR • REVIEW • PALISADES (PWR) • SUPPORT STRUCTURE •
SEISMIC DESIGN • PIPES AND PIPE FITTINGS

17
CONTAINMENT SPRAY LINE PIPE SNUBBERS CAPAGED AT FITZPATRICK
NIAGARA MOHAWK POWER CORP., NEW YORK
2 PAGES, LETTER WITH AD REPORT 75/31 TO NRC DIRECTORATE OF LICENSING, MARCH 26, 1975, DOCKET 50-333, TYPE--
BWR, NPG--CMB.. AF--STONE & REISTER

CAUSE - WATER HAMMER. DURING AN INSPECTION, DAMAGED PIPE RESTRAINTS AND BROKEN SNUBBERS WERE
FOUND ON THE CONTAINMENT SPRAY LINE. PROBABLE CAUSE WAS DUE TO OPERATING THE BWR SYSTEM WITH THE
DISCHARGE NOT FULL OF WATER. WHEN OPERATING ONLY ONE SIDE OF THE BWR IN SHUTDOWN COOLING MODE,
THE KEEP FULL SYSTEM WAS NOT AVAILABLE TO THE OTHER SIDE. THE KEEP FULL SYSTEM WILL BE MODIFIED
TO PREVENT RECURRENCE. THE DAMAGED COMPONENTS WERE REPLACED OR REPAIRED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

REACTOR, BWR • CONTAINMENT SPRAY • FAILURE • HYDRAULIC EFFECT • FITZPATRICK (BWR) • MODIFICATION • REACTOR
STARTUP EXPERIENCE • FAILURE, DESIGN ERROR • DAMAGE • SUPPORT STRUCTURE • PIPES AND PIPE FITTINGS

18
LATERAL RESTRAINTS FOR SPENT FUEL RODS BROKEN AT TURKEY POINT 4
FLORIDA POWER & LIGHT CO.
4 PAGES, LETTER TO NRC OFFICE OF NUCLEAR REACTOR REGULATION, MARCH 21, 1975, DOCKET 50-251, TYPE--PWR, NPG--
DECT.. AF--DECHTEL

CAUSE - UNKNOWN. THE SPENT FUEL POOL WAS DRAINED AND BEING CLEANED IN PREPARATION FOR THE FIRST
REFUELING. ONE OF THE 110 STAINLESS STEEL SEISMIC RESTRAINT SPRINGS WAS FOUND BROKEN INTO TWO
PIECES AND LYING ON THE POOL FLOOR. EXAMINATION FOUND 5 MORE WERE SIMILARLY BROKEN BUT WERE HELD
IN PLACE BY THE NUTS USED TO FASTEN THE SPRING TO THE STUD USED FOR PRELOADING THE SPRING. THE
CAUSE OF FAILURE HAS NOT BEEN DETERMINED. THE FAILED SPRINGS WERE REPLACED IN KIND.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

FAILURE, EQUIPMENT • FAILURE • REACTOR, PWR • FUEL STORAGE • SUPPORT STRUCTURE • TURKEY POINT 4 (PWR) •
SEISMIC DESIGN

19
SEISMIC RESTRAINTS FAIL TO COMPLY WITH DESIGN CRITERIA AT PALISADES
CONSUMERS POWER COMPANY, MICH.
3 PAGES, LETTER WITH AD REPORT 4/75 TO NRC DIVISION OF REACTOR LICENSING, MARCH 17, 1975, DOCKET 50-255, TYPE--
PWR, NPG--CMB.. AF--DECHTEL

CAUSE - INSTALLATION ERROR. A REVIEW OF THE SEISMIC RESTRAINTS WAS DETERMINED THAT NOT ALL THE
RESTRAINTS ON THE ENGINEERED SAFEGUARDS SYSTEMS AND CONNECTIONS TO THE PRIMARY COOLANT LOOPS WERE
IN CONFORMANCE. ABOUT 135 NEW AND MODIFIED RESTRAINTS WILL BE INSTALLED PRIOR TO FULL POWER
OPERATION. THE CAUSE OF THE DEFICIENCY IS BEING STUDIED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 (100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00)

FAILURE • REACTION, PWR • MODIFICATION • REVIEW • PALISADES (PWR) • SUPPORT STRUCTURE • FAILURE, INSTALLATION
ERROR • ENGINEERED SAFETY FEATURE • SEISMIC DESIGN • REACTOR SHUTDOWN • PIPES AND PIPE FITTINGS

20
HYDRAULIC PIPE SUPPRESSOR FAILS AT DRESEN 3
COMMONWEALTH EDISON COMPANY, ILLINOIS
2 PAGES, LETTER TO NRC DIRECTORATE OF REGULATORY OPERATIONS, REGION 3, MARCH 3, 1975, DOCKET 50-249, TYPE--
BWR, NPG--CMB.. AF--SGT & LUNDY

CAUSE - LEAKING FITTING. DURING AN INSPECTION WHILE THE REACTOR WAS IN COLD SHUTDOWN, ONE BERGEN-
PATERSON SNUBBER WAS FOUND TO HAVE LOST ALL ITS HYDRAULIC FLUID. INSPECTION FOUND 2 O-RINGS
MISSING FROM THE CHECK VALVE ASSEMBLY AND ITS TUBING AND THE ZIRC FITTING USED TO ADD HYDRAULIC
FLUID TO THE SNUBBER WAS FOUND TO LEAK THROUGH. THE ZIRC FITTING, WHICH WAS LOCATED AT THE
BOTTOM OF THE ASSEMBLY, WAS BELIEVED TO BE THE PRIME CAUSE. THE REPAIR PROCEDURE DID NOT LIST
THE O-RINGS THAT WERE MISSING ON THE CHECK OFF SHEET. NEW PROCEDURES WERE PREPARED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE, EQUIPMENT + FAILURE + ORESDEN 3 (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + PIPES AND PIPE FITTINGS

21

HYDRAULIC SHOCK SUPPRESSOR INOPERABLE AT PEACH BOTTOM 3
PHILADELPHIA ELECTRIC COMPANY, PA.

2 PAGES, LETTER TO NRC DIVISION OF REACTOR LICENSING, MARCH 4, 1975, DOCKET 50-278, TYPE--BUR, MFG--G.E., AE--BECHTEL

CAUSE - UNKNOWN. A ROUTINE INSPECTION OF DRYWELL HYDRAULIC SHOCK SUPPRESSORS DURING AN OUTAGE IDENTIFIED ONE SHOCKER AS HAVING AN EMPTY RESERVOIR. THE SOURCE OF LEAKAGE COULD NOT BE IDENTIFIED. THE SHOCKER RESERVOIR WAS REFILLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE, EQUIPMENT + FAILURE + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PEACH BOTTOM 3 (BUR) + PIPES AND PIPE FITTINGS

22

HYDRAULIC SHOCK SUPPRESSOR INOPERABLE AT MONTICELLO
NORTHERN STATES POWER COMPANY, MINNESOTA

1 PAGE, LETTER TO NRC DIVISION OF REACTOR LICENSING, FEBRUARY 27, 1975, DOCKET 50-203, TYPE--BUR, MFG--G.E., AE--BECHTEL

CAUSE - DAMAGED SEAL. DURING NORMAL OPERATION, A BERGEN-PATERSON SHOCKER LOCATED OUTSIDE THE DRYWELL WAS DISCOVERED TO BE INOPERABLE DUE TO LOSS OF OIL. IT WAS REPLACED IN KIND. FAILURE RESULTED FROM A LEAK DUE TO A CUT O-RING. THE AREA AROUND THE O-RING CALLED. TWO OTHER SHOCKERS WERE FOUND TO BE LEAKING OIL THROUGH CUT OR DEFORMED SEALS. SEAL DAMAGE APPARENTLY OCCURRED DURING ASSEMBLY OF THE SUPPRESSORS. ALSO, SAND WAS FOUND IN THE ACCUMULATORS. THESE UNITS WERE SANDING AND REPAINTED PRIOR TO SHIPMENT TO THE SITE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D.C. 20545 10 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + FAILURE, MAINTENANCE ERROR + SEAL + MONTICELLO (BUR) + DAMAGE + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + PIPES AND PIPE FITTINGS

23

DEFECTIVE BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS (PG 73-4)

U.S. ATOMIC ENERGY COMMISSION, DENVER

3 PAGES, LETTER TO OHIO PUBLIC POWER DISTRICT, AUGUST 17, 1973, DOCKET 50-285, TYPE--BUR, MFG--CONQ., AE--GIBBS & PILL

COMPILED RESULTS OF THE INSPECTION OF BERGEN-PATERSON SHOCK ABSORBERS REQUESTED BY RD BULLETIN NO. 73-3 REVEALED THAT A LARGE PERCENTAGE OF THE INSTALLED UNITS WERE NOT FULLY OPERATIONAL. PRELIMINARY INFORMATION INDICATES THAT ROUTINE REPAIRS MAY NOT BE AN ADEQUATE LONG-RANGE SOLUTION. THEREFORE, AEC REQUESTS THAT A REINSPECTION OF BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN SAFETY-RELATED SYSTEMS BE MADE AFTER ABOUT 45 DAYS OF PLANT OPERATION AT TEMPERATURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + MAINTENANCE AND REPAIR + REACTOR, BUR + FT. CALHOUN (BUR) + SUPPORT STRUCTURE + BACKFIT + AGENCY, AEC + PIPES AND PIPE FITTINGS

24

POTENTIALLY SIGNIFICANT EVENTS FROM REPORTS SUBMITTED AS OF NOVEMBER 1974

AEC, OFFICE OF OPERATIONS EVALUATION, WASHINGTON, D.C.

8 PAGES, CURRENT EVENTS - POWER REACTORS, NOVEMBER, 1974

TEN TYPES OF SIGNIFICANT EVENTS ARE REPORTED. THEY INCLUDE THE FOLLOWING: CRACKS IN RECIRCULATION PIPING AND OTHER PRIMARY SYSTEM LEAKAGE PROBLEMS (5 REACTORS INVOLVED), MALFUNCTIONS OF TRAVELING INCORE PROBE BALL VALVES (3 REACTORS), DIESEL GENERATOR FAILS TO START, REDUNDANT VALVES IN CHARGING PUMP SYSTEM FAIL, SAFETY INJECTION VALVES INOPERABLE, VALVE GUIDE PIN FAILS, EMERGENCY SHUT ISOLATION VALVE FAILS TO OPEN, THIN BALL VALVE VERIFICATION PROGRAM, AND SHOCK ARRESTOR REPLACEMENT PROBLEMS.

AVAILABILITY - NRC, OFFICE OF OPERATIONS EVALUATIONS, WASHINGTON, D.C. 20551

FAILURE, EQUIPMENT + FAILURE + FAILURE, PIPE + INCIDENT COMPILATION + REVIEW + SURVEILLANCE PROGRAM + AGENCY, AEC + VALVES + GENERATOR, DIESEL

25

HYDRAULIC PIPING RESTRAINTS FAIL AT ORESDEN 3
COMMONWEALTH EDISON COMPANY, ILLINOIS

3 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), JANUARY 16, 1975, DOCKET 50-249, TYPE--BUR, MFG--G.E., AE--SGT & LUNDY

CAUSE - OIL LEAKS. AN INSPECTION OF ALL 35 BERGEN-PATERSON SHOCK SUPPRESSOR IN THE DRYWELL FOUND 2 INOPERABLE AND 6 OTHERS WITH LOW OIL LEVEL. THIS INSPECTION WAS MADE DURING A SHUTDOWN. THE LAST INSPECTION WAS 103 DAYS EARLIER. FOR THE INOPERABLE UNITS, THE O-RINGS WERE PINCHED, SEALS SLIGHTLY DEGRADATED, AND THE CYLINDER SCRATCHED. NO SINGLE CAUSE CAN BE ASSIGNED AS MODE OF

FAILURE. THE INOPERABLE SHROBBER WERE REPLACED WITH REBUILT ONES AND OIL WAS ADDED TO THE OTHERS.

AVAILABILITY - NRC PUBLIC DOCUMENT PCDD, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00
 REACTOR, BUR + FAILURE, EQUIPMENT + FAILURE + DRISDEN 3 (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

NO FLUID INDICATION IN THE BERGEN-PATERSON SHROBBER AT HILLSTONE

NORTHEAST NUCLEAR ENERGY COMPANY
 3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JANUARY 2, 1975, DOCKET 50-245, TYPE--BUR, NPG--G.E., AE--EPASCO

CAUSE - MAINTENANCE ERROR. DURING A MAINTENANCE OUTAGE, INSPECTION OF ALL BERGEN-PATERSON SHROBBER FOUND 2 IN THE DRYWELL WITH NO FLUID LEVEL INDICATION. ONE UNIT HAD BEEN IMPROPERLY REASSEMBLED DURING THE LAST OVERHAUL AS A SEAL ON THE PISTON ROD WAS MISSING. THIS UNIT HAD A HISTORY OF FLUID LOSS AND WAS REPLACED. THE OTHER UNIT WAS OVERHAULED USING A NEW MASTER REPAIR KIT.

AVAILABILITY - NRC PUBLIC DOCUMENT PCDD, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + FAILURE, MAINTENANCE ERROR + SEAL + SUPPORT STRUCTURE + LEAK + HILLSTONE POINT 1 (BUR) + PIPES AND PIPE FITTINGS

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT COOPER

NEBRASKA PUBLIC POWER DISTRICT, BRADYVILLE
 2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), REGION IV, DECEMBER 20, 1974, DOCKET 50-290, TYPE--BUR, NPG--G.E., AE--BURNS & BEE

CAUSE - FITTING LEAKS. DURING A MAINTENANCE OUTAGE, AN INSPECTION OF THE HYDRAULIC SHROBBER FOUND 4 FIG. 200 MODEL GRINNELL SHROBBER DEVOID OF FLUID IN THE RESERVOIR AND 2 EXTREMELY LOW ON FLUID. FLUID LEAKAGE WAS OBSERVED AT THE PIPE FITTINGS BETWEEN THE RESERVOIR AND THE CONTROL VALVE ON 4 UNITS. NO CLEAR LOCATION OF LEAKAGE WAS FOUND ON THE OTHER TWO. PIPING WAS REPLACED WITH STAINLESS STEEL TUBING AND HIGH PRESSURE FITTINGS ON 4 UNITS. ANOTHER WAS REPLACED WITH A SPARE. SOME PARTS WERE REPLACED ON THE LAST UNIT.

AVAILABILITY - NRC PUBLIC DOCUMENT PCDD, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE, EQUIPMENT + FAILURE + MODIFICATION + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + COOPER (BUR) + BACKFIT + PIPES AND PIPE FITTINGS

FLUID LOST FROM HYDRAULIC SHOCK SUPPRESSOR AT THREE MILE ISLAND 1

METROPOLITAN EDISON COMPANY, READING, PA.
 3 PAGES, LETTER WITH ABNORMAL OCCURRENCE REPORT 74-30 TO DIRECTORATE OF LICENSING (AEC), DEC. 24, 1974, DOCKET 50-289, TYPE--FOR, NPG--ED, AE--GILBERT ASSOC.

CAUSE - LOOSE END CAPS. DURING AN INSPECTION OF SAFETY-RELATED SHOCK SUPPRESSORS WHILE THE REACTOR WAS AT 100% POWER, ONE WAS FOUND TO BE EMPTY OF HYDRAULIC FLUID. THE SHROBBER END CAPS WERE NOT SUFFICIENTLY CRIMP TOGETHER BY THE CONNECTING BOLTS RESULTING IN LEAKAGE FROM ONE CAP. THE BOLTS WERE TORQUED AND THE SHROBBER REFILLED WITH HYDRAULIC FLUID.

AVAILABILITY - NRC PUBLIC DOCUMENT PCDD, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, BUR + SUPPORT STRUCTURE + FAILURE, INSTALLATION ERROR + SURVEILLANCE PROGRAM + LEAK + THREE MILE ISLAND 1 (FOR) + BACKFIT + PIPES AND PIPE FITTINGS

HYDRAULIC SHROBBER FOUND INOPERABLE AT PEACH BOTTOM 3

PHILADELPHIA ELECTRIC CO., PA.
 3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), DECEMBER 17, 1974, DOCKET 50-278, TYPE--BUR, NPG--G.E., AE--HECPEL

CAUSE - LOOSE LOCK NUTS. DURING AN INSPECTION OF DRYWELL HYDRAULIC SHROBBER, 6 SHROBBER ON THE MAIN STEAM RELIEF VALVE DISCHARGE PIPING WERE FOUND INOPERABLE. TWO WERE INVERTED BECAUSE THE LOCK NUTS HAD VIBRATED LOOSE ALLOWING THEM TO ROTATE. ONE HAD AN EMPTY RESERVOIR. ON 1 THE THREADED EXTENSION TO THE CYLINDER WAS 1/2" AND THE RESERVOIR WAS MOVED OUT OF POSITION. ANOTHER FAILED WHERE THE PISTON ROD CONNECTS TO THE PIPE CLAMP. THE LAST HAD FAILED WHERE THE ROD END ATTACHES TO THE PISTON ROD. ALL WERE REPAIRED, REPOSITIONED, AND REFILLED. ALL LOCK NUTS WERE CHECKED FOR TIGHTNESS.

AVAILABILITY - NRC PUBLIC DOCUMENT PCDD, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + FAILURE, MAINTENANCE ERROR + VIBRATION + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PEACH BOTTOM 3 (BUR) + PIPES AND PIPE FITTINGS

POTENTIALLY SIGNIFICANT EVENTS REPORTED TO THE AEC AS OF OCTOBER 1974
 U.S. ATOMIC ENERGY COMMISSION, WASHINGTON
 17 PAGES, CURRENT EVENTS - POWER REACTORS, OCTOBER 1974

DESCRIBES 12 POTENTIALLY SIGNIFICANT EVENTS THAT HAVE BEEN REPORTED AS OF OCTOBER 1976. THESE INCLUDE THE FOLLOWING: (1) FAILURE OF SODIUM THIOSULFATE TANK, (2) PIPE CRACK - 2 PLANTS, (3) PIPE WELD DEFECTS, (4) FUEL GRAPPLE MALFUNCTION, (5) DISCHARGED BATTERY, (6) SPRAY VALVE CIRCUIT FAILURE, (7) RADIOACTIVE GAS RELEASES - 3 PLANTS, (8) FAULTY ARRESTORS IN CORE SPRAY SYSTEM, (9) HEAT TRACE CIRCUIT FAILURE, (10) CRACK INDICATIONS IN SEISMIC RESTRAINT COMPONENTS, (11) MALFUNCTION OF SAFETY RELIEF VALVE CAUSES DEPRESSURIZATION, AND (12) FAILURE OF MAIN STOP VALVE.

AVAILABILITY - LSAC, OFFICE OF OPERATIONS EVALUATIONS, WASHINGTON, D.C. 20545

AIRBORNE RELEASE + CONTAINMENT SPRAY + CORE SPRAY + FAILURE + INCIDENT COMPILATION + WELDS + INCIDENT + PRESSURE RELIEF + STORAGE CONTAINER + FUEL HANDLING MACHINE + REVIEW + AGENCY, AEC + VALVES + PIPES AND PIPE FITTINGS + BATTERIES & CHARGERS + HEATERS

31

HYDRAULIC SHOCK ABSORBERS LOSE PART OF FLUID AT THREE MILE ISLAND 1

METROPOLITAN EDISON CO., READING, PA.

4 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), DECEMBER 6, 1974, DOCKET 50-209, TYPE--PWR, NRC--B+W, AE--GILBERT ASSOC.

CAUSE - FITTING LEAKS. DURING A WALK-THROUGH INSPECTION OF THE INTERMEDIATE BUILDING, 5 HYDRAULIC SHOCK SUPPRESSORS LOCATED ON THE MAIN STEAM LINES WERE FOUND TO HAVE LOW LEVELS OF HYDRAULIC FLUID DUE TO MINOR LEAKS ON SOME OF THEIR FITTINGS AND RESERVOIR END CAPS. THE CAPS AND FITTINGS WERE TIGHTENED AND THE RESERVOIRS REFILLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PWR + FAILURE, MAINTENANCE ERROR + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + THREE MILE ISLAND 1 (PWR) + BACKFIT + PIPES AND PIPE FITTINGS

32

SHOCK ABSORBER EXTENSION WELD FAILS AT COOPER

NEBRASKA PUBLIC POWER DISTRICT

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, AEC, REGION 4, JANUARY 31, 1975, DOCKET 50-290, TYPE--BWR, NRC--G.E., AE--BURNH & POE

CAUSE - LACK OF PENETRATION. DURING THE ANNUAL SHOCKER INSPECTION, A CIRCUMFERENTIAL WELD ON THE SHOCKER EXTENSION TO THE ANCHOR BRACKET OF A HYDRAULIC SHOCK SUPPRESSOR (GRINNELL) WAS FOUND BROKEN. THE APPARENT CAUSE WAS A LACK OF PENETRATION BETWEEN THE PIPE PORTION OF THE EXTENSION AND THE FLANGE PLATE. THE WELD WAS REPAIRED. AT THE TIME, THE REACTOR WAS OPERATING AT 2300 MW.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + WELDS + SUPPORT STRUCTURE + FAILURE, INSTALLATION ERROR + SURVEILLANCE PROGRAM + COOPER (BWR) + BACKFIT + PIPES AND PIPE FITTINGS

33

BERGEN PATERSON SHOCK ARRESTORS FAIL AT BROWNS FERRY 2

EVA, CHATTANOOGA, TENN.

3 PAGES, LETTER WITH NO REPORT 7540 TO NRC ACTING DIRECTOR OF LICENSING, JANUARY 31, 1975, DOCKET 50-260, TYPE--BWR, NRC--G.E., AE--EVA

CAUSE - SEAL FAILURES. DURING AN INSPECTION OF ALL GRINNELL AND BERGEN PATERSON SHOCK ARRESTORS WITH THE REACTOR IN COLD SHUTDOWN, 4 BERGEN PATERSON UNITS WERE FOUND WITH AN UNACCEPTABLE LOW OIL LEVEL. ON 2 UNITS A SMALL RICK WAS FOUND IN THE SEALING SURFACE TO THE ACCUMULATOR PISTON SEAL. THE OTHER 2 UNITS CONTAINED SEALS THAT HAD NOT BEEN REPLACED, THROUGH ERROR, DURING THE REBUILDING PROGRAM. THESE SEALS HAD DETERIORATED. ALL FAILED SEALS WERE REPLACED AND THE UNITS RETURNED TO SERVICE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + FAILURE, MAINTENANCE ERROR + SEAL + SUPPORT STRUCTURE + BROWNS FERRY 2 (BWR) + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

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HYDRAULIC SHOCK SUPPRESSOR FAILS AT THREE MILE ISLAND 1

METROPOLITAN EDISON COMPANY, PENNSYLVANIA

2 PAGES, LETTER TO NRC DIRECTORATE OF LICENSING, FEBRUARY 2, 1975, DOCKET 50-209, TYPE--PWR, NRC--B+W, AE--GILBERT ASSOC.

CAUSE - LOOSE END CAPS. DURING AN INSPECTION OF ALL HYDRAULIC SHOCK SUPPRESSORS INSIDE THE REACTOR BUILDING'S SECONDARY SHIELD, A SHOCKER WAS FOUND TO BE INOPERABLE DUE TO A LOSS OF FLUID. THE RESERVOIR END CAPS WERE LOOSE. SOME EVIDENCE OF LEAKAGE AT THE CYLINDER END CAPS WAS FOUND. NO SEAL DETERIORATION WAS OBSERVED. THE DEFECTIVE UNIT WAS REPLACED WITH A REBUILT ONE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PWR + FAILURE, MAINTENANCE ERROR + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + THREE MILE ISLAND 1 (PWR) + BACKFIT + PIPES AND PIPE FITTINGS

35

SHOCK ARRESTORS INOPERABLE AT BROWNS FERRY 1

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA
3 PAGES, LETTER WITH ABNORMAL OCCURRENCE REPORT 70570 TO DIRECTORATE OF LICENSING (ARC), NOV. 29, 1974, COCKET
AC-259, TYPE--BWR, HPG--G.E., AE--TVA

CAUSE - POOR WORKMANSHIP. DURING AN INSPECTION OF ALL SHOCK ARRESTORS WHILE THE UNIT WAS IN COLD
SHUTDOWN, 3 WERE FOUND WITH UNACCEPTABLE LOW AMOUNT OF OIL AND ONE OF THE PISTON ROD TORN OUT OF
THE PIPE CLEVES. THE CAUSE WAS POOR WORKMANSHIP DURING INSTALLATION. ONLY TWO THREADS WERE
ENGAGED BETWEEN THE PISTON ROD AND THE PIPE CLEVES. THE THREADS TORN OUT. IT WAS REINSTALLED
PROPERLY. THE OIL LEAK IN ONE UNIT RESULTED FROM THE INNER LIP OF A V-CUP BEING TORN DURING
INSTALLATION. THE OTHER TWO UNITS HAD BEEN REBUILT USING SEALS OF THE IMPROPER (OLD TYPE)
MATERIALS. ALL OF THE IMPROPER SEALS HAVE BEEN REMOVED FROM THE STORE ROOM.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00

REACTOR, BWR * FAILURE * FASTENER * FAILURE, MAINTENANCE ERROR * SEAL * SUPPORT STRUCTURE * FAILURE,
INSTALLATION ERROR * SURVEILLANCE PROGRAM * BROWN'S FERRY 1 (BWR) * PIPES AND PIPE FITTINGS

HYDRAULIC SHOCK SUPPRESSOR INOPERABLE AT THREE MILE ISLAND 1
METROPOLITAN EDISON CO., READING, PA.
3 PAGES, LETTER TO DIRECTORATE OF LICENSING (ARC), NOVEMBER 8, 1974, DOCKET 50-249, TYPE--BWR, HPG--G.E., AE--
WILCOX ATSCC.

CAUSE - INSTALLATION ERROR. DURING A CHECK OF PIPING, THE ENGINEER NOTICED HYDRAULIC FLUID ON THE
FLOOR. A GRINNELL SHOCK SUPPRESSOR ON THE RELIEF VALVE LINE HAD ROTATED OUT OF POSITION AND WAS
LYING ON AN ADJACENT PIPE AND THE CONNECTOR LINE TO THE FLUID RESERVOIR HAD BROKEN ALLOWING THE
FLUID TO LEAK OUT. THE SHOCKER HAD BEEN IMPROPERLY INSTALLED. NORMAL OPERATIONAL VIBRATION
HAD FRED THE LOCK NUT. A LOCKWITE HAD BEEN USED. THE BROKEN FITTING WAS REPLACED AND THE
SHOCKER REORIENTED. LOCKITE IS ON ORDER AND WILL BE PLACED ON ALL LOCK NUTS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00

FAILURE * REACTOR, BWR * REACTOR STARTUP EXPERIENCE * SUPPORT STRUCTURE * FAILURE, INSTALLATION ERROR * THREE
MILE ISLAND 1 (BWR) * PIPES AND PIPE FITTINGS

INSPECTION OF BERGEN PATERSON SHOCK SUPPRESSORS AT DPESDEN 2
COMMONWEALTH Edison COMPANY, ATLANTA
3 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (ARC), REGION 111, OCTOBER 31, 1974, COCKET 50-237,
TYPE--BWR, HPG--G.E., AE--SGT & LUNCE

CAUSE - SEAL DETERIORATION. DURING AN INSPECTION OF THE 31 SHOCKERS IN THE DRYWELL, 4 WERE FOUND
TO HAVE LOW OIL LEVEL, 2 OF WHICH WERE INOPERABLE. THE SEALS IN 2 HAD DETERIORATED AND WERE
REPLACED. ONE HAD NOT BEEN FILLED PROPERLY. SEAL LEAKAGE IS SUSPECTED IN THE FOURTH ONE. IT
WILL BE REPLACED DURING THE UPCOMING REFUEL OUTAGE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM
CHARGE \$2.00

REACTOR, BWR * FAILURE * DPESDEN 2 (BWR) * MODIFICATION * FAILURE, DESIGN ERROR * SEAL * SUPPORT STRUCTURE *
SURVEILLANCE PROGRAM * LEAK * BACKFIT * PIPES AND PIPE FITTINGS

HYDRAULIC SHOCKERS FAIL AT PEACH BOTTOM 3
PHILADELPHIA ELECTRIC COMPANY, PA.
3 PAGES, LETTER TO DIRECTORATE OF LICENSING (ARC), OCTOBER 25, 1974, DOCKET 50-278, TYPE--BWR, HPG--G.E., AE--
BECHTEL

CAUSE - CYCLING OF BYPASS VALVES. DURING AN INSPECTION OF THE PIPE HANGER SYSTEM, 4 SHOCKERS ON
THE PIPING BETWEEN THE BYPASS VALVES AND THE MAIN CONDENSER WERE FOUND TO BE DEFECTIVE. ON ONE
THE NUTS AND BOLTS WHICH HELD IT TO THE PIPE CLAMP HAD VIBRATED LOOSE. THE PIPE CLAMPS FOR 2 HAD
ROTATED AROUND THE PIPE. THE LAST HAD BROKEN AT THE POINT OF ATTACHMENT. THE BYPASS VALVE HAD
FLUCTUATED ON ABOUT A 1 SECOND INTERVAL FOR SEVERAL MINUTES DUE TO A CONTROLLER BEING OUT OF
CALIBRATION. THE CYCLING IS BELIEVED TO HAVE CAUSED THE SHOCKER FAILURES. THE SHOCKERS WERE
REPAIRED AND THE CONTROLLER ADJUSTED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM
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REACTOR, BWR * FAILURE, EQUIPMENT * FAILURE * REACTOR STARTUP EXPERIENCE * FAILURE, MAINTENANCE ERROR *
SUPPORT STRUCTURE * PEACH BOTTOM 3 (BWR) * PIPES AND PIPE FITTINGS

INSPECTION OF HYDRAULIC SHOCK ARRESTORS AT BROWN'S FERRY 2
TENNESSEE VALLEY AUTHORITY, CHATTANOOGA
3 PAGES, LETTER WITH ABNORMAL OCCURRENCE REPORT 70208 TO DIRECTORATE OF LICENSING (ARC), OCTOBER 25, 1974,
COCKET 50-266, TYPE--BWR, HPG--G.E., AE--TVA

CAUSE - DESIGN ERROR. DURING AN INSPECTION OF THE HYDRAULIC SHOCKERS, 1 GRINNELL AND 7 BERGEN
PATERSON UNITS WERE FOUND WITHOUT SUFFICIENT OIL. LOSS OF OIL IN THE GRINNELL UNIT WAS FROM
NICKS ON 2 OF THE 4 O-RING-TYPE SEALS WHICH COULD HAVE BEEN FROM BURNS FOUND ON THE PISTON ROD
END. SEALS WERE REPLACED AND PISTON ROD STONED. BERGEN PATERSON UNITS FAILED FROM
MISALIGNMENT OF THE CONTROL VALVE ASSEMBLY WITH THE MAIN CYLINDER AND FROM A POOR DESIGN OF THE
PISTON ROD PACKING RING. THE CONTROL VALVE ASSEMBLIES WERE REALIGNED. DAMAGED PACKING RINGS
WERE REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + MODIFICATION + REACTOR STARTUP EXPERIENCE + FAILURE, DESIGN ERROR + FAILURE, MAINTENANCE ERROR + SEAL + SUPPORT STRUCTURE + BURNS PERBY 2 (BUR) + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

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HYDRAULIC SHOCK ABSORBER RESERVOIR EMPTY AT PEACH BOTTOM 2
PHILADELPHIA ELECTRIC COMPANY, PA.
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), OCTOBER 20, 1974, DOCKET 50-277, TYPE--BUR, NRC--G.F., AE--BECHTEL

CAUSE - LOOSE SCREWS. DURING A ROUTINE INSPECTION OF THE HYDRAULIC SHOCK ABSORBERS, ONE WAS FOUND WITH AN EMPTY RESERVOIR. THE PRIMARY FLUID LOSS WAS FROM LOOSE ADJUSTING SCREWS IN THE BOTTOM OF THE VALVE BLOCK. THE PISTON AND VALVE ASSEMBLY WERE FULL OF FLUID, SO WERE OPERABLE. THE LEAKING SCREWS WERE TIGHTENED, THE RESERVOIR FILLED, AND THE PISTON STROKED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + FASTENER + FAILURE, MAINTENANCE ERROR + SUPPORT STRUCTURE + PEACH BOTTOM 2 (BUR) + SURVEILLANCE PROGRAM + LEAK + PIPES AND PIPE FITTINGS

41
HYDRAULIC SHOCK SUPPRESSOR INSPECTION AT PILGRIM
BOSTON EDISON COMPANY, PLIMOUTH, MASS.
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), OCT. 4, 1974, DOCKET 50-293, TYPE--BUR, NRC--G.F., AE--BECHTEL

CAUSE - DESIGN ERROR. DURING AN OUTAGE, THE 70 SHOCKERS INSIDE THE DRYWELL WERE INSPECTED. FIVE HAD LOW FLUID INDICATION AND WERE REFILLED WHILE ONE HAD A LEAK. IT WAS REPLACED. THERE WAS A SMALL SCORE ON THE ACCUMULATOR WASPER, PROBABLY OCCURRING DURING THE REBUILDING PROGRAM. OF THE 40 SHOCKERS OUTSIDE THE DRYWELL, 5 WERE LOW ON FLUID AND WERE REFILLED, WHILE 3 HAD LEAKS SIMILAR TO THE ABOVE LEAK AND THROUGH LOOSE FITTINGS. THE 3 WERE REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + PILGRIM (BUR) + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

42
HYDRAULIC SHOCKER FOUND INOPERABLE AT PEACH BOTTOM 3
PHILADELPHIA ELECTRIC COMPANY
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), SEPTEMBER 20, 1974, DOCKET 50-278, TYPE--BUR, NRC--G.F., AE--BECHTEL

CAUSE - INSTALLATION ERROR. DURING A MAINTENANCE OUTAGE, INSPECTION OF THE HYDRAULIC SHOCKERS FOUND ONE WHICH WAS INVERTED RESULTING IN DRAINING ALL HYDRAULIC FLUID OUT OF THE RESERVOIR VENT. THE LOCKOUT WHICH PREVENTS ROTATION WAS NOT TIGHTENED PROPERLY. THE SHOCKER WAS CORRECTLY POSITIONED AND THE LOCKOUT ADEQUATELY TIGHTENED. THE RESERVOIR WAS FILLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + REACTOR STARTUP EXPERIENCE + SUPPORT STRUCTURE + FAILURE, INSTALLATION ERROR + SURVEILLANCE PROGRAM + BACKFIT + PEACH BOTTOM 3 (BUR) + PIPES AND PIPE FITTINGS

43
TWO HYDRAULIC SHOCK ARRESTORS FOUND TO BE INOPERABLE AT OYSTER CREEK
JERSEY CENTRAL POWER & LIGHT COMPANY
3 PAGES, LETTER WITH ABNORMAL OCCURRENCE REPORT 74-87 TO DIRECTORATE OF LICENSING (AEC), SEPT. 23, 1974, DOCKET 50-219, TYPE--BUR, NRC--G.F., AE--BURNS & ROE

CAUSE - LOSS OF OIL. DURING A PIPE TRACING PROJECT WITH THE REACTOR AT 1007 MW, 2 SHOCKERS POSITIONED IN A PIPE TRACE WERE FOUND WHICH HAD NOT BEEN INSPECTED PREVIOUSLY. THERE WAS NO OIL IN EITHER ACCUMULATOR. THE PISTON ROD ON ONE WAS ESSENTIALLY FROZEN IN POSITION. THE MOTION OF THE SECOND WAS NOT SMOOTH. BOTH WERE REPLACED WITH REBUILT UNITS. DURING THIS TRACE-OUT, 4 ADDITIONAL SHOCKERS WERE LOCATED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + OYSTER CREEK (BUR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

44
INSPECTION OF SHOCK SUPPRESSORS AT THREE HILE ISLAND 1
METROPOLITAN EDISON COMPANY
4 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), AUGUST 28, 1974, DOCKET 50-289, TYPE--BUR, NRC--G.F., AE--GILBERT ASSOC.

CAUSE - INSTALLATION ERROR. DURING AN INSPECTION OF THE GRINNELL HYDRAULIC SHOCK ABSORBERS, 3 WERE FOUND TO BE INOPERABLE FROM LOSS OF FLUID. FOR ONE THE LINE FROM THE HYDRAULIC FLUID RESERVOIR TO THE SHOCKER VALVE WAS CONNECTED SO THAT HEAT FROM A NEARBY PIPE CAUSED IT TO EXPAND AND BREAK. A NEW ASSEMBLY WAS INSTALLED WITH THE LINE IN A DIFFERENT LOCATION. FOR ANOTHER A

LOCK NUT WAS NOT TIGHTENED PROPERLY ALLOWING IT TO TIP OVER AND SPILL THE FLUID. IT WAS PROPERLY POSITIONED AND ALL LOCK NUTS TIGHTENED. IN THE THIRD THE CYLINDER SEAL FAILED. THE UNIT WAS REPLACED. THE CAUSE OF SEAL FAILURE HAS NOT BEEN DETERMINED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • REACTOR, PWR • FAILURE, DESIGN ERROR • SEAL • SUPPORT STRUCTURE • FAILURE, INSTALLATION ERROR • SURVEILLANCE PROGRAM • THREE MILE ISLAND: (PWR) • BACKFIT • PIPES AND PIPE FITTINGS

45
INSPECTION OF SHOCK SUPPRESSORS AT QUAD CITIES 2
CONSOLIDATED EDISON COMPANY
3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), SEPT. 10, 1974, DOCKET 50-265, TYPE--BWR, NRC--G.R., AE--SGT S LUNNEY

CAUSE - DESIGN ERROR. INSPECTION OF 46 HYDRAULIC SHOCK SUPPRESSORS FOUND 3 GRINNELL UNITS WITH LOW OIL LEVEL BUT OPERABLE. THEY WERE REFILLED AND TUBING FITTINGS TIGHTENED. ONE BERGIN PATERSON UNIT WAS INOPERABLE. A SMALL RUBBER PIECE INSIDE A GREASE FITTING ON THE FLUID RESERVOIR HAD HARDENED, GIVING A BAD SEAL, ALLOWING ALL THE OIL TO LEAK OUT. THE SUPPRESSOR WAS COMPLETELY REBUILT.

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REACTOR, BWR • FAILURE • MODIFICATION • FAILURE, DESIGN ERROR • SEAL • SUPPORT STRUCTURE • SURVEILLANCE PROGRAM • LEAK • QUAD CITIES 2 (BWR) • BACKFIT • PIPES AND PIPE FITTINGS

46
DEFECTIVE SEISMIC SUPPORTS FOUND AT BROWNS FERRY 3
TENNESSEE VALLEY AUTHORITY, CHATTANOOGA
3 PAGES, LETTER WITH ATTACHED REPORT TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), SEPT. 9, 1974, DOCKET 50-269, TYPE--BWR, NRC--G.R., AE--TVA

CAUSE - ASSEMBLY ERROR. DURING THE STARTUP TESTING ON UNIT 2, A SEISMIC SUPPORT WAS FOUND TO BE INOPERABLE BECAUSE IT WAS NOT BEEN LUBRICATED DURING ASSEMBLY AT THE FACTORY. AS A RESULT OF THIS, UNIT 3 SUPPORTS WERE INSPECTED AND 5 OF 19 WERE FOUND INOPERATIVE. INSPECTION OF THOSE IN STORAGE SHOWED NO LUBRICATION. THE CAUSE WAS A BREAKDOWN OF QA AT THE VENDOR'S PLANT. ALL THE SEISMIC SUPPORTS WERE REPLACED WITH NEW ONES FROM THE FACTORY, EACH HAVING QA DOCUMENTATION. EACH WAS TESTED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • FAILURE, FABRICATION ERROR • QUALITY ASSURANCE • LUBRICATION • BROWNS FERRY 3 (BWR) • SEISMIC DESIGN • CONSTRUCTION

47
INSPECTION OF SHOCK SUPPRESSORS AT DRESCEN 2
CONSOLIDATED EDISON COMPANY
3 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), REGION III, AUGUST 30, 1974, DOCKET 50-237, TYPE--BWR, NRC--G.R., AE--SGT S LUNNEY

CAUSE - UNKNOWN. INSPECTION OF THE 31 BERGIN PATERSON SHAMBERS IN THE OXYWELL REVEALED THAT 8 WERE LOW ON OIL. AFTER FILLING, 2 WERE NOTED TO LEAK. LEAK PATHS WERE THE SHARP SEAL ON ONE AND THE RECUMULATOR PISTON ON THE OTHER. THESE 2 AND 1 OTHER WERE REPLACED AND WILL BE STUDIED FOR CAUSES OF FAILURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • DRESCEN 2 (PWR) • FAILURE, DESIGN ERROR • SUPPORT STRUCTURE • SURVEILLANCE PROGRAM • LEAK • BACKFIT • PIPES AND PIPE FITTINGS

48
INSPECTION OF SHOCK ABSORBERS AT INDIAN POINT 2
CONSOLIDATED EDISON COMPANY
3 PAGES, LETTER WITH ABNORMAL OCCURRENCE REPORT 4-2-25 TO DIRECTORATE OF LICENSING (AEC), AUGUST 29, 1974, DOCKET 50-247, TYPE--PWR, NRC--BEST, AE--UNITED ENGR

CAUSE - LOOSE FITTINGS. DURING A SHUTDOWN ALL 540 SHOCKERS WERE INSPECTED. THREE WERE FOUND INOPERABLE BECAUSE OF LOW OIL LEVEL. LOOSE FITTINGS WERE FOUND ON 2. NO REASON FOR THE LOW OIL LEVEL WAS FOUND FOR THE THIRD WHICH HAD THE NEW TYPE SPALS. OIL WAS ADDED AND FITTINGS TIGHTENED ON ALL THREE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • REACTOR, PWR • FAILURE, MAINTENANCE ERROR • INDIAN POINT 2 (PWR) • SUPPORT STRUCTURE • SURVEILLANCE PROGRAM • LEAK • BACKFIT • PIPES AND PIPE FITTINGS

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SHOCK ABSORBER INSPECTION AT INDIAN POINT 2
CONSOLIDATED EDISON COMPANY OF NEW YORK
3 PAGES, LETTER WITH REPORT TO DIRECTORATE OF LICENSING (AEC), AUGUST 19, 1974, DOCKET 50-247, TYPE--PWR, NRC--BEST, AE--UNITED ENGR

CAUSE - DESIGN ERROR. INSPECTION OF THE 362 BERGEN PATERSON SHUTTERS LOCATED INSIDE CONTAINMENT FOUND ONE INOPERABLE AND 16 WITH LEAKAGE. A TOTAL OF 49 SHUTTERS WERE REPLACED WITH NEW. REPAIRS TO UNITS EMPLOYING ETHYLENE PROPYLENE SEAL MATERIAL. OUTSIDE CONTAINMENT ALL 114 UNITS WERE OPERABLE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE - REACTOR, PUR - MODIFICATION - FAILURE, DESIGN ERROR - SEAL - INSIGN POINT 2 (PUR) - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - BACKFIT - PIPES AND PIPE FITTINGS

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SEISMIC RESTRAINTS FOUND INOPERABLE AT BROWN FERRY 2

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA

2 PAGES. LETTER WITH ABNORMAL OCCURRENCE REPORT OF 50-260/741N TO DIRECTORATE OF LICENSING (AEC), AUGUST 9, 1974. DOCKET 50-260. TYPE-BUR. NRC-G.E., AE-TVA

CAUSE - NO LUBRICATION DURING ASSEMBLY. WHILE CORRECTING AN INTERFERENCE PROBLEM, A SEISMIC RESTRAINT ON A RPV VIBRATORY COLUMN WAS FOUND TO BE SEIZED. A CHECK OF ALL SEISMIC RESTRAINTS FOUND THAT 11 OUT OF 14 WERE INOPERATIVE. THE RESTRAINTS HAD NOT BEEN LUBRICATED DURING ASSEMBLY AT THE FACTORY. FOURTEEN NEW RESTRAINTS WERE OBTAINED FROM THE FACTORY AND INSTALLED. NO DOCUMENTATION WAS RECEIVED ON EACH.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - PRESSURE VESSELS - REACTOR STARTUP EXPERIENCE - FAILURE, FABRICATION ERROR - QUALITY ASSURANCE - LUBRICATION - BROWN FERRY 2 (BUR)

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SEISMIC PIPE RESTRAINT FAILS AT PALISADES

CONSUMERS POWER COMPANY

3 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC), JULY 19, 1974. DOCKET 50-219. TYPE-PUR. NRC-CORR., AE-BECHTEL

CAUSE - WATER HAMMER. A HORIZONTAL PIPE RESTRAINT ON THE SUCTION LINE OF THE LOW-PRESSURE SAFETY INJECTION PUMP HAD PULLED LOOSE FROM THE CONCRETE PILLAR SHEARING FOUR 5/8-IN. ANCHOR BOLTS. FAILURE APPARENTLY OCCURRED AS A RESULT OF A WATER HAMMER, PROBABLY DURING THE COMPLETION OF THE TESTING AND FILL OF THE SODIUM HYDROXIDE SYSTEM. THE RESTRAINT ANCHOR WAS RELOCATED TO PLACE THE BOLTS IN SHEAR INSTEAD OF TENSILE AND THE CONCRETE IN COMPRESSION INSTEAD OF SHEAR.

AVAILABILITY - NUSAE PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D.C. 20545 10 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE - HYDRAULIC EFFECT - REACTOR, PUR - MODIFICATION - FAILURE, DESIGN ERROR - PALISADES (PUR) - SUPPORT STRUCTURE - PIPES AND PIPE FITTINGS - LPCS

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HYDRAULIC SHOCK SUPPRESSOR INSPECTED AT FT. CALHOUN

OMAHA PUBLIC POWER DISTRICT

5 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC), JULY 19, 1974. DOCKET 50-285. TYPE-PUR. NRC-CORR., AE-GIBBS & HILL

CAUSE - DESIGN ERROR. INSPECTION OF ALL 324 BERGEN PATERSON SHUTTERS LOCATED IN ACCESSIBLE AREAS REVEALED 2 WITH LOW HYDRAULIC FLUID BUT STILL OPERABLE. THEY WERE REFILLED.

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FAILURE - REACTOR, PUR - FAILURE, DESIGN ERROR - SEAL - FT. CALHOUN (PUR) - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - BACKFIT - PIPES AND PIPE FITTINGS

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LOW OIL LEVEL IN HYDRAULIC SHOCK ABSORBER AT OYSTER CREEK

JERSEY CENTRAL POWER AND LIGHT COMPANY

3 PAGES. LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), REGION 1, JULY 18, 1974. DOCKET 50-219. TYPE-BUR. NRC-G.E., AE-BURNS AND ROE

CAUSE - CUT SEAL. INSPECTION OF OYSTER CREEK SHOCK AND SWAY ARRESTORS FOUND ONE UNIT INOPERABLE FROM LOW HYDRAULIC FLUID LEVEL. THERE WERE 2 SMALL CUTS ON THE MAIN CYLINDER SHAFT O-RING CAUSED BY BURRS ON THE PISTON. THE FAILED UNIT WAS REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - OYSTER CREEK (BUR) - FAILURE, MAINTENANCE ERROR - SEAL - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - BACKFIT - PIPES AND PIPE FITTINGS

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OIL LEAK IN HYDRAULIC SHOCK SUPPRESSOR AT ARNOLD

IOWA ELECTRIC LIGHT AND POWER COMPANY

4 PAGES. LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), JUNE 10, 1974. DOCKET 50-331. TYPE-BUR. NRC-G.E., AE-COMMONWEALTH ASSOC.

CAUSE - ASSEMBLY ERROR. DURING A GENERAL INSPECTION, A SEISMIC HYDRAULIC SHOCK SUPPRESSOR WAS FOUND TO BE LEAKING AT THE PISTON ROD GLAND AREA. THE INNER DIAMETER OF THE O-RING OF THE PISTON ROD PACKING HAD A SMALL CUT WHICH PROBABLY OCCURRED DURING ASSEMBLY. THE UNIT WAS REPLACED.

AVAILABILITY - ARC PUBLIC DOCUMENT RCOP, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + FAILURE, FABRICATION ERROR + SEAL + DAMAGE + SUPPORT STRUCTURE + LEAK + ARNOLD (BUR) + BACKFIT + PIPES AND PIPE FITTINGS

CS
MAIN STEADY LINE SEISMIC RESTRAINTS AT ROBINSON 2
CANDLER POWER AND LIGHT COMPANY
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JULY 9, 1970, DOCKET 50-261, TYPE--BUR, NPG--BEST., AE--ERASCC

AS REPORTED EARLIER, A SP SPEC RESTRAINT ON MAIN STEADY LINE A WAS SEVERELY DAMAGED. THE CAUSE WAS BELIEVED TO BE PROPPANT FRICTION LOADS BETWEEN THE PIPE SHOES AND THE RESTRAINT STRUCTURE DURING AXIAL THERMAL MOVEMENT. THE RESTRAINT WAS REMOVED. THE ADJACENT PIPE SHIP RESTRAINT WAS MODIFIED TO CARRY THE ADDITIONAL THERMAL AND SEISMIC LOADS AS WELL AS THE PIPE SHIP LOADS. A COMPLETE INSPECTION WAS PERFORMED ON THE ENTIRE RESTRAINT AND SUPPORT SYSTEM TO ASSURE INSTALLATION WAS AS DESIGNED.

AVAILABILITY - ARC PUBLIC DOCUMENT RCOP, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + MODIFICATION + ROBINSON 2 (BUR) + SUPPORT STRUCTURE + SEISMIC DESIGN + PIPE SHIP + PIPES AND PIPE FITTINGS

CA
INSPECTION OF SHOCK SUPPRESSORS AT WILLSTONE
THE WILLSTONE POINT COMPANY
1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), JULY 9, 1970, DOCKET 50-245, TYPE--BUR, NPG--G.E., AE--ERASCC

CAUSE - DESIGN ERROR. THE UNIT WAS SHUT DOWN TO INSPECT THE 62 BERGEN PATERSON SHOCKERS LOCATED IN THE DRYWELL. TWO HAD LOW OIL LEVELS AND WERE REFILLED. FIVE HAD NO LEVEL INDICATIONS. SEALS AND RINGS WERE REPLACED. THE SEALS AND RINGS THAT WERE REMOVED SHOWED NO VISIBLE SIGNS OF DEGRADATION. HOWEVER, 3 OF 5 ALUMINUM FILLER PLUGS EXHIBITED FAILURE OF SEAL MATERIAL. THE 5 PLUGS WERE REPLACED WITH A MODIFIED FILLER PLUG. ALL OTHER FILLER PLUGS WILL BE REPLACED DURING THE NEXT OUTAGE.

AVAILABILITY - ARC PUBLIC DOCUMENT RCOP, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + CONTAINMENT + FAILURE + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + WILLSTONE POINT 1 (BUR) + PIPES AND PIPE FITTINGS

CA
HYDRAULIC SHOCK SUPPRESSORS INSPECTED AT FT. CALHOUN
ORCA PUBLIC POWER DISTRICT
5 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JUNE 18, 1970, DOCKET 50-285, TYPE--BUR, NPG--COMB., AE--GIBBS & HILL

CAUSE - DESIGN ERROR. ALL 326 BERGEN PATERSON SHOCKERS LOCATED IN ACCESSIBLE AREAS WERE INSPECTED. EIGHT WERE DEFECTIVE FROM LOW OIL LEVEL. THE PISTON GLAND SEALS HAD BEEN DAMAGED ON 2. BRITTLE SEAL MATERIAL WAS FOUND ON 3. THE OTHER 3 HAD MINOR LEAKAGE REQUIRING ONLY THE ADDITION OF OIL.

AVAILABILITY - ARC PUBLIC DOCUMENT RCOP, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, BUR + FAILURE, DESIGN ERROR + FAILURE, MAINTENANCE ERROR + SEAL + FT. CALHOUN (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

CA
DEFECTIVE SHOCK ABSORBERS FOUND AT DRESDEN 2
COMMONWEALTH Edison COMPANY
7 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JUNE 20, 1970, DOCKET 50-237, TYPE--BUR, NPG--G.E., AE--SGTALLADY

CAUSE - UNKNOWN. DURING AN INSPECTION OF BERGEN PATERSON SHOCK SUPPRESSORS IN THE DRYWELL, 8 OF THE 31 WERE FOUND INOPERABLE, ONE OF WHICH HAD NOT BEEN INSTALLED ON THE LINE AFTER THE LAST INSPECTION. SIX OTHERS HAD LOW OIL LEVEL. INSPECTION SHOWED THAT THE ETHYLENE-PROPYLENE SEALS WERE IN GOOD CONDITION. THE CYLINDERS AND PISTONS OF THE INOPERABLE UNITS HAD RADIAL SCORE MARKS. THE CAUSE OF SCORING HAS NOT BEEN DETERMINED. THE SHOCKERS WITH DAMAGE WERE REPLACED WITH NEW OR REBUILT UNITS. AN AS-LEFT INSPECTION WILL BE MADE TO ASSURE PROPER INSTALLATION.

AVAILABILITY - ARC PUBLIC DOCUMENT RCOP, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE, COMPONENT + FAILURE + DRESDEN 2 (BUR) + FAILURE, DESIGN ERROR + FAILURE, MAINTENANCE ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

CA
INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS
U.S. ATOMIC ENERGY COMMISSION
3 PAGES, LETTER TO VIRGINIA ELECTRIC & POWER COMPANY, MARCH 5, 1974, DOCKETS 50-720/281, TYPE--BUR, NPG--BEST., AE--STONE & WEBSTER

STATES THAT TWO DIFFERENT SEAL MATERIALS HAVE BEEN USED IN BERGEN-PATERSON SHOCKERS ONE OF WHICH IS A MILLABLE GUM POLYURETHANE WHICH CONTAINS PLASTICIZERS AND OTHER ADDITIVES. IT IS POSTULATED

THAT THE PLASTICIZERS ARE DISSOLVED INTO THE SILICONE HYDRAULIC FLUID AND HAS CAUSED SHRINKAGE AND DETERIORATION. DEFECTS CAN OCCUR IN 6 REELS OR LESS. INSPECTION OF THE SHROBBER AND APPROPRIATE ACTION IS REQUESTED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

CHEMICAL REACTION • REACTOR, PUR • SEAL • SURRY 1 (PUR) • SURRY 2 (PUR) • BACKFIT • AGENCY, APC • PIPES AND PIPE FITTINGS

60

RESPONSE TO AN INFORMATION REQUEST 70-1 - ABNORMAL OCCURRENCES IN PIPING SYSTEMS

VIRGINIA ELECTRIC AND POWER COMPANY

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), REGION 2, MARCH 12, 1970, DOCKET 50-200/201, TYPE--PUR, NPG--WEST., AE--STONE & BESTER

DESCRIBES AN EVENT NOT PREVIOUSLY REPORTED, PD IN JANUARY 1973, THE HYDRAULIC SHOCK AND SHAW SUPPRESSORS WERE DAMAGED AND PULLED FROM THEIR ANCHORS WHEN THE PRESSURIZER RELIEF VALVES OPENED TO REDUCE AN OVERPRESSURE CONDITION IN THE REACTOR. CORRECTIVE ACTION WAS TO PROVIDE ADDITIONAL SHAW COMPRESSORS AND PIPE RESTRAINTS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, PUR • FASTENER • PRESSURE RELIEF • DAMAGE • SUPPORT STRUCTURE • SURRY 1 (PUR) • PRESSURE TRANSFER • SURRY 2 (PUR) • VALVES • PIPES AND PIPE FITTINGS

61

FINAL REPORT ON SHOCK SUPPRESSOR PERFORMANCE AT PEACH BOTTOM 3

PHILADELPHIA ELECTRIC COMPANY

6 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), MAY 20, 1970, DOCKET 50-270, TYPE--BUR, NPG--G.E., AE--DECATEL

CAUSE - DESIGN ERROR. DURING EARLY STAGES OF OPERATIONAL TESTING, GRINNELL HYDRAULIC SHOCK SUPPRESSORS WERE FOUND ACTING AS RESTRAINTS TO THERMAL MOTION AFTER A DYNAMIC EVENT. THIS OCCURRED IN THE RELIEF VALVE DISCHARGE LINES AND THE TURBINE BYPASS LINES. THE SUPPRESSOR DESIGN WAS SUCH THAT A DYNAMIC MOVEMENT FOLLOWED BY CONSTANT PRESSURE (SUCH AS THERMAL MOVEMENT) CAUSED THIS CONDITION. SUPPRESSORS HAVE BEEN MODIFIED AND CHANGED TO PROVIDE FASTER CHECK VALVE ACTION AND LARGER ORIFICES FOR SLOW MOVEMENT. OF THE 130 SHROBBER COMMITTED P.7M CHANGE, 110 HAVE BEEN COMPLETED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR • FAILURE • STRESS • MODIFICATION • TEST, SYSTEM OPERABILITY • FAILURE, DESIGN ERROR • SUPPORT STRUCTURE • CONSTRUCTION • PEACH BOTTOM 3 (BUR) • PIPES AND PIPE FITTINGS

62

MODIFICATIONS TO SHOCK ABSORBERS AT DRESDEN 3

COMMONWEALTH EDISON COMPANY

1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), MAY 15, 1970, DOCKET 50-249, TYPE--BUR, NPG--G.E., AE--SGT & LUNDY

CAUSE - DESIGN ERROR. DURING THE CURRENT REFUELING OUTAGE, ALL 31 DRY WELL SHROBBER WERE REMOVED FROM THE DRYWELL. ALL EXISTING SEALS WERE REMOVED AND REPLACED WITH ETHYLENE-PROPYLENE SEALS. ALL ETHYLENE-PROPYLENE SEALS THAT WERE REMOVED APPEARED TO BE IN LIKE-NEW CONDITION. SOME OF THE OTHER SEALS SHOWED SIGNS OF DETERIORATION. THE TORUS SHROBBER WERE NOT OVERHAULED BECAUSE THEY ARE SUBJECTED TO A MUCH HARSHER ENVIRONMENT.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR • FAILURE • DRESDEN 3 (BUR) • MODIFICATION • FAILURE, DESIGN ERROR • SEAL • SUPPORT STRUCTURE • SURVEILLANCE PROGRAM • BACKFIT • PIPES AND PIPE FITTINGS

63

INOPERABILITY OF HYDRAULIC SHROBBER AT OYSTER CREEK

JERSEY CENTRAL POWER & LIGHT COMPANY

6 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), MAY 29, 1970, DOCKET 50-219, TYPE--BUR, NPG--G.E., AE--GURNS & ROE

CAUSE - DESIGN ERROR. WHILE THE PLANT WAS SHUT DOWN FOR REFUELING, AN INSPECTION OF THE SHROBBER IN THE REACTOR BUILDING LOCATED 2 INOPERABLE UNITS AND 5 LEAKING UNITS. ALL WERE BERGEN PATTERSON TYPE MSS-10. SEALS HAD FAILED. ONE INOPERABLE UNIT HAD NEVER BEEN REBUILT AND THE OTHER HAD BEEN PARTLY REBUILT. ALL 7 UNITS WERE REPLACED WITH UNITS EQUIPPED WITH ETHYLENE PROPYLENE SEALS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR • FAILURE • OYSTER CREEK (BUR) • MODIFICATION • REFUELING • FAILURE, DESIGN ERROR • SEAL • SUPPORT STRUCTURE • SURVEILLANCE PROGRAM • BACKFIT • PIPES AND PIPE FITTINGS

64

INSPECTION OF HYDRAULIC SHROBBER AT INDIAN POINT 2

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), MAY 9, 1970, DOCKET 50-247, TYPE--PUR, NPG--WEST., AE--UNITED ENGR

CAUSE - DESIGN ERROR. INSPECTION OF THE 356 BERGEN-PATERSON SHROBBER LOCATED INSIDE CONTAINMENT FOUND ALL TO BE OPERABLE BUT 45 HAD LOW OIL LEVEL. TWENTY WERE LEAKING FROM THE OIL FITTING. NEW OR REPAIRED UNITS WITH ETHYLENE PROPYLENE SEALS WERE INSTALLED AS REPLACEMENTS. ALL 168 SHROBBER OUTSIDE CONTAINMENT WERE OPERABLE WITH 20 SHOWING INDICATIONS OF LEAKAGE. LEAKS WERE REPAIRED BY TIGHTENING THE FITTINGS.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PWR + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + INDIAN POINT 2 (PWR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

HYDRAULIC SHOCK INSPECTION AT QUAD CITIES 1

CONSOLIDATED EDISON COMPANY

1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), MAY 9, 1974, DOCKET 50-254, TYPE--BUR, NRC--G.E., AE--SGT & LUNDY

CAUSE - DESIGN ERROR. INSPECTION OF THE HYDRAULIC SHOCK SUPPRESSORS SHOWED ALL TO BE OPERABLE. ALL BUT 2 OF THE 29 BERGEN-PATERSON UNITS WERE REPLACED WITH ONES HAVING ETHYLENE PROPYLENE SEALS. THE OTHER WILL ALSO BE REPLACED WHEN REPLACEMENT PARTS ARRIVE.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + MATERIAL + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + QUAD CITIES 1 (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + PIPES AND PIPE FITTINGS

FAILURE OF HYDRAULIC SHOCK ABSORBERS AT OYSTER CREEK

JERSEY CENTRAL POWER & LIGHT COMPANY

3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), APRIL 26, 1974, DOCKET 50-219, TYPE--BUR, NRC--G.E., AE--BLANKS & KEE

CAUSE - DESIGN ERROR. DURING AN INSPECTION OF ALL BERGEN PATERSON SHROBBER IN THE OYSTER CREEK, 3 HAD NO OIL LEVEL INDICATION IN THE ACCUMULATOR. DURING THE PRESENT REFUELING OUTAGE, ALL UNITS IN THE PRIMARY CONTAINMENT WHICH STILL CONTAIN MOLDED POLYURETHANE SEAL MATERIAL (AS THE 3 FAILED UNITS DID) WILL BE REPLACED WITH UNITS REBUILT EXCLUSIVELY WITH ETHYLENE PROPYLENE MATERIAL.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + OYSTER CREEK (BUR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

HYDRAULIC SHOCK ABSORBER SEAL REPLACEMENT PROGRAM AT INDIAN POINT 2

CONSOLIDATED EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), APRIL 12, 1974, DOCKET 50-247, TYPE--PWR, NRC--WEST., AE--UNIT ENGR.

CAUSE - DESIGN ERROR. TO DATE, 125 OF THE 353 HYDRAULIC SHROBBER INSIDE CONTAINMENT HAVE BEEN REPLACED WITH NEW SEAL MATERIAL (29 SHROBBER WITH UNADULTERATED SEAL MATERIAL AND 96 WITH ETHYLENE PROPYLENE SEAL MATERIAL). THE PROGRAM REQUIRES REPLACEMENT OF SHROBBER FOUND TO BE LEAKING OR SUSPECTED TO BE LEAKING WITH NEW OR REPAIRED UNITS CONTAINING IMPROVED SEAL MATERIAL.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PWR + MATERIAL + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + INDIAN POINT 2 (PWR) + SUPPORT STRUCTURE + BACKFIT + PIPES AND PIPE FITTINGS

HYDRAULIC SHOCK ABSORBER INSPECTION AT INDIAN POINT 2

CONSOLIDATED EDISON COMPANY

6 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), APRIL 12, 1974, DOCKET 50-247, TYPE--PWR, NRC--WEST., AE--UNIT ENGR

CAUSE - DESIGN ERROR. THE UNIT HAS BEEN SHUTDOWN MOST OF THE TIME FROM NOV. 12, 1973, TO MARCH 19, 1974 FOR REPAIR. INSPECTION OF THE 353 BERGEN PATERSON SHROBBER INSIDE CONTAINMENT SHOWED 47 HAD SOME MINOR LEAKAGE. THESE WERE REPLACED WITH REBUILT UNITS. ALL 353 UNITS WERE OPERABLE AS FOUND. ALL 68 UNITS LOCATED OUTSIDE CONTAINMENT WERE OPERABLE BUT 6 HAD BODY LEAKS AND LOW OIL LEVEL. THE OIL LEVEL WAS RESTORED.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PWR + FAILURE, DESIGN ERROR + SEAL + INDIAN POINT 2 (PWR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

HYDRAULIC SHOCK ABSORBER INSPECTION AT INDIAN POINT 1

CONSOLIDATED EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), APRIL 12, 1974, DOCKET 50-3, TYPE--PWR, NRC--R.W., AE--CON ED

CAUSE - DESIGN ERROR. INSPECTION OF THE 19 BERGEN PATERSON SHROBBER, ALL OF WHICH ARE LOCATED

INSIDE CONTAINMENT. FOUND ONLY 1 WITH LOW OIL LEVEL AND EVIDENCE OF FLUID LEAKAGE. IT WAS REPLACED.

AVAILABILITY - MRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE - INDIAN POINT 1 (IPU) - REACTOR, PWR - FAILURE - DESIGN ERROR - SEAL - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - BACKFIT - PIPES AND PIPE FITTINGS

70

INSPECTION OF HYDRAULIC SHOCK SUPPRESSOR AT QUAD CITIES 2

COMMONWEALTH EDISON COMPANY

2 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC). APRIL 3, 1970. DOCKET 50-285. TYPE--BUR. WFG--G.E., AE--SGT & LLNDY

CAUSE - DESIGN ERROR. FOUR PARKER-HANNAFIN, 20 BERGEN PATERSON, AND 16 GRIMMELL SHOCK SUPPRESSORS WERE INSPECTED. ALL EXCEPT A GRIMMELL WERE OPERABLE AND THEIR INTEGRITY INTACT. THE OIL LEVEL WAS LOW IN THE ONE BUT IT WAS STILL OPERABLE. ALL FITTINGS IN THE ONE WERE CLEANED AND TIGHTENED. MONTHLY INSPECTION WILL BE CONTINUED ONLY ON THIS ONE.

AVAILABILITY - MRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - FAILURE, DESIGN ERROR - SEAL - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - QUAD CITIES 2 (BUR) - BACKFIT - PIPES AND PIPE FITTINGS

71

REBUILDING OF SHOCK SUPPRESSORS AT PILGRIM

BOSTON Edison COMPANY

1 PAGE. LETTER TO DIRECTORATE OF LICENSING (AEC). MARCH 26, 1970. DOCKET 50-293. TYPE--BUR. WFG--G.E., AE--RECTOR

CAUSE - DESIGN ERROR. ALL 110 HYDRAULIC SHOCK SUPPRESSORS INSTALLED IN THE STATION WERE INSPECTED FOLLOWING THE REFUELING SHUTDOWN. ALL WERE IN SATISFACTORY CONDITION. ALL 79 DRYWELL SHOCKERS WERE COMPLETELY REBUILT USING ALL ETHYLENE PROPYLENE SEALS, GASKETS, AND O-RINGS. DURING THE INSPECTION ONLY MINOR FLAWS WERE OBSERVED. PART OF WHICH WERE THOUGHT TO HAVE OCCURRED DURING DISASSEMBLY. ALL MAIN STEAM LINE SHOCKERS WERE ALSO REBUILT. THE REMAINDER WILL BE REBUILT WHEN MATERIAL IS AVAILABLE. REQUESTS PERMISSION TO DELAY NEXT INSPECTION UNTIL 120 OPERATING DAYS.

AVAILABILITY - MRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - MODIFICATION - REFUELING - FAILURE, DESIGN ERROR - SEAL - SUPPORT STRUCTURE - PILGRIM (BUR) - SURVEILLANCE PROGRAM - BACKFIT - PIPES AND PIPE FITTINGS

72

HYDRAULIC SHOCK SUPPRESSOR SEALS AT ARNOLD

IOBA ELECTRIC LIGHT AND POWER COMPANY

3 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC). MARCH 21, 1970. DOCKET 50-331. TYPE--BUR. WFG--G.E., AE--COMMONWEALTH ASSOC.

CAUSE - DESIGN ERROR. ALL 67 BERGEN PATERSON SHOCKERS INSTALLED ON SAFETY-RELATED SYSTEMS WITHIN THE DRYWELL AND MAIN STEAM TUNNEL HAVE BEEN REBUILT BY THE VENDOR WITH ETHYLENE PROPYLENE SEALS. TESTS INDICATE THAT THE ENVIRONMENTAL CONDITION FOR ALL OTHER SHOCKERS WILL NOT DEGRADE THE INSTALLED SEALS.

AVAILABILITY - MRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - MODIFICATION - FAILURE, DESIGN ERROR - SEAL - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - ARNOLD (BUR) - BACKFIT - PIPES AND PIPE FITTINGS

73

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT DRESDEN 3

COMMONWEALTH EDISON COMPANY

2 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC). MARCH 25, 1970. DOCKET 50-249. TYPE--BUR. WFG--G.E., AE--SGT & LLNDY

CAUSE - DESIGN ERROR. DURING A SHUTDOWN, AN INSPECTION REVEALED THAT 40 BERGEN PATERSON SHOCKERS WERE OPERABLE. SIX OF THESE HAD LOW OIL LEVEL INDICATION. THREE SHOCKERS IN THE DRYWELL HAD NO OIL LEVEL INDICATION ON THE SHOCKER ACCUMULATOR. CURRENT PLANS CALL FOR OVERHAULING ALL BERGEN PATERSON SHOCKERS IN THE DRYWELL DURING THE PRESENT REFUELING OUTAGE.

AVAILABILITY - MRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR - FAILURE - DRESDEN 3 (BUR) - MODIFICATION - FAILURE, DESIGN ERROR - SEAL - SUPPORT STRUCTURE - SURVEILLANCE PROGRAM - LEAK - BACKFIT - PIPES AND PIPE FITTINGS

74

HYDRAULIC SHOCK ABSORBER FAILURES AT OYSTER CREEK

JERREY CENTRAL POWER AND LIGHT COMPANY

3 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC). MARCH 18, 1970. DOCKET 50-219. TYPE--BUR. WFG--G.E., AE--BLUNS AND ACE

CAUSE - DESIGN ERROR. DURING AN INSPECTION OF THE BERGEN PATERSON TYPE H52A SHOCKERS IN THE DRYWELL, 3 UNITS WERE FOUND INOPERABLE AND 4 WERE LEAKING. ONLY ONE WAS ASSOCIATED WITH AN

ENGINEERED SAFEGUARD SYSTEM. ALL 7 UNITS WERE REPLACED WITH IDENTICAL SHROBBER WHICH WERE EQUIPPED WITH ETHYLENE PROPYLENE SEALS. THE CAUSE OF LOSS OF FLUID IN ALL 7 UNITS IS UNKNOWN AT THIS TIME.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTION, BUR + FAILURE + SYSTEM CRED (EPR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

73
INSPECTION OF SPOCK SUPPRESSORS AT QUAD CITIES 2
COMMONWEALTH EDISON COMPANY

3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 19, 1974, DOCKET 50-205, TYPE--BUR, NRC--G.E., AE--SGT & LUNDY

CAUSE - UNKNOWN. REINSPECTION REVEALED THAT ALL 29 BERGEN PATERSON SHROBBER WERE OPERABLE. OF THE 10 GRINNELL SHROBBER INSPECTED, 2 HAD EMPTY OIL RESERVOIRS AND 2 HAD LESS THAN 50% LEVELS. NO CAUSE WAS FOUND. THE FITTINGS WERE TIGHTENED AND THE SHROBBER WERE FILLED TO THE PROPER LEVEL.

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REACTION, BUR + FAILURE + FAILURE, DESIGN ERROR + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + QUAD CITIES 2 (EPR) + BACKFIT + PIPES AND PIPE FITTINGS

74
HYDRAULIC SPOCK SUPPRESSION INSPECTION AT HILLSTONE POINT
THE HILLSTONE POINT COMPANY

1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), MARCH 8, 1974, DOCKET 50-245, TYPE--BUR, NRC--G.E., AE--KANSAC

CAUSE - DESIGN ERROR. AN INSPECTION OF THE BERGEN PATERSON SHROBBER FOUND 2 UNITS TO HAVE LOWER FILL LEVELS AND ANOTHER WITH NO FLUID. MODIFIED ALUMITE FILLER PLUGS WERE INSTALLED IN ALL THREE UNITS. SEALS WERE REPLACED IN THE UNIT THAT SHOWED NO OIL LEVEL. THE REMOVED SEALS SHOWED NO DETEGRATION.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTION, BUR + FAILURE + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + HILLSTONE POINT 1 (EPR) + PIPES AND PIPE FITTINGS

77
INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT CRESOEN 3
COMMONWEALTH EDISON COMPANY

4 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), NOVEMBER 2, 1973, DOCKET 50-289, TYPE--BUR, NRC--BEST, AE--SGT & LUNDY

INSPECTION OF THE BERGEN PATERSON HYDRAULIC SHOCK SUPPRESSORS REVEALED 2 THAT HAD NO OIL LEVEL AND 41 THAT WERE OPERABLE. HOWEVER, THERE WERE 7 OPERABLE UNITS WITH LOW OIL LEVEL. THE FAILED UNITS AND 3 OPERABLE UNITS HAD DETEGRATED SEALS WHICH WERE REPLACED USING ETHYLENE PROPYLENE SEALS. THE OTHER 4 UNITS HAD NOT BEEN FILLED PROPERLY. ONE OF THE 11 GRINNELL SHROBBER HAD LOW OIL INDICATION.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTION, BUR + FAILURE + CRESOEN 3 (EPR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

74
HYDRAULIC SPOCK ABSORBER INSPECTION AT CRYSTAL CREEK
JERSEY CENTRAL POWER AND LIGHT COMPANY

40 PAGES, LETTER WITH ATTACHMENT TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 19, 1974, DOCKET 50-219, TYPE--BUR, NRC--G.E., AE--BURNS AND ROE

DURING JANUARY, ALL 90 HYDRAULIC SHOCK AND SHAY ARRESTORS LOCATED IN THE DRYWELL WERE INSPECTED. TWENTY OF THE 65 BERGEN PATERSON UNITS WERE REPLACED. SOME OF THESE HAD NEVER BEEN REBUILT. SOME OF THE SEALS HAD DETEGRATED WHILE OTHERS WERE IN GOOD CONDITION. NINE GRINNELL SHROBBER WERE FOUND WITH LOW OIL LEVELS. THEY WERE REFILLED AND THE COUPLING TIGHTENED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTION, BUR + FAILURE + CRYSTAL CREEK (EPR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

75
SHOCK SUPPRESSORS AT MONTECELLO RERAIL
NORTHERN STATES POWER COMPANY

4 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 25, 1974, DOCKET 50-283, TYPE--BUR, NRC--G.E., AE--RECHTEL

ALL SHOCK SUPPRESSORS ON SAFETY RELATED SYSTEMS HAVE BEEN REBUILT TO PROVIDE ETHYLENE PROPYLENE INTERNAL PARTS AND HIGH TEMPERATURE, HIGH PRESSURE, LEAKPROOF OIL FILL FITTINGS. NO INSURABLE UNITS WERE FOUND. DURING THE REBUILDING PROGRAM NUMEROUS UNITS WERE FOUND TO HAVE SEAL AND RETAIL

PARTS DAMAGE DUE TO THE PRESENCE OF FOREIGN MATERIALS SUCH AS DIRT, RUST, AND METAL CHIPS. TEMPERATURE DATA INDICATE A RANGE OF 98 F TO 140 F FOR UNITS WITHIN THE DRYWELL.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + MODIFICATION + FAILURE, FABRICATION ERROR + FAILURE, DESIGN ERROR + SEAL + MONTICELLO (BUR) + SUPPORT STRUCTURE + BACKFIT + PIPES AND PIPE FITTINGS

80
HYDRAULIC PIPE RESTRAINTS ACQUAT AT TURKEY POINT 4
FLORIDA POWER & LIGHT COMPANY
1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 20, 1974, DOCKET 50-251, TYPE--PWR, MFG--WEST., AE--RECHTOL

DURING A SHUTDOWN PERIOD ALL 41 BERGEN PATERSON HYDRAULIC SHOCK ABSORBERS WERE REBUILT USING THE ETHYLENE PROPYLENE SEAL MATERIAL RECOMMENDED BY THE VENDOR. THE REMOVED SEALS WERE IN SATISFACTORY CONDITION EXCEPT IN 2 INSTANCES. ONE RESTRAINT ACCUMULATOR SPRING WAS BROKE; IT WAS REPLACED. FOUR ACCUMULATOR CYLINDER RELIEF HOLES WERE DRILLED SLIGHTLY OFF THEIR SPECIFIED LOCATION; THE CYLINDERS WERE REPLACED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

FAILURE + REACTOR, PWR + MODIFICATION + FAILURE, FABRICATION ERROR + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + TURKEY POINT 4 (PWR) + BACKFIT + PIPES AND PIPE FITTINGS

81
FAILURE OF SHOCK SUPPRESSORS AT CRESCENT 2 FROM DETERIORATED SEALS
COMMONWEALTH EDISON COMPANY
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 21, 1974, DOCKET 50-237, TYPE--BWR, MFG--G.E., AE--S61 & LINDY

DURING A SHUTDOWN, AN INSPECTION OF THE BERGEN PATERSON SHOCK SUPPRESSORS IN THE DRYWELL REVEALED THAT 12 OF THE 31 WERE INOPERABLE. THE SEAL MATERIAL HAD DEGRADATED UNTIL A SATISFACTORY SEAL WAS NOT POSSIBLE. THE FAILED MATERIAL WAS UNTREATED POLYURETHANE. SEALS OF ETHYLENE-PROPYLENE WERE INSTALLED IN ALL BUT ONE SHOCKER. SEALS OF THIS MATERIAL WERE NOT AVAILABLE FOR THAT SHOCKER.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

REACTOR, BUR + FAILURE + CRESCENT 2 (BWR) + MATERIAL + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

82
LOW OIL LEVEL IN HYDRAULIC SHOCK ARRESTERS AT INDIAN POINT 2 (AD 4-2-3)
CONSOLIDATED EDISON COMPANY OF NEW YORK, INCORPORATED
2 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), FEBRUARY 1, 1974, DOCKET 50-247, TYPE--PWR, MFG--UNITED ENGINEER

DURING AN INSPECTION OF THE 350 BERGEN PATERSON HYDRAULIC SHOCK AND SHAY ARRESTORS IN THE CONTAINMENT, 2 WERE FOUND WITH LOW OIL LEVEL. THEY WERE REPLACED WITH SPARE UNITS. ALL EXISTING PILLAR GUN POLYURETHANE SEALS WILL BE REPLACED ON A PROGRESSIVE SCHEDULE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

FAILURE + REACTOR, PWR + MODIFICATION + SEAL + INDIAN POINT 2 (PWR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

83
DAMAGE TO MAIN STEAM LINE SEISMIC RESTRAINT AT ROBINSON 2
CAROLINA POWER & LIGHT COMPANY
3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JANUARY 4, 1974, DOCKET 50-261, TYPE--PWR, MFG--WEST., AE--EDASLO

A ROUTINE CONTAINMENT INSPECTION REVEALED SOME FRAGMENTS OF CONCRETE GROUTING IN THE FLOOR. A MAIN STEAM LINE SEISMIC RESTRAINT HAD MOVED 2 TO 3 INCHES FROM WHERE IT WAS ATTACHED BREAKING LOOSE GROUTING AROUND ITS ANCHOR STUDS. BENDING OF THE RESTRAINT WAS CAUSED BY FAILURE OF THE PIPE SHOE TO SLIDE ON THE MATING RESTRAINT SURFACE. A PERMANENT CORRECTION PROPOSAL WILL BE MADE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. (100 CENTS/PAGE -- MINIMUM CHARGE \$2.00)

FAILURE + REACTOR, PWR + FASTENER + FAILURE, DESIGN ERROR + ROBINSON 2 (PWR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + FRICTION + SEISMIC DESIGN + PIPES AND PIPE FITTINGS

84
FAILURE OF HYDRAULIC SHOCK ARRESTORS AT OYSTER CREEK (AD 50-219/74/3)
JERSEY CENTRAL POWER & LIGHT COMPANY
3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), JANUARY 23, 1974, DOCKET 50-219, TYPE--BWR, MFG--G.E., AE--BURNS & ROE

DURING AN INSPECTION OF THE BERGEN PATERSON MSSA-10 HYDRAULIC SHOCK ARRESTORS, 9 UNITS WERE FOUND WITH NO FLUID. NO VISUALLY OBVIOUS DETERIORATION OF THE SEAL MATERIAL WAS FOUND EXCEPT FOR SOME

BRITTLENESS. THE UNITS WERE LOCATED ABOVE THE BIOLOGICAL SHIELD IN A RELATIVELY HOT AREA IN THE CONTAINMENT. THE UNITS HAD BEEN REBUILT USING MOLDED POLYURETHANE AND VITON TYPE SEAL MATERIAL. THIS TIME THEY WERE REBUILT USING ETHYLENE PROPYLENE SEAL MATERIAL. THE UNITS WERE ON A CORE SPRAY SYSTEM AND BOTH ISOLATION CONDENSER SYSTEMS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + OYSTER CREEK (BUR) + MATERIAL + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

85
FAILURE OF SHOCK ABSORBERS AT OYSTER CREEK (AO 73-21)
JERSEY CENTRAL POWER & LIGHT COMPANY
3 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 1 (AEC), SEPTEMBER 10, 1973, DOCKET 50-219, TYPE--BUR, NRC--G.R., AE--BURNS & ROE

DURING A PLANT SHUT-DOWN, INSPECTION OF THE HYDRAULIC SHOCK AND SHUT ARRESTORS REVEALED THAT 21 ARRESTORS WERE INOPERABLE DUE TO A LOSS OF HYDRAULIC FLUID. THEY WERE REPLACED WITH SHOCKERS REBUILT WITH SEAL KITS SUPPLIED BY BERGEN-PATERSON. THE NEW SEALS ARE OF A DIFFERENT TYPE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + OYSTER CREEK (BUR) + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

86
REINSPECTION OF SEISMIC RESTRAINTS OCCASIONED DURING OPERATION AT TURKEY POINT 3
FLORIDA POWER & LIGHT COMPANY
1 PAGE, LETTER TO DIRECTORATE OF LICENSING (AEC), DECEMBER 11, 1973, DOCKET 50-250, TYPE--BUR, NRC--WEST., AE--RECHTEL

REINSPECTION OF 14 SEISMIC RESTRAINTS OF THE BERGEN-PATERSON DESIGN WERE MADE DURING POWER OPERATION. ALL WERE OPERABLE. HYDRAULIC FLUID LEAKS WERE FOUND ON 2 RESTRAINTS. FLUID WAS ADDED. ALL OF THESE ARE IN AREAS OF VERY HIGH TEMPERATURE AND RADIATION.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + TURKEY POINT 3 (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

87
REINSPECTION OF HYDRAULIC SHOCK ABSORBERS AT HILLSTONE POINT
THE HILLSTONE POINT COMPANY
3 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 1 (AEC), SEPTEMBER 25, 1973, DOCKET 50-245, TYPE--BUR, NRC--G.R., AE--EBASCO

THE 45 BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS WERE REINSPECTED. TWO HAD LOW FLUID LEVELS AND FOUR HAD NO FLUID LEVEL INDICATION. THE O-RINGS WERE BROKEN OR EXTREMELY BRITTLE AND SEAL RINGS WERE SEMI-BRITTLE. REPAIR INCLUDED INSTALLING NEW ETHYLENE-PROPYLENE O-RINGS, NEW POLYURETHANE SEALS AND HYDRAULIC FLUID. THE USE OF MILLABLE O-RINGS WAS DISCONTINUED WITH THESE LAST REPAIRS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + MODIFICATION + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + HILLSTONE POINT 1 (BUR) + PIPES AND PIPE FITTINGS

88
REINSPECTION OF SHOCK SUPPRESSORS AT FT. CALHOUN
OMAHA PUBLIC POWER DISTRICT
6 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 4 (AEC), NOVEMBER 27, 1973, DOCKET 50-285, TYPE--BUR, NRC--COMB., AE--GIBBS & HILL

ALL HYDRAULIC SHOCK ABSORBERS WERE REINSPECTED. OF THE 525 INSTALLED, 151 ARE IN NON-SAFETY RELATED SYSTEMS. DURING THE INSPECTION, 2 SUPPRESSORS IN THE CONTAINMENT AND 2 IN THE AUXILIARY BUILDING REQUIRED REPAIR. A FEW SMALL TUBING LEAKS WERE REPAIRED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + MAINTENANCE AND REPAIR + REACTOR, BUR + MODIFICATION + FT. CALHOUN (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

89
REINSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT TURKEY POINT 3
FLORIDA POWER AND LIGHT COMPANY
2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 2 (AEC), OCTOBER 31, 1973, DOCKET 50-250, TYPE--BUR, NRC--WEST., AE--RECHTEL

OF THE 51 BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS INSTALLED ON SAFETY RELATED SYSTEMS, 5 WERE FOUND TO HAVE LOST HYDRAULIC FLUID. NONE OF THESE WERE ONES INSTALLED AS REPLACEMENTS DURING THE JULY OUTAGE. TWO OF THE UNITS CONTAINED SEALS THAT WERE EXCESSIVELY SOFT AND GUMMY. TWO CONTAINED SEALS THAT WERE CRACKED AND BRITTLE, AND THE FIFTH CONTAINED SEALS THAT WERE WORN. FOUR REBUILT UNITS AND ONE NEW UNIT WERE INSTALLED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, BUR + SEAL + TURKEY POINT 3 (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

90

REINSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT MONTICELLO

NORTHERN STATES POWER COMPANY

4 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), OCTOBER 9, 1973, DOCKET 50-263, TYPE-- BUR, NRC--G.E., AE--BECHTEL

THERE ARE 59 BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS INSTALLED, 34 OF WHICH ARE WITHIN THE CONTAINMENT DRYWELL. THOSE EXTERNAL TO THE CONTAINMENT WERE INSPECTED WEEKLY. NO OIL LOSS HAS BEEN FOUND. AN INSPECTION INSIDE THE CONTAINMENT REVEALED 5 SHROUDERS WITH SLIGHT OIL LOSS, 3 OF THEM WERE REBUILT UNITS. THESE HAD LEAKS IN THE OIL-ADDITION FITTINGS. EXAMINATION OF 5 REBUILT UNITS SHOWED THE SEALS TO BE IN GOOD CONDITION. EXAMINATION OF 5 UNITS NOT PREVIOUSLY REBUILT HAD GENERAL O-RING DETEIORATION. THE SEALS WERE DEFORMED, GUNNY, AND SUSCEPTIBLE TO THINNING AND BREAKAGE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + SEAL + MONTICELLO (BUR) + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + PIPES AND PIPE FITTINGS

91

REINSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT DRESDEN 2

COMMONWEALTH EDISON COMPANY

4 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), OCTOBER 15, 1973, DOCKET 50-237, TYPE-- BUR, NRC--G.E., AE--SGT & LUNDY

ALL 43 BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS WERE REINSPECTED 52 DAYS AFTER THE INITIAL SHROUDER OUTAGE AS REQUIRED BY DRO BULLETIN 73-4. ALL SHROUDERS WERE OPERABLE AND EXHIBITED OVERALL INTEGRITY. FIVE SHROUDERS IN THE DRYWELL HAD SLIGHTLY LOW OIL LEVEL, 4 OF WHICH WERE BELIEVED TO BE FROM IMPROPER FILLING FOLLOWING INSTALLATION. A LOOSE CONNECTION WAS FOUND ON THE OTHER. THE SHROUDERS WERE DISMANTLED TO DETERMINE SEAL DROPTIC. THE SEALS OF BOTH WERE FOUND TO BE STIFF, BUT STILL CAPABLE OF PROVIDING AN EFFECTIVE SEAL.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + DRESDEN 2 (BUR) + SEAL + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

92

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AT BROWNS FERRY 1

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 2 (AEC), NOVEMBER 26, 1973, DOCKET 50-250, TYPE-- BUR, NRC--G.E., AE--TVA

DURING A UNIT SHUTDOWN, ALL HYDRAULIC SHOCK ARRESTORS WERE INSPECTED. ONE BERGEN-PATERSON ARRESTOR HAD LOW OIL LEVEL AND 3 GRINNELL ARRESTORS HAD NO OIL INDICATED IN THE ACCUMULATORS. TWO OF THESE 3 HAD EVIDENCE OF OIL LEAKAGE. OIL WAS ADDED TO RESTORE THE PROPER LEVEL. A WEEK LATER ALL OIL LEVELS WERE SATISFACTORY. IN ANOTHER WEEK 2 OTHER GRINNELL ARRESTORS HAD EMPTY RESERVOIRS. NO LEAKAGE WAS FOUND. DURING RECENT REPAIR ACTIVITIES AIR MAY HAVE BEEN TRAPPED AND IS NOW ESCAPING.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + SUPPORT STRUCTURE + SURVEILLANCE PROGRAM + LEAK + BACKFIT + BROWNS FERRY 1 (BUR) + PIPES AND PIPE FITTINGS

93

HYDRAULIC SHOCK ABSORBER INSPECTION AT PILGRIM

BOSTON EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 1 (AEC), OCTOBER 9, 1973, DOCKET 50-293, TYPE-- BUR, NRC--G.E., AE--BECHTEL

IN COMPARISON WITH DRO BULLETIN NO. 73-4 A REINSPECTION OF BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS WAS MADE. ALL UNITS WERE FOUND TO BE OPERABLE. THREE MOORE HSSA 10 ABSORBERS WERE REMOVED FOR INSPECTION BY THE VENDOR. IN THE ONE INSTALLED IN 1972 THE HYDRAULIC FLUID WAS DISCOLORED WITH THE CONSIDERABLE BLACK SILTY DEPOSITS IN THE FLUID. THE SEALS WERE VISIBLY DETEIORATED. A PROGRAM IS UNDERWAY TO REPLACE ALL THE MILLABLE GUN POLYURETHANE COMPOUND SEALS WITH ONES FABRICATED FROM ETHYLENE PROPYLENE FOR THE O-RINGS AND MOLDED POLYURETHANE FOR THE U-CUPS AND RIPS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + MATERIAL + MODIFICATION + SEAL + SUPPORT STRUCTURE + PILGRIM (BUR) + SURVEILLANCE PROGRAM + BACKFIT + PIPES AND PIPE FITTINGS

94

FAILURE OF HYDRAULIC SHOCK AND SWAY ARRESTOR AT OYSTER CREEK

JERSEY CENTRAL POWER AND LIGHT COMPANY

3 PAGES. LETTER TO DIRECTORATE OF LICENSING (AEC), NOVEMBER 13, 1973. DOCKET 50-216. TYPE--BUR. MFG--G.E.. AE--
PLANS & MCE

DURING AN INSPECTION OF THE HYDRAULIC SHOCK AND SHUT ARRESTOR UNITS LOCATED IN THE REACTOR BUILDING OUTSIDE THE DRYWELL, THE ACCUMULATOR IN ONE UNIT WAS FOUND TO BE DEVOID OF FLUID. ALSO, THE FLUID LEVEL WAS LOW IN ANOTHER UNIT. IN THE FIRST ONE, THE SPRING-LOADED PISTON RING HAD FAILED. THE U-CUP ON THE ACCUMULATOR PISTON MEAC APPARENTLY HAD DEGRADED TO A POINT WHERE IT ALLOWED THE FLUID TO LEAK OUT. THE ACCUMULATOR WAS REPLACED, AND FLUID WAS ADDED TO THE OTHER UNIT. THES: WERE BERGEN PATERSEN PIPE SUPPORT COMPANY, TYPE H55A-10, SERIAL NO. 449946 UNITS.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + DYSEER CREEK (BUR) + FAILURE, DESIGN ERROR + SEAL + SUPPORT STRUCTURE + LEAK + PIPES AND PIPE FITTINGS + INSERVICE INSPECTION

15
NINE MILE POINT SHUTDOWN (LEAKAGE THROUGH VALVE PACKING)
NIAGARA REMARK POWER CORPORATION

7 PAGES. LETTER TO DIVISION OF REACTOR LICENSING (AEC), OCTOBER 26, 1973. DOCKET 50-220. TYPE--BUR. MFG--G.E.. AE--NIAGARA REMARK

THE REACTOR WAS SHUT DOWN WHEN THE UNIDENTIFIED LEAK RATE INCREASED TO 4-5 GPM. TWO ELECTROMATIC RELIEF SYSTEMS BLOCKING VALVES HAD STEAM LEAKS THROUGH THE VALVE PACKING. ALSO, A SMALL LEAK WAS FOUND IN A REACTOR RECIRCULATION PUMP SEAL. DURING THE SHUTDOWN, ALL CONTROL RODS WERE VERIFIED TO MEET THE MINIMUM SHUTDOWN MARGIN OF 0.0075 DELTA K/K. ALSO, ALL HYDRAULIC SHOCK SUPPRESSORS WERE INSPECTED. LCB LEVEL WAS FOUND IN A FEW DUE TO LOOSE CONNECTIONS, MAINLY RESERVOIR END-CAPS. OIL WAS ADDED AND FITTINGS TIGHTENED. THE MANHOLE COVER ON THE DRYWELL WAS LEAK TESTED.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + FAILURE + NINE MILE POINT (BUR) + SHUTDOWN MARGIN + SEAL + SUPPORT STRUCTURE + LEAK + BACKFIT + CONTROL RODS + PUMPS + VALVES + PIPES AND PIPE FITTINGS

16
INSPECTION OF BERGEN-PATTERSON SHOCK ABSORBERS AT SURRY 1
VIRGINIA ELECTRIC AND POWER COMPANY

2 PAGES. LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 2, OCTOBER 9, 1973. DOCKET 50-200. TYPE--PWR. MFG--WEST.. AE--STONE & WEBSTER

A REINSPECTION OF ALL BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS WAS MADE BETWEEN SEPT. 25 AND 30. THE HYDRAULIC-FLUID LEVELS WERE NORMAL AND NO EVIDENCE OF LEAKAGE WAS FOUND. TO DATE, NO PROBLEMS HAVE BEEN EXPERIENCED WITH THESE SHOCK ABSORBERS.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + MAINTENANCE AND REPAIR + REACTOR, PWR + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + SURRY 1 (PWR) + BACKFIT + PIPES AND PIPE FITTINGS

17
SHOCK SUPPRESSORS AT POINT BEACH
WISCONSIN ELECTRIC POWER COMPANY

2 PAGES. LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), AUGUST 10, 1973. DOCKET 50-266. TYPE--PWR. MFG--WEST.. AE--BECTTEL

STATES THAT UNIT 1 HAS NO FLUID LEVEL PROBLEMS WITH ITS 10 ANKOR-MOLTH AND 9 GRINNEL UNITS. THIS GIVES ASSURANCE THAT HE SHOULD LIKEWISE FIND THE SAME MANUFACTURER'S UNITS ON UNIT 2 IN GOOD CONDITION WHEN A SHUTDOWN OR OTHER OPPORTUNITY FOR INSPECTION PRESENTS ITSELF.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, PWR + POINT BEACH 1 (PWR) + BACKFIT + SEISMIC DESIGN + POINT BEACH 2 (PWR) + PIPES AND PIPE FITTINGS

18
SHOCK SUPPRESSORS AT HILLSTONE
THE HILLSTONE POINT COMPANY

2 PAGES. LETTER TO DIRECTORATE OF REGULATORY OPERATIONS (AEC), JULY 18, 1973. DOCKET 50-245. TYPE--BUR. MFG--G.E.. AE--EBA5EC

AN EXAMINATION OF THE SHOCK SUPPRESSORS IN THE HILLSTONE 1 PLANT WAS INITIATED IN RESPONSE TO A TELEPHONE CONVERSATION WITH ANOTHER PLANT CONCERNING THE FAILURE OF A NUMBER OF THEIR BERGEN PATERSEN SUPPLIED SHOCK SUPPRESSORS. THE RESULTS OF EXAMINATION SHOWED THAT EITHER NO OR INSUFFICIENT HYDRAULIC FLUID WAS PRESENT IN 10 OF THE 44 UNITS INSTALLED IN THE PLANT. THE 10 FAILED UNITS WERE REPAIRED AND REFILLED USING NEW 'O' RINGS, SEALS AND HYDRAULIC FLUID, WHICH WERE PROVIDED BY THE VENDOR REPRESENTATIVES. WITH EXCEPTION OF THE HYDRAULIC FLUID, ALL THE REPLACEMENT PARTS WERE OF THE SAME DESIGN AND MATERIAL COMPOSITION AS THAT USED DURING THE ORIGINAL FABRICATION OF THE FAILED UNITS.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545. 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BUR + BACKFIT + SEISMIC DESIGN + HILLSTONE POINT 1 (BUR) + PIPES AND PIPE FITTINGS

92

FALLT SHOCK SUPPRESSORS AT MONTICELLO NORTHERN STATES POWER COMPANY

4 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), AUGUST 9, 1973, DOCKET 50-283, TYPE--
BWR, HPG--G.E., AE--BECHTEL

FIFTY NINE BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS ARE EMPLOYED ON THE VARIOUS SAFETY SYSTEMS. LOW OIL LEVEL WAS IDENTIFIED ON A TOTAL OF THIRTY SEVEN HYDRAULIC SHOCK SUPPRESSORS. TWENTY NINE OF WHICH ARE LOCATED INSIDE THE DRYWELL. THE MAIN CYLINDER AND ACCUMULATOR CYLINDER TUBE SEALS WERE DEFORMED. GURDY AND SUSCEPTIBLE TO THINNING WITH RESULTANT BREAKAGE WHEN SLIGHTLY STRETCHED. IN GENERAL, THE METAL PARTS OF THE UNITS APPEARED TO BE IN GOOD CONDITION EXCEPT IN A FEW INSTANCES. THE THIRTY TWO DISASSEMBLED UNITS WERE CLEANED AND REASSEMBLED USING NEW O-RINGS AND SEALS WHICH WERE PROVIDED BY THE VENDOR.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + MONTICELLO (BWR) + BACKFIT + SEISMIC DESIGN + PIPES AND PIPE FITTINGS

120

NO BULLETIN 73-3 -- DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS

U.S. ATOMIC ENERGY COMMISSION, GEORGIA

3 PAGES, LETTER WITH ATTACHMENT TO DUKE POWER COMPANY, JULY 27, 1973, DOCKET 50-269, TYPE--PWR, HPG--B&W, AE--OLKE

INFORMATION CONTAINED IN AN ABNORMAL OCCURRENCE REPORT FROM THE HILLSTONE 1 REACTOR, SUPPLEMENTED BY ADDITIONAL INFORMATION OBTAINED BY REGULATORY OPERATIONS FROM OTHER LICENSEES, REVEALED THAT 21 OF 112 HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS WERE MANUFACTURED BY THE BERGEN-PATERSON COMPANY. BPP REQUESTS INVESTIGATION AND CORRECTIVE ACTION.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + BACKFIT + SEISMIC DESIGN + HILLSTONE POINT 1 (BWR) + AGENCY, AEC + PIPES AND PIPE FITTINGS

101

HYDRAULIC SHOCK ABSORBERS AT DRESDEN, GLAD CITIES, AND ZION

COMMONWEALTH EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), AUGUST 29, 1973, DOCKET 50-10, TYPE--BWR, HPG--G.E., AE--BECHTEL

DESCRIBES THE PROGRAM FOR REINSPECTION OF BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS INSTALLED ON SAFETY-RELATED SYSTEMS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + REACTOR, PWR + DRESDEN 2 (BWR) + QUAD CITIES 1 (BWR) + ZION 1 (PWR) + BACKFIT + SEISMIC DESIGN + PIPES AND PIPE FITTINGS

102

NO BULLETIN 73-3 -- DEFECTIVE BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS

U.S. ATOMIC ENERGY COMMISSION, GEORGIA

1 PAGE, LETTER TO TENNESSEE VALLEY AUTHORITY, CHATTANOOGA, AUGUST 17, 1973, DOCKET 50-259, TYPE--BWR, HPG--G.E., AE--TVA

COMPILED RESULTS OF INSPECTIONS OF SHOCK ABSORBERS REVEAL THAT A LARGE PERCENTAGE OF INSTALLED BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS WERE NOT FULLY OPERATIONAL. ROUTINE REPAIRS, REPLACING DEFECTIVE SEALS AND FILLING HYDRAULIC OIL RESERVOIRS, MAY NOT BE AN ADEQUATE LONG-RANGE SOLUTION TO THIS PROBLEM. THERE IS ALSO INDICATION THAT DETERIORATION OF THE AFFECTED HYDRAULIC SHOCK ABSORBERS CAN OCCUR OVER A RELATIVELY SHORT PERIOD OF TIME, LESS THAN 90 DAYS. REQUESTS INVESTIGATION AND CORRECTIVE ACTION

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

BACKFIT + SEISMIC DESIGN + AGENCY, AEC + PIPES AND PIPE FITTINGS

103

HYDRAULIC SHOCK AND SWAY ARRESTOR FAILURE

JERSEY CENTRAL POWER & LIGHT COMPANY

3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), SEPTEMBER 21, 1973, DOCKET 50-219, TYPE--BWR, HPG--G.E., AE--BURNS & ROE

PARTIAL INSPECTION HAS REVEALED THE FAILURE OF 23 OUT OF 60 HYDRAULIC SHOCK AND SWAY ARRESTORS ON PIPING SYSTEMS IN THE DRYWELL AND 19 OUT OF 72 (50 PART INSPECTED) EXTERNAL TO THE DRYWELL. SOME OF WHICH ARE ASSOCIATED WITH ENGINEERED SAFEGUARD SYSTEMS. THE SHOCKERS WERE MADE INOPERABLE DUE TO EXCESSIVE LOSS OF HYDRAULIC FLUID RESULTING FROM THE FAILED MILLABLE GUN POLYURETHANE SEALS. THE FAILED HYDRAULIC SHOCK AND SWAY ARRESTORS ARE BEING, OR WILL BE REPLACED USING SHOCKERS REBUILT WITH SEAL KITS SUPPLIED BY THE BERGEN-PATERSON PIPE SUPPORT COMPANY.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + CYSTER CREEK (BWR) + SUPPORT STRUCTURE + BACKFIT + EMERGENCY COOLING SYSTEM + SEISMIC DESIGN + PIPES AND PIPE FITTINGS

1.14
REINSPECTION OF HYDRAULIC SHOCK SUPPRESSORS - QUAD CITIES 2
COMMONWEALTH EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), OCTOBER 26, 1973, DOCKET 50-265, TYPE--
RNR, WFG--G.E., AE--SGT & LUNDY

IN ACCORDANCE WITH HQ 73-8, WE INSPECTED THE 20 BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS. DURING THE INITIAL INSPECTION 20 SNUBBERS HAD BEEN REPAIRED. THREE SNUBBERS WERE FOUND EMPTY OF FLUID, AND 5 OTHERS SHOWED SIGNS OF LEAKAGE. ALL 20 SNUBBERS WERE REMOVED. THREE WERE REBUILT AND REINSTALLED. WHILE 20 WERE REPLACED WITH REBUILT SNUBBERS FROM UNIT 1. ALL BERGEN-PATERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN BOTH UNITS NOW CONTAIN MOLDED POLYURETHANE SEALS AND ETHYLENE PROPYLENE O-RINGS.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + MAINTENANCE AND REPAIR + MODIFICATION + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + QUAD CITIES 2 (BWR) + BACKFIT + PIPES AND PIPE FITTINGS

1.15
REINSPECTION OF QUAD CITIES 1 HYDRAULIC SHOCK SUPPRESSORS
COMMONWEALTH EDISON COMPANY

2 PAGES, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 3 (AEC), OCTOBER 12, 1973, DOCKET 50-254, TYPE--
RNR, WFG--G.E., AE--SGT & LUNDY

IN ACCORDANCE WITH HQ 73-8, WE INSPECTED THE 20 BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS. SEVEN OF THE 20 WERE IN AN UNSATISFACTORY CONDITION, OF WHICH 20 WERE REPLACED WITH REBUILT UNITS OBTAINED FROM THE VENDOR. THE OTHER 5 WERE REBUILT AND REINSTALLED. ALL THE SHOCK ABSORBERS REMOVED FROM UNIT 1 HAVE BEEN REPLACED BY STATION MAINTENANCE PERSONNEL AND WILL BE INSTALLED IN UNIT 2. MOLDED POLYURETHANE SEALS AND ETHYLENE PROPYLENE O-RINGS WERE USED IN THE REPAIR.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + MAINTENANCE AND REPAIR + MODIFICATION + QUAD CITIES 1 (BWR) + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + BACKFIT + PIPES AND PIPE FITTINGS

1.16
TUG REPORTS ON PIPING AND ITS SUPPORT STRUCTURE AT OCONEE 1, 2, AND 3
CLUE POWER COMPANY

100 PAGES, LETTER WITH ATTACHMENTS TO DIRECTORATE OF LICENSING (AEC), AUGUST 1, 1973, DOCKET 50-269/270/287, TYPE--RNR, WFG--BWR, AE--CLUE

MCS REPORT OS-73-3, THRUST MOVEMENT MONITORING PROGRAM FOR OCONEE 1, 2, 3 MAIN STEAM BYPASS TO CONDENSER. CONCLUDES THAT ALL THRUST MOVEMENTS WERE WELL WITHIN ALLOWABLE MOVEMENT, THAT THE SYSTEM BEHAVED AS PREDICTED, AND THAT ACTUAL THRUST MOVEMENTS WERE CONTROLLED BY USE OF HYDRAULIC SUPPRESSORS. MCS REPORT OS-73-4, MECHANICAL POWER PIPING SUPPORT SYSTEM QUALITY ASSURANCE MONITORING PROGRAM FOR LP INJECTION SYSTEM. CONCLUDES THAT THE HANGER-RESTRAINT SUPPORT SYSTEMS WERE ERECTED PROPERLY, THAT MOVEMENT CORRESPONDS TO PREDICTIONS, AND THAT ACCEPTABLE LOAD AND TRAVEL ADJUSTMENTS ARE ASSURED.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, PWR + COMPARISON, THEORY AND EXPERIENCE + REACTOR STARTUP TESTING + SUPPORT STRUCTURE + DISPLACEMENT + CORE REPLEADING SYSTEM + CONDENSER + BYPASS + OCONEE 1 (PWR) + PIPES AND PIPE FITTINGS

1.17
HYDRAULIC SUPPRESSOR AND RESTRAINT INSPECTION AT MUMBOLDT BAY
PACIFIC GAS AND ELECTRIC COMPANY

1 PAGE, LETTER TO DIRECTORATE OF REGULATORY OPERATIONS, REGION 5 (AEC), SEPTEMBER 25, 1973, DOCKET 50-133, TYPE--BWR, WFG--G.E., AE--BECHTEL

THERE ARE 4 HANNA HYDRAULIC SHOCK ABSORBERS INSTALLED AT MUMBOLDT BAY. INSPECTION SHOWED THEM TO BE IN GOOD CONDITION. EACH REQUIRED A OZ OF HYDRAULIC OIL (CAPACITY, 2.9 OZ AT NORMAL LEVEL).

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + MUMBOLDT BAY (BWR) + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + BACKFIT + PIPES AND PIPE FITTINGS

1.18
FAILURE OF WELD FOR SHOCK SUPPRESSOR AT CRESOEN 3
COMMONWEALTH EDISON COMPANY

3 PAGES, LETTER TO DIRECTORATE OF LICENSING (AEC), AUGUST 16, 1973, DOCKET 50-240, TYPE--RNR, WFG--WEST., AE--SGT & LUNDY

REPORTS TWO BERGEN-PATERSON HYDRAULIC SHOCK SUPPRESSORS, SIZE 2-3 INCH BORE 3-25 INCH STROKE, WERE REMOVED FROM THE UNIT 3 CRYSTALL FOR OVERHAUL. THE 3 INCH DIAMETER PIPE STUB TO WHICH THE TWO SNUBBERS WERE AFFIXED WAS BROKEN AT A CHROMIUMFERAL WELD. VIBRATIONS IN THE SYSTEM IMPOSED CYCLIC LOADING ON THE WELD WHICH ULTIMATELY CAUSED A FATIGUE FAILURE OF THE WELD.

AVAILABILITY - ARC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + FAILURE + WELD + CRESOEN 3 (BWR) + FAILURE, FATIGUE + VIBRATION + SUPPORT STRUCTURE + SEISMIC DESIGN + PIPES AND PIPE FITTINGS

107
AEC LETS REPORTS FROM LICENSERS ON SEISMIC SHOCK ABSORBERS
U.S. ATOMIC ENERGY COMMISSION, WASHINGTON
AEC PRESS RELEASE N-320 -- 2 PAGES, AUGUST 1, 1973

THE DEFECT IN THE SUPPRESSORS IS BELIEVED TO BE CAUSED BY FAULTY OR IMPROPER SEALS. THE AEC CONCLUDED THAT ALL SUPPRESSORS MADE BY THIS MANUFACTURER SHOULD BE TESTED AT ONCE. OF THE 34 NUCLEAR POWER PLANTS LICENSED TO OPERATE, PRELIMINARY REPORTS INDICATE THAT 20 USE BERGEN-PATTERSON SHOCKS. OF THESE, SOME DEFECTIVE SHOCKS WERE FOUND IN 11 PLANTS. NO PROBLEMS WERE FOUND IN SIX PLANTS AND THE TESTS WERE NOT COMPLETED IN THE REMAINING THREE PLANTS. THE OTHER 14 NUCLEAR PLANTS USE SHOCK ABSORBERS MADE BY OTHER MANUFACTURERS; PRELIMINARY CHECKS OF SOME OF THESE SHOCK ABSORBERS HAVE NOT REVEALED ANY INOPERABLE EQUIPMENT.

AVAILABILITY - USAREC, DIVISION OF PUBLIC INFORMATION, WASHINGTON, D.C. 20545

FAILURE • FASTENER • SUPPORT STRUCTURE • OPERATING EXPERIENCE • SEISMIC DESIGN • PIPES AND PIPE FITTINGS

110
AUGUST 1973 MONTHLY INSPECTION SUMMARY REPORT
U.S. ATOMIC ENERGY COMMISSION
40 PAGES, DIRECTORATE OF REGULATORY OPERATIONS MONTHLY INSPECTION REPORT, AUGUST 1973

PROVIDES A MONTHLY REPORT OF INSPECTION AND ENFORCEMENT ACTIVITIES BY REGIONS. HIGHLIGHTS: (1) STEAM-GENERATOR DOWNCOMER REPAIRS AT INDIAN POINT 2; (2) FT. CALHOUN INITIAL CRITICALITY ON AUGUST 9; (3) BROWN FERRY 1 INITIAL CRITICALITY ON AUGUST 19; (4) PEACH BOTTOM 2 ISSUED LICENSE FOR 10% POWER; (5) PRAIRIE ISLAND 1 ISSUED FUEL LOADING LICENSE; AND (6) HYDRAULIC SHOCK-ABSORBER PROBLEM IDENTIFIED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

MAINTENANCE AND REPAIR • INCIDENT COMPILATION • SUPPORT STRUCTURE • OPERATING LICENSE PROCESS • STEAM GENERATOR • REPORT, NRC INSPECTION • REACTOR STARTUP • FUEL LOADING • PIPES AND PIPE FITTINGS

111
DEFECTIVE BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS (NO 73-4)
U.S. ATOMIC ENERGY COMMISSION, KING OF PRUSSIA
3 PAGES, LETTER TO BOSTON EDISON COMPANY, AUGUST 17, 1973, DOCKET 50-293, TYPE--BWR, NRG--G.E., AE--BECHTEL

COMPILED RESULTS OF THE INSPECTION OF BERGEN-PATTERSON SHOCK ABSORBERS REQUESTED BY RO BULLETIN NO. 73-3 REVEALED THAT A LARGE PERCENTAGE OF THE INSTALLED UNITS WERE NOT FULLY OPERATIONAL. PRELIMINARY INFORMATION INDICATES THAT ROUTINE REPAIRS MAY NOT BE AN ADEQUATE LONG-RANGE SOLUTION. THEREFORE, AEC REQUESTS THAT A REINSPECTION OF BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN SAFETY-RELATED SYSTEMS BE MADE AFTER ABOUT 45 DAYS OF PLANT OPERATION AT TEMPERATURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • MAINTENANCE AND REPAIR • SUPPORT STRUCTURE • PILGRIM (BWR) • BACKFIT • AGENCY, AEC • PIPES AND PIPE FITTINGS

112
DEFECTIVE BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS (NO 73-4)
U.S. ATOMIC ENERGY COMMISSION, KING OF PRUSSIA
3 PAGES, LETTER TO CONNECTICUT YANKEE ATOMIC POWER COMPANY, AUGUST 17, 1973, DOCKET 50-213, TYPE--PWR, NRG--WEST., AE--STONE & WEBSTER

COMPILED RESULTS OF THE INSPECTION OF BERGEN-PATTERSON SHOCK ABSORBERS REQUESTED BY RO BULLETIN NO. 73-3 REVEALED THAT A LARGE PERCENTAGE OF THE INSTALLED UNITS WERE NOT FULLY OPERATIONAL. PRELIMINARY INFORMATION INDICATES THAT ROUTINE REPAIRS MAY NOT BE AN ADEQUATE LONG-RANGE SOLUTION. THEREFORE, AEC REQUESTS THAT A REINSPECTION OF BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN SAFETY-RELATED SYSTEMS BE MADE AFTER ABOUT 45 DAYS OF PLANT OPERATION AT TEMPERATURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • MAINTENANCE AND REPAIR • REACTOR, PWR • CONNECTICUT YANKEE (PWR) • SUPPORT STRUCTURE • BACKFIT • AGENCY, AEC • PIPES AND PIPE FITTINGS

113
DEFECTIVE BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS (NO 73-4)
U.S. ATOMIC ENERGY COMMISSION, ATLANTA
3 PAGES, LETTER TO CAROLINA POWER AND LIGHT COMPANY, AUGUST 17, 1973, DOCKET 50-261, TYPE--PWR, NRG--WEST., AE--ERASCC

COMPILED RESULTS OF THE INSPECTION OF BERGEN-PATTERSON SHOCK ABSORBERS REQUESTED BY RO BULLETIN NO. 73-3 REVEALED THAT A LARGE PERCENTAGE OF THE INSTALLED UNITS WERE NOT FULLY OPERATIONAL. PRELIMINARY INFORMATION INDICATES THAT ROUTINE REPAIRS MAY NOT BE AN ADEQUATE LONG-RANGE SOLUTION. THEREFORE, AEC REQUESTS THAT A REINSPECTION OF BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN SAFETY-RELATED SYSTEMS BE MADE AFTER ABOUT 45 DAYS OF PLANT OPERATION AT TEMPERATURE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • MAINTENANCE AND REPAIR • REACTOR, PWR • ROBINSON 2 (PWR) • SUPPORT STRUCTURE • BACKFIT • AGENCY, AEC

• PIPES AND PIPE FITTINGS

113

DEFECTIVE BURGESS-PATTERSON HYDRAULIC SHOCK ABSORBERS (NO 73-8)

U.S. ATOMIC ENERGY COMMISSION, ATLANTA

3 PAGES, LETTER TO DURE POWER COMPANY, AUGUST 17, 1973, DOCKET 50-269, TYPE--PDR, HFG--BIV, AE--DURE

COPIED RESULTS OF THE INSPECTION OF BURGESS-PATTERSON SHOCK ABSORBERS REQUESTED BY DC BULLETIN NO. 73-3 REVEAL THAT A LARGE PERCENTAGE OF THE INSTALLED UNITS WERE NOT FULLY OPERATIONAL. PRELIMINARY INFORMATION INDICATES THAT ROUTINE REPAIRS MAY NOT BE A GOOD LONG-RANGE SOLUTION. THEREFORE, AEC REQUESTS A REINSPECTION OF BURGESS-PATTERSON HYDRAULIC SHOCK ABSORBERS INSTALLED IN SAFETY-RELATED SYSTEMS FOLLOWING ABOUT 45 DAYS OF PLANT OPERATION AT TEMPERATURE.

AVAILABILITY - AEC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + MAINTENANCE AND REPAIR + REACTOR, PDR + SUPPORT STRUCTURE + BACKFIT + JCONEE 1 (PDR) + AGENCY, AEC + PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS (NO 73-3)

U.S. ATOMIC ENERGY COMMISSION, NEBARR

3 PAGES, LETTER TO BOSTON EDISON COMPANY, JULY 27, 1973, DOCKET 50-293, TYPE--BUR, HFG--G.E., AE--BECHTEL

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BURGESS-PATTERSON COMPANY AT A PDR SHOWED 51 OF 112 WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR WITHIN 3 DAYS. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, AN INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - AEC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

HEATER, BPH + FAILURE + SUPPORT STRUCTURE + PILGRIM (BUR) + MAIN COOLING SYSTEM + BACKFIT + AGENCY, AEC + PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS (NO 73-3)

U.S. ATOMIC ENERGY COMMISSION, NEBARR

3 PAGES, LETTER TO PHILADELPHIA ELECTRIC COMPANY, JULY 27, 1973, DOCKET 50-171, TYPE--HTGR, HFG--G.E., AE--BECHTEL

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BURGESS-PATTERSON COMPANY AT A PDR SHOWED 51 OF 112 WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR WITHIN 3 DAYS. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, AN INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - AEC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, GRAPHITE MODERATED + PEACH BOTTOM 1 (HTGR) + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + REACTOR, HTGR + BACKFIT + AGENCY, AEC + PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS (NO 73-3)

U.S. ATOMIC ENERGY COMMISSION, NEBARR

3 PAGES, LETTER TO CONSOLIDATED Edison COMPANY, JULY 27, 1973, DOCKET 50-287, TYPE--PDR, HFG--WEST., AE--UNITED ENGR

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BURGESS-PATTERSON COMPANY AT A PDR SHOWED 51 OF 112 WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR WITHIN 3 DAYS. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, AN INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - AEC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE + REACTOR, PDR + INDIAN POINT 2 (PDR) + SUPPORT STRUCTURE + MAIN COOLING SYSTEM + BACKFIT + AGENCY, AEC + PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS (NO 73-3)

U.S. ATOMIC ENERGY COMMISSION, NEBARR

3 PAGES, LETTER TO THE HILLSTONE POINT COMPANY, JULY 27, 1973, DOCKET 50-285, TYPE--BUR, HFG--G.E., AE--EBASCO

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BURGESS-PATTERSON COMPANY AT A PDR SHOWED 51 OF 112 WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR WITHIN 3 DAYS. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, AN INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - AEC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • SUPPORT STRUCTURE • MAIN COOLING SYSTEM • BACKFIT • HILLSTONE POINT 1 (BWR) • AGENCY, AEC • PIPES AND PIPE FITTINGS

119
DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS (RD 73-3)
U.S. ATOMIC ENERGY COMMISSION, GLEN ELLYN, ILLINOIS
2 PAGES, LETTER TO COMMONWEALTH EDISON COMPANY, JULY 27, 1973, DOCKET 50-10, TYPE--BWR, WPG--G.E., AE--BECHTEL

INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BERGEN-PATTERSON COMPANY AT A PUR SHOWN 91 OF 112 WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR WITHIN 3 DAYS. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, AN INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • DRESCON 1 (BWR) • FAILURE • SUPPORT STRUCTURE • MAIN COOLING SYSTEM • BACKFIT • AGENCY, AEC • PIPES AND PIPE FITTINGS

120
DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS AT HILLSTONE
THE HILLSTONE POINT COMPANY
2 PAGE LETTER TO DIRECTOR OF LICENSING (AEC), JULY 31, 1973, DOCKET 50-245, TYPE--BWR, WPG--G.E., AE--ERASCO

ON JULY 18, 1973, A REPORT OF THE FAILURE OF 19 OF 44 BERGEN-PATTERSON TYPE SHOCK SUPPRESSORS WAS MADE. SUBSEQUENT REVIEWS SHOWED ONE OTHER SHOCK SUPPRESSOR TO HAVE INSUFFICIENT FLUID LEVEL. ALSO, ONE ADDITIONAL UNIT WAS LOCATED, BRINGING THE TOTAL NUMBER TO 45. IT WAS OPERABLE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • MAINTENANCE AND REPAIR • SUPPORT STRUCTURE • MAIN COOLING SYSTEM • BACKFIT • HILLSTONE POINT 1 (BWR) • PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSOR AND RESTRAINTS AT FT. CALHOUN
OMAHA PUBLIC POWER DISTRICT
8 PAGES, LETTER WITH ATTACHMENT TO DIRECTORATE OF REGULATORY OPERATIONS, REGION IV (AEC), AUGUST 3, 1973, DOCKET 50-289, TYPE--PWR, WPG--CEM, AE--GIBBS & HILL

SITE RECORDS INDICATE THAT THERE ARE 525 BERGEN-PATTERSON SHOCK SUPPRESSORS INSTALLED AT THE PLANT. ALL WERE INSPECTED, AND 26 SHOWED OIL LEAKAGE, OF WHICH 8 WERE EMPTY OF HYDRAULIC FLUID. EMPTY ONES WERE FILLED. LEAKERS DO NOT HAVE THEIR FUNCTIONS AFFECTED. ALL SUPPRESSORS WILL BE INSPECTED DURING EACH REFUELING OUTAGE. LEAKERS WILL BE INSPECTED QUARTERLY.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

FAILURE • MAINTENANCE AND REPAIR • REACTOR, PWR • FT. CALHOUN (PWR) • SUPPORT STRUCTURE • MAIN COOLING SYSTEM • BACKFIT • PIPES AND PIPE FITTINGS

122
DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS AT OYSTER CREEK
JERSEY CENTRAL POWER & LIGHT COMPANY
• 35 PAGES, LETTER WITH ATTACHMENT TO DIRECTORATE OF LICENSING (AEC), AUGUST 6, 1973, DOCKET 50-219, TYPE--BWR, WPG--G.E., AE--BURNS & ROE

SUBMITS SUMMARY REPORT (JULY 18, 1973) ON SHUTTER REPAIR ACTIVITIES DURING THE 1973 REFUELING OUTAGE WHEN AN INSPECTION REVEALED THAT A MAJORITY OF THE UNITS WERE TOTALLY DEVOID OF FLUID BECAUSE OF LEAKS THROUGH SEALS. PRELIMINARY RESULTS SHOW THAT HIGH AMBIENT TEMPERATURES DETERIORATED THE SEALS. A SECOND INSPECTION OF THE DRYWELL ON JULY 21 REVEALED 8 OF 62 SHUTTERS WERE LOW ON HYDRAULIC FLUID IN VARYING AMOUNTS. LEAKS AGAIN RESULTED FROM SEAL FAILURES. IT IS THOUGHT THAT THE SILICONE-BASE FLUID HAS A COMPONENT WHICH REPLACED THE PLASTICIZER IN THE POLYURETHANE SEALS, CAUSING SPRINGAGE OF THE SEAL.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR • FAILURE • MAINTENANCE AND REPAIR • OYSTER CREEK (BWR) • SEM. • DAMAGE • SUPPORT STRUCTURE • MAIN COOLING SYSTEM • LUBRICATION • LEAK • BACKFIT • PIPES AND PIPE FITTINGS

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DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS - NO BULLETIN NO. 73-3
U.S. ATOMIC ENERGY COMMISSION, DIRECTORATE OF REGULATORY OPERATIONS
4 PAGES, LETTER TO OMAHA PUBLIC POWER DISTRICT, JULY 27, 1973, DOCKET 50-285, TYPE--PWR, WPG--CEM, AE--GIBBS & HILL

AT HILLSTONE 1 REACTOR, 51 OF 112 HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS MADE BY BERGEN-PATTERSON CO. WERE DEFECTIVE DUE TO LOSS OF HYDRAULIC OIL SUPPLY. AEC THEREFORE REQUESTS INSPECTION (BY NOON JULY 30, 1973) OF ALL INSTALLED SHOCK SUPPRESSORS AND RESTRAINTS FROM THIS VENDOR. IF SUPPRESSORS AND RESTRAINTS WERE OBTAINED FROM OTHER VENDORS, THE INSPECTION WILL BE MADE AT THE NEXT SHUTDOWN.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

AN EXAMINATION OF THE SHOCK SUPPRESSORS WAS INITIATED AFTER A CALL FROM ANOTHER PLANT CONCERNING FAILURE OF THEIR PULPER PATTERSONS SUPPLY SHOCK SUPPRESSORS. NO OR INSUFFICIENT HYDRAULIC FILLER WAS FOUND IN 19 OF THE 44 UNITS INSTALLED. LOSS OF FILLER RESULTED FROM DETERIORATION OF THE O-RINGS AND SEALS. SEALS IN THE OTHER UNITS WERE IN GOOD CONDITION. THE DEFECTIVE PARTS WERE REPLACED AND HYDRAULIC FILLER ADDED TO THE SUPPRESSORS. ALL THE DEFECTIVE UNITS WERE PURCHASED AT THE SAME TIME AND INSTALLED PRIOR TO INITIAL PLANT OPERATION. TWO OF THE GOOD UNITS HAD ALSO BEEN INSTALLED AT THIS TIME, BUT PURCHASED AFTER THE FIRST ORDER. THE OTHER 42 UNITS WERE INSTALLED LATER.

REACTION, EMB + FAILURE + FAILURE, FABRICATION ERROR + SEAL + MAIN COOLING SYSTEM + MILLSTONE POINT 1 (BWR) + EFFECT, AGE + FAILURE, CORROSION, MCEP

WHILE PERFORMING ALIGNMENT CHECKS IN APRIL AND MAY, MALFUNCTION OF MOVEMENT OF FOUR CONTROL ROD DRIVE LIPS WERE EXPERIENCED. REACTION WAS SHUT DOWN TO COLD CONDITION, AND EXAMINATION REVEALED MALFUNCTIONS AT 2 LOCATIONS WERE CAUSED BY FOREIGN MATTER AND AT OTHER TWO THE CAUSE WAS A LOCALLY REDUCED SECTION OF THE GUIDE TUBE IN THE DASHPOT AREA OF THE FUEL ASSEMBLIES. ALL FUEL ASSEMBLIES AND ROD-CLUSTER CONTROL ASSEMBLIES WERE MOVED FROM VESSEL. FIVE CONTROL ASSEMBLIES AND THE GUIDE TUBE WERE FOUND UNACCEPTABLE.

GUIDE • FAILURE • MECHANISM, PWR • FAILURE, SCRAM MECHANISM • INDIAN POINT 2 (PWR) • CORE COMPONENTS • OBSTRUCTION • CONTROL ROD DRIVE MECHANISMS

DURING A REGULAR ENG-OF-CYCLE SPLIT DOWN, 1 CONTROL ROD FAILED TO INSERT THE LAST 6 IN. IT BOUNDED IN THE SPACE ABSORBER. THE ROD WAS REPLACED WITH A SPARE ONE.

REACTOR, RESEARCH + REACTOR, PCCU TYPE + FAILURE, SCRAM MECHANISM + OBSTRUCTION + REACTOR SHUTDOWN + CONTROL RECS

NOTES TEN ABNORMAL OCCURRENCES - UNEXPLAINED PARTIAL CROP OF SHIM ARM 2, FAILURE OF SHIM 2 TO DROP ON MANUAL START, MALFUNCTION OF REGULATING ROD, HEAT SMOKE ABSORBER VANE OF SHIM 4, FAILURE OF REG. ROD TO DRIVE IN, BROKEN FUEL-ELEMENT-HEAD ROLL PIN, DAMAGED DUMMY ELEMENT IN POSITION M-4, FAILURE OF SHIM 4 TO DRIVE IN FULLY, AND FAILURE OF SHIM ARM TO DRIVE IN UPON ACTUATION OF INSERT SWITCH.

FAILURE • REACTION, RESEARCH • ACIDENT, OPERATIONS SUMMARY • NBS • CONTROL ACCS • FUEL ELEMENTS • CONTROL ROD DRIVE MECHANISMS

REPORT DESCRIBES EXPERIENCES IN PERIOD 1963 TO 1969. LIQUID NITROGEN IRRADIATION PERFORMED IN 3-INCH-ODIAM AL TUBE CENTERED IN 7.0-INCH-ODIAM SECTION OF AL PIPE, WITH ANNULAR SPACE FILLED WITH STYROFOAM. THIS PING EXHAUSTS PLANT PLUM AND PROVIDES A SMOKE ABSORBER. ONLY NITROGEN WITH 20 PPM OXYGEN USED, REDUCES POSSIBILITY OF O₂ EXPLOSION. DOORSHIFT IN LEAD PLATE BETWEEN REACTOR AND THERMAL COLUMN CAUSED REGULATING ROD TO DRIVE INWARD. WITH COOLING OF MODERATION AND OTHER EFFECTS, TOTAL REACTIVITY ADDITION WAS QUOTE PERCENT DELTA SIX

AVAILABILITY - PENNSYLVANIA STATE UNIVERSITY, NUCLEAR ENGINEERING DEPARTMENT, 231 SACKETT HALL, UNIVERSITY PARK, PENNSYLVANIA 16802

OXYGEN + REACTOR, RESEARCH + TRAINING + NITROGEN + OZONE + THERMALIZATION + IRRADIATION TESTING + REACTIVITY EFFECT, ANCHALUS + OPERATING EXPERIENCE

129

CHANGE 7 - MODIFICATION OF 15 RCC DRIVES

U.S. ATOMIC ENERGY COMMISSION

5 PAGES, LETTER TO PRIMA, JUNE 4, 1968, DOCKET 115-8, TYPE--BWR, RFG--C.E., AE--JACKSON + MCRELAND

ALLCDS CHANGE AFTER SATISFACTORY OPERATION SINCE JUNE 07 OF 2 DRIVES WITH ACCED (1) TORQUE SPRING TO OVERCOME FRICTION ON INITIAL INSERTION, (2) CENTRIFUGAL BRAKE TO LIMIT VELOCITY AND HENCE ENERGY ON DECELERATION, (3) CIL RESERVOIR TO COMPENSATE FOR LEAKAGE. 000 TEST PROGRAM REVERSED IN SAFETY EVALUATED.

AVAILABILITY - ARC PUBLIC DOCUMENT RCCH, 1717 N STREET, WASHINGTON, D. C. 20545, 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

REACTOR, BWR + BONUS (ISR) + MODIFICATION + TECHNICAL SPECIFICATIONS + TEST, SYSTEM OPERABILITY + SAFETY EVALUATION + CONTROL ROD DRIVE MECHANISMS + ACCUMULATORS

130

POLASKI CA

DAMPING CHARACTERISTICS OF THE NSC SHIM-SAFETY RODS

TEXAS A + M UNIVERSITY, COLLEGE STATION, TEXAS

NSC-11 P. 11 PAGES, 3 FIGURES, 1 REFERENCE, NUCLEAR SCIENCE CENTER TECHNICAL REPORT NO. 11, MARCH 1964

AFTER HEARING CONSIDERABLE NOISE WHEN THE SHIM-SAFETY RODS HIT BOTTOM AFTER A SCRAM, ROD-OPPO TESTS WERE RUN TO DETERMINE ROD ACCELERATION FOR ESTIMATING THE MAXIMUM STRESS ON THE ROD WHEN IT STOPPED. DAMPING ACTION OF THE DASHPOT WAS OBSERVED, AND THE MAXIMUM DECELERATION MEASURED WAS 0.65 G. THE D-SS RODS HAVE A STRESS SAFETY FACTOR OF 7.46, BUT IMPROVED PERFORMANCE OF THE DASHPOT WILL BE INVESTIGATED.

AVAILABILITY - NUCLEAR SCIENCE CENTER, TEXAS A + M UNIVERSITY, COLLEGE STATION, TEXAS 77843
INTEGRITY + MEASUREMENT + NOISE + REACTOR, RESEARCH + STRESS + REACTOR, POOL TYPE + ACCELERATION + SAFETY MARGIN + SYSTEM CAPABILITY + CONTROL RODS

131

SELECTED RCCHS OPERATING EXPERIENCE

PUERTO RICO WATER RESOURCES AUTHORITY, SAN JUAN, PUERTO RICO

12 PAGES, 3 TABLES, BONUS NUCLEAR POWER PLANT ORL MONTHLY REPORT NO. 10, OCTOBER 1967, DOCKET NO. 115-8, TYPE--BWR, RFG--C.E., AE--JACKSON + MCRELAND

INSPECTION OF CORE PERFORMED TO DETERMINE CAUSE OF REDUCTION IN RECIRCULATION FLOW. HIGH-COPPER-CONTENT CAUSE OBSERVED ON CORE-STRUCTURE-BOX ORIFICES AND FUEL-ASSEMBLY END PIECES. CONTROL-ROD INSPECTIONS DISCUSSED. BELLEVILLE SPRINGS (EMERGENCY SHOCK ABSORBERS) ON ROD NO. 9 FOUND FLATTENED DUE TO POOR HYDRAULIC SMOOTHER ACTION CAUSED BY LOW OIL VISCOSITY.

AVAILABILITY - USARC PUBLIC DOCUMENT RCCH, WASHINGTON, D. C.

BONUS (ISR) + REPORT, OPERATIONS + REACTOR, INTERNAL SUPERHEAT + COPPER + CRJ0 + FAILURE, SCRAM MECHANISM + EXAMINATION + SURFACE FILM DEPOSIT + CORE COMPONENTS + CONTROL RODS + FUEL ELEMENTS

ADDENDUM TO APPENDIX A
 ADDITIONAL CITATIONS RECEIVED AFTER COMPILATION OF THE REPORT

100554
 HYDRAULIC SHOCK SUPPRESSORS FAIL TO MEET CRITERIA AT YANKEE NPP
 YANKEE ATOMIC ELECTRIC CO., MAINE, WASS-
 2 PWS, LTR W/AG NO 50-29275-15 TO NRC OFFICE OF L. & E., REGION IV, DEC. 8, 1975. DOCKET 50-29, TYPE--RBR, MFG--
 GENERAL ELECTRIC, WHEATON

CAUSE - NOT STATED. DURING TESTING OF THE HYDRAULIC SHOCK SUPPRESSORS BY THE MANUFACTURER FOR
 PROVEN STROKE, LOCK-UPS, AND BLEED, EIGHT 1.5 INCH BORE, 5 INCH STROKE, GRINNELL, FIG 2001 UNITS
 FAILED TO MEET THE ACCEPTANCE CRITERIA. ALL WERE REPLACED WITH SIMILAR SUPPRESSORS THAT HAD
 BEEN SUCCESSFULLY TESTED. THE REACTOR WAS IN A REFUELING OUTAGE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM
 CHARGE \$25.00

YANKEE NPP (RBR) + REACTOR, RBR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + TEST, SYSTEM
 PROGRAM + FAILURE

100547
 SEAL MATERIAL WITHIN GRINNELL HYDRAULIC SHOCK SUPPRESSOR FAILS AT FT. CALHOUN
 MAHA PUBLIC POWER DISTRICT, OHIO, WASS-
 2 PWS, LTR W/AG NO 50-28575-7 TO NRC, NRC, REGION IV, NOV. 11, 1975. DOCKET 50-285, TYPE--RBR, MFG--COMB., BE--
 GRINNELL

CAUSE - MATERIAL COMPATIBILITY AND WEAR. DURING A SHUTDOWN, A GRINNELL SHOCK SUPPRESSOR WAS
 REMOVED AND DISASSEMBLED TO INVESTIGATE A LEAK. TWO SPECIAL O-RING SEALS LOCATED ON THE PISTON
 SHAFT O-RING SEALS WERE FOUND TO BE BRITTLE. BRITTLENESS WAS FOUND ON SEALS IN 2 OTHER
 UNITS. THE PROBLEM SEEMS TO BE COMPATIBILITY OF THE SEAL MATERIALS WITH THE HYDRAULIC FLUID AND
 THE WEAR. THE MATERIAL IS CALLED NORYTHANE. NEW SEAL KITS ARE ON ORDER FOR ALL 24 GRINNELL
 UNITS. THEY WILL BE INSTALLED WHEN FEASIBLE AFTER THEY ARE RECEIVED.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM
 CHARGE \$25.00

FT. CALHOUN (RBR) + REACTOR, RBR + FAILURE + SEAL + LEAK + FAILURE, DESIGN ERROR + FAILURE, COMMON MODE +
 SURVEILLANCE PROGRAM

100203
 HYDRAULIC SHOCK SUPPRESSOR FOUND DISCONNECTED AT WATON 1
 GEORGIA POWER CO., DALY, GEORGIA
 2 PWS, LTR W/AG NO 50-321375-34 TO NRC DIRECTORATE OF REGULATORY OPERATIONS, REGION II, DEC. 2, 1975. DOCKET 50-
 321, TYPE--RBR, MFG--GEORGIA, BE--SEE

CAUSE - JAM NUTS VIBRATED LOOSE. DURING VISUAL INSPECTION OF THE DRYWELL AFTER SHUTDOWN, A
 HYDRAULIC SHOCK SUPPRESSOR ON A BSL SAFETY RELIEF VALVE WAS FOUND TO BE DISCONNECTED FROM THE
 LINE. JAM NUTS ON THE ADJUSTABLE SHAFT BORDED LOOSE WITH CONTINUAL VIBRATION OF THE STEAM LINE
 ALLOWING THE UNIT TO DISCONNECT ITSELF FROM THE LINE. THE SUPPRESSOR WAS RECONNECTED.
 INSPECTION FOUND A OTHER SUPPRESSORS LOOSE. NUTS WERE REINSTALLED AND THREADS CUT TO PREVENT
 REOCCURENCE.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM
 CHARGE \$25.00

WATON 1 (RBR) + REACTOR, RBR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + FAILURE, EQUIPMENT +
 VIBRATION + FASTENER + FAILURE, INSTALLATION ERROR

100447
 TWO HYDRAULIC SHOCKERS FOUND INOPERABLE AT BEACH BOTTOM 2
 PHILADELPHIA ELECTRIC CO., PHILADELPHIA, PA.
 2 PWS, AG NO 50-277-74-75 TO NRC OFFICE OF NUCLEAR REACTOR REGULATION, NOV. 26, 1975. DOCKET 50-277, TYPE--RBR,
 MFG--GEORGIA, BE--GEORGIA

CAUSE - SEAL LEAKS. DURING A ROUTINE INSPECTION WITH THE REACTOR IN COLD SHUTDOWN, THE RESERVOIRS
 OF 2 HYDRAULIC SHOCKERS WERE FOUND EMPTY. GASKETS AND O-RINGS WERE LEAKING. EFFECTIVE GASKETS,
 SEALS, O-RINGS, AND FITTINGS WILL BE REPLACED. FOLLOWING REPAIR, EACH UNIT WILL BE CHECKED IN A
 TEST STAND.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM
 CHARGE \$25.00

BEACH BOTTOM 2 (RBR) + REACTOR, RBR + FAILURE + SUPPORT STRUCTURE + PIPES AND PIPE FITTINGS + SURVEILLANCE
 PROGRAM + SEAL + LEAK + FAILURE, EQUIPMENT

100409
 HYDRAULIC SHOCKERS FOUND INOPERABLE AT BEACH BOTTOM 2
 PHILADELPHIA ELECTRIC CO., PHILADELPHIA, PA.
 2 PWS, AG NO 50-277-74-75 TO NRC OFFICE OF NUCLEAR REACTOR REGULATION, NOV. 16, 1975. DOCKET 50-277, TYPE--RBR,
 MFG--GEORGIA, BE--GEORGIA

CAUSE - LEAKING O-RINGS AND SEALS. DURING A ROUTINE INSPECTION WHILE THE UNIT WAS IN SHUTDOWN,
 THE RESERVOIRS OF FIVE HYDRAULIC SHOCKERS WERE FOUND EMPTY. THE O-RINGS AND GASKETS WERE
 LEAKING. THE EFFECTIVE O-RINGS AND GASKETS WILL BE REPLACED. THE SHOCKERS WILL BE TESTED FOR
 OPERATING CAPABILITY AND LEAKS.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

PEACH BOTTOM 2 (BWR) * REACTOR, BWR * FAILURE * *SUPPORT STRUCTURE * PIPES AND PIPE FITTINGS * SURVEILLANCE PROGRAM * FAILURE, EQUIPMENT * *SEAL * *LEAK

100000
HYDRAULIC SHOCK SUPPRESSOR FOUND TO BE DISCONNECTED AT THREE MILE ISLAND 1
METROPOLITAN EDISON CO., READING, PA.
J. PDS, AD 50-289/75-34 TO NRC DIRECTOR OF REACTOR REGULATION, OCT. 8, 1979, DOCKET 50-289, TYPE--PWR, MFC--
HUB, AR--GILBERT ASSOC.

CAUSE - INSTALLATION ERROR. DURING AN INSPECTION OF HYDRAULIC SHOCK SUPPRESSORS INSIDE THE SECONDARY SHIELD OF THE REACTOR BUILDING WHILE THE REACTOR WAS IN COLD SHUTDOWN, 1 OF THE 14 SNOBBERS ON THE PRESSURIZER AUXILIARY SPRAY LINE WAS FOUND TO BE DISCONNECTED. THE UNIT WAS IMMEDIATELY REBUILT AND RE-INSTALLED. IT HAD BEEN REMOVED FOR REPAIR IN MAY AND APPARENTLY WAS NOT PROPERLY CONNECTED DURING RE-INSTALLATION.

AVAILABILITY - NRC PUBLIC DOCUMENT ROOM, 1717 M STREET, WASHINGTON, D. C. 20545 100 CENTS/PAGE -- MINIMUM CHARGE \$2.00

THREE MILE ISLAND 1 (PWR) * REACTOR, PWR * FAILURE * *SUPPORT STRUCTURE * PIPES AND PIPE FITTINGS * SURVEILLANCE PROGRAM * *FAILURE, INSTALLATION ERROR * *MAINTENANCE AND REPAIR

APPENDIX B
PRINTOUT OF RECON SEARCH OF NSA

[illegible]

1/2/000001-000001// 22
 20011700 454-20-02 76.700
 (CONF-720402- REITERA FOR THE DESIGN AND ANALYSIS OF PIPE HUMP RESTRAINTS/
 KOPPEL, R. E.//
 PITTSBURGH UNIV., PA. USA DEPT. OF CIVIL ENGINEERING/
 SARGENT AND LUNDY ENGINEERS, CHICAGO/
 ECC 1972/
 STRUCTURAL DESIGN OF NUCLEAR POWER PLANT FACILITIES/
 ADAMS, J. E.// STEVENSON, J. D.// EOS-1/
 ICN 5 227 100/
 US/
 SYMPOSIUM ON STRUCTURAL DESIGN OF NUCLEAR POWER PLANT FACILITIES/
 PITTSBURGH, PENNSYLVANIA, USA/
 20 APR 1972/
 CONFIGURATION/DESIGN/NUCLEAR POWER PLANTS:PI/PREP/CRANES/PIPELINES:R2.01/PIPES/SPOCK ABSORBERS:R2.02/WEIR/SE/SUPPORTS:R2

1/2/000001-000001// 24
 20011700 454-20-02 77.000
 (CONF-720402- REVIEW OF PIPE RESTRAINT DESIGN CONSIDERATIONS/
 KOPPEL, R. E.//
 PITTSBURGH UNIV., PA. USA DEPT. OF CIVIL ENGINEERING/
 GENERAL ELECTRIC CO., SAN JOSE, CA/
 ECC 1972/
 STRUCTURAL DESIGN OF NUCLEAR POWER PLANT FACILITIES/
 ADAMS, J. E.// STEVENSON, J. D.// EOS-1/
 ICN 5 227 100/
 US/
 SYMPOSIUM ON STRUCTURAL DESIGN OF NUCLEAR POWER PLANT FACILITIES/
 PITTSBURGH, PENNSYLVANIA, USA/
 20 APR 1972/
 REACTOR TYPE/REACTOR SYSTEM/CONFIGURATION/DESIGN/PIPELINES:R2.02/PRIMARY COOLANT CIRCUITS:R2.01/SPOCK ABSORBERS:R2.03/STRESS/SUPPORTS:R2

1/2/000001-000001// 25
 20011700 454-20-02 76.700
 (CONF-720402- CHECK NUCLEAR POWER PLANT UNIT 1 ABNORMAL OCCURRENCE: HYDRAULIC SHOCK AND SWAY ARRESTOR
 FAILURES/
 JEREMY CENTRAL POWER AND LIGHT CO., MORRISTOWN, NJ, USA//
 13 SEP 1972/DEPARTMENTS 12.000/
 ICN 5 427 100/
 US/
 77-100/
 FAILURES/PIPING/ISOLATION CONDENSERS/LEVELS/SYSTEM CHECK-1 REACTOR:PI/REACTOR SHUTDOWN/SPOCK ABSORBERS:R2.01/TESTING/

1/2/000001-000001// 26
 20011700 454-20-02 76.700
 (CONF-720402-2501) IDENTIFIED NUCLEAR GENERATING PLANT UNIT 1 IDENTIFICATION AND INSPECTION OF DEFECTIVE HYDRAULIC
 SHOCK SUPPRESSORS AND ARRESTORS//
 NORTH OREGON STATES POWER CO., PORTLAND, OREGON, USA//
 14 SEP 1972/DEPARTMENTS 12.000/
 ICN 5 757 100/
 US/
 77-100/
 DEFECTS:R2.02/INSPECTION/IDENTIFIED REACTOR:PI/RESTRAINTS:R2.01/SPOCK ABSORBERS:R2.01/

1/2/000001-000001// 27
 20011700 454-20-02 76.700
 (CONF-720402-2501) WILLSTONE NUCLEAR POWER STATION UNIT 1 CORRESPONDENCE RE SHOCK ARRESTOR FAILURES/
 WILLSTONE POINT COMMUNITY DEVELOPMENT//
 10 JUL 1972/DEPARTMENTS 12.000/
 ICN 5 190 700/
 US/
 77-100/
 FAILURES:WILLSTONE-1 REACTOR:PI/PIPELINES:R2.01/REACTOR OPERATIONS/SPOCK ABSORBERS:R2.02/

1/2/000001-000001// 28
 20011700 454-20-02 76.700
 (CONF-720402-321) SYSTEM CHECK NUCLEAR POWER PLANT UNIT 1 ABNORMAL OCCURRENCE REPORT NO. 7-21: FAILURE OF 21 HYDRAULIC
 SHOCK AND SWAY ARRESTORS ON PIPING SYSTEMS IN THE DRYWELL, INCLUDING UNITS ON BOTH CORE SPRAY AND NORTH ISOLATION
 CONDENSER//
 JEREMY CENTRAL POWER AND LIGHT CO., MORRISTOWN, NJ, USA//
 10 SEP 1972/DEPARTMENTS 12.000/
 ICN 5 427 100/
 US/
 77-100/
 FAILURES:R2.02/SYSTEM CHECK-1 REACTOR:PI/PIPELINES:R2.01/REACTOR OPERATIONS/RESTRAINTS:R2.02/SPOCK ABSORBERS:R2.02/

1/2/000001-000001// 29
 20011700 454-20-02 76.700
 (CONF-720402-2801) WILLSTONE NUCLEAR POWER STATION UNIT 1 INFORMATION RE SHOCK SUPPRESSOR FAILURES//
 WILLSTONE POINT COMMUNITY DEVELOPMENT//
 10 JUL 1972/
 20/DEPARTMENTS 12.000/
 NUCLEAR POWER PLANTS/REACTOR ENGINEERING/REACTOR SAFETY/
 CC#520 6070/
 FIC-05/
 FAILURES/INSPECTION/WILLSTONE-1 REACTOR/PIPELINES/REACTOR OPERATIONS/SPOCK ABSORBERS/

1/2/000001-000001// 30
 20011700 454-20-02 76.700
 (CONF-720402-2801) WILLSTONE NUCLEAR POWER STATION UNIT 1 INFORMATION RE SHOCK ARRESTOR FAILURES//
 WILLSTONE POINT COMMUNITY DEVELOPMENT//
 10 JUL 1972/
 20/DEPARTMENTS 12.000/
 NUCLEAR POWER PLANTS/REACTOR ENGINEERING/REACTOR SAFETY/
 CC#520 6070/
 FIC-05/
 FAILURES/INSPECTION/WILLSTONE-1 REACTOR/PIPELINES/SPOCK ABSORBERS/

1/2/000001-000001// 31
 20011700 454-20-02 76.700
 (CONF-720402-3201) SYSTEM CHECK NUCLEAR POWER PLANT UNIT 1 ABNORMAL OCCURRENCE- HYDRAULIC SHOCK AND SWAY ARRESTOR
 FAILURES//
 JEREMY CENTRAL POWER AND LIGHT CO., MORRISTOWN, NJ//
 21 SEP 1972/
 10/DEPARTMENTS 12.000/
 NUCLEAR POWER PLANTS/REACTOR ENGINEERING/REACTOR SAFETY/
 CC#520 6070/
 FIC-05/
 FAILURES/INSPECTION/SYSTEM CHECK-1 REACTOR/PIPELINES/REACTOR OPERATIONS/SPOCK ABSORBERS/

APPENDIX C

RO Bulletin No. 73-3
July 27, 1973

DEFECTIVE HYDRAULIC SHOCK SUPPRESSORS AND RESTRAINTS

Information contained in an abnormal occurrence report from the Millstone 1 reactor, supplemented by additional information obtained by Regulatory Operations from other licensees, revealed that 51 of 112 hydraulic shock suppressors and restraints inspected were defective due to loss of hydraulic oil supply. These suppressors and restraints were manufactured by the Bergen-Patterson Company.

In the light of this information you are requested to take the following specific actions:

- A. Determine whether Bergen-Patterson hydraulic shock suppressors and restraints are utilized in safety systems within your facility. Report the results of this determination to this office by noon, Monday, July 30, 1973.
- B. If Bergen-Patterson suppressors and restraints are utilized in such systems:
 1. Inspect prior to noon, July 30, 1973, each suppressor and restraint for proper hydraulic fluid level.
 2. Report by telephone to this office by noon, Monday, July 30, 1973, the results of your actions to show:
 - a. Number of suppressors and restraints installed in safety-related systems.
 - b. Number inspected.
 - c. Number defective by model number and location of installation and failure mode.
 - d. Confirmation of operability of defective suppressors and restraints. If repairs are not completed, your justification for continuing operation of your plant and your schedule for completion of repairs.
 - e. Existing or planned surveillance schedule for suppressors and restraints.
 3. For plants with existing surveillance of suppressors and restraints, if your inspection has been performed within the last 30 days and there is no history of defective suppressors and

restraints or if all were repaired, this request for inspection prior to noon July 30, 1973, does not apply.

- C. Reports made in response to A and B above should be confirmed in writing within 10 days.
- D. For facilities with no Bergen-Patterson suppressors and restraints or with existing surveillance inspections of suppressors and restraints:
 - 1. At the next reactor shutdown, inspect all hydraulic suppressors and restraints in safety-related systems. Inform this office of your schedule for this inspection by noon, July 30, 1973.
 - 2. When the inspection is performed, if defective suppressors and restraints are identified, the results of your inspection should be reported immediately by telephone to this office and confirmed in writing within 10 days. This report should include:
 - a. Number of suppressors and restraints inspected, identified by manufacturer.
 - b. Number of defective suppressors and restraints.
 - c. For each defective suppressor and restraint report:
 - (1) manufacturer (3) location of installation
 - (2) model number (4) failure mode
 - d. Confirmation of operability of defective suppressors and restraints. If repairs are not completed, your justification for operation of your plant and your schedule for completion of repairs.
 - e. Surveillance schedule.
 - 3. If no defective suppressors and restraints are identified a report should be submitted within 10 days of completion of the inspection to show the number of suppressors and restraints inspected identified by manufacturer and model number.

If you have any questions concerning this request, please contact this office.

APPENDIX D

Regulatory Operations
Bulletin No. 73-4
Date: August 17, 1973

DEFECTIVE BERGEN-PATTERSON HYDRAULIC SHOCK ABSORBERS

INFORMATION

Reference is made to Regulatory Operations Bulletin 73-3, dated July 27, 1973, entitled DEFECTIVE HYDRAULIC SHOCK ABSORBERS AND RESTRAINTS which provided information on known problems with hydraulic shock absorbers and which requested actions, including inspections of installed hydraulic shock absorbers, by certain utilities.

The compiled results of these inspections of Bergen-Patterson shock absorbers, based on telephone reports from affected licensees to the five Regional Offices of the Directorate of Regulatory Operations, reveal that a large percentage of installed Bergen-Patterson hydraulic shock absorbers were not fully operational. In addition, preliminary information indicates that routine repairs, replacing defective seals, and filling hydraulic oil reservoirs may not be an adequate long-range solution to this problem. There is also some indication that deterioration of the affected hydraulic shock absorbers can occur over a relatively short period of time (less than 90 days).

ACTION INDICATED

1. Schedule and conduct a reinspection of Bergen-Patterson hydraulic shock absorbers installed in safety-related systems following approximately 45 days and no longer than 90 days after the plant has been at operating temperature subsequent to the inspection performed as requested in RO Bulletin 73-3.
2. The inspection should include:
 - a. Determination of condition of seals.
 - b. Verification of overall integrity of shock absorber assemblies.
 - c. Examination for loss of fluid, fluid leaks, and other signs of distress.
 - d. Recording of piston rod extension and fluid level indicator positions.
3. Inform this office of the planned date for reinspection of the Bergen-Patterson hydraulic shock absorbers.

4. Provide this office with a prompt telephone report of the significant findings of this reinspection. If defective shocks are identified, a written report should be submitted to this office within 10 days following completion of the inspection; if no defective shock absorbers are identified, the written report should be submitted within 30 days following the completion of the inspection.
5. The written report should include:
 - a. As appropriate, a description of the mode of failure, corrective action, and tests performed to determine the adequacy of the repair.
 - b. A description of the program for the development and subsequent installation of a permanent modification to the hydraulic shock absorber installation to assure proper operation. The description should include the technical basis for the conclusion that deficiencies in the Bergen-Patterson hydraulic shock absorbers have been resolved.

APPENDIX E

IE Bulletin No. 75-05
April 14, 1975

OPERABILITY OF CATEGORY I HYDRAULIC SHOCK AND SWAY SUPPRESSORS

DESCRIPTION OF CIRCUMSTANCES:

The Metropolitan Edison Company notified the Region I Office of Inspection and Enforcement by telephone on March 21, 24, and 25, 1975, of the finding of eight inoperable hydraulic shock suppressors on the main steam lines inside containment at the Three Mile Island 1 facility.

The licensee reported that these suppressors were removed for overhaul (seal replacement) and testing during a planned maintenance program. The suppressors were determined to be inoperable (suppressor lockup could not be achieved) during piston displacement tests performed by the licensee. The tests were performed on a test rig which actuates the piston with air pressure. These suppressors, representing equipment originally installed at the facility, were specified to achieve lockup at a velocity not exceeding 10 in. per minute. The test rig at the facility was reported to have a capability of testing at velocities up to 50 in. per minute. The specific cause of the reported failures has not been determined. Spare suppressors were installed as replacements after their acceptability was determined by the licensee by test.

For your information, RO Bulletins 73-3 and 73-4, dated July 27, 1973, and August 17, 1973, respectively (copies enclosed), discuss some prior experience concerning the operability of hydraulic suppressors.

In general, the installation of hydraulic suppressors provides a system for the restraint of Category I systems and components against excessive movement during seismic and fluid system transient conditions. Although in such a restraint system the failure or inoperability of a single suppressor would not normally defeat the design function of the restraint system, it is desirable to provide for the periodic testing of a representative sample from the total population of suppressors to assess the operational capability of the restraint system on a continuing basis.

ACTION TO BE TAKEN BY LICENSEES:

1. For all power reactor facilities with an operating license:

Review the design and installation of your hydraulic restraint systems, and provide the following information to this office in writing within 30 days of the date of this Bulletin:

- a. The design requirements which the various suppressors are intended to meet, such as velocity, acceleration, load, etc. Also, indicate the margin available between the design requirements and the requirements specified for purchase of these components.
 - b. Describe the testing of the hydraulic suppressors conducted by you or your supplier(s) prior to installation to assure their operation in accordance with design requirements.
 - c. Describe the surveillance (including testing) programs now underway or planned by you to assure continued operability of the hydraulic suppressors under the design conditions throughout the life of the facility.
2. For all power reactor facilities with a construction permit:

Report to this office in writing within 60 days of the date of this Bulletin or prior to completion of preoperational testing, whichever is earlier, the information requested in Items 1.a. through 1.c. above.

A copy of your response to Items 1 and 2 above should also be sent to: Assistant Director for Construction and Operations, Office of Inspection and Enforcement, USNRC, Washington, D.C. 20555.

APPENDIX F

Questionnaire Sent to Reactor Operators**OAK RIDGE NATIONAL LABORATORY**

OPERATED BY
UNION CARBIDE CORPORATION
 NUCLEAR DIVISION

POST OFFICE BOX Y
 OAK RIDGE, TENNESSEE 37830

December 3, 1975

Mr. I. R. Finfrock, Jr.
 Vice President
 Jersey Central Power and
 Light Co.
 Madison Avenue at Punch Bowl Rd.
 Morristown, NJ 07960

Dear Sir:

I am presently investigating, under the auspices of NRC, the failure criteria of hydraulic shock absorbers (snubbers) as used in reactor facilities across the country. It is my understanding that you reported a snubber failure in the letter(s) listed below as indicated by the dates they were received by ERDA along with the associated Docket number. It would be a great aid to my investigation if you could supply me with any test data or evaluations you, the snubber manufacturer and/or an independent laboratory, performed regarding performance or mode of failure related to failed snubber(s) as indicated in the below A.O. report(s). Your cooperation will be greatly appreciated.

Sincerely yours,

/S/

J. H. Butler
 Reactor Division
 (615) 483-8611, Ext. 3-7185 or 3-5509

JHB/lad

<u>Reactor</u>	<u>Docket</u>	<u>Dates</u>
Oyster Creek Unit 1	50-219	Aug. 6, 1973; Sept. 10, 1973; Sept. 21, 1974; Nov. 13, 1973; Jan. 234 (sic), 1974; Feb. 19, 1974; Mar. 18, 1974; Apr. 26, 1974; May 29, 1974; July 16, 1974; Sept. 23, 1974