

SNUBBER AUGMENTED INSERVICE
INSPECTION/EXAMINATION AND FUNCTIONAL TESTING
PROGRAM FOR PERRY NUCLEAR POWER
PLANT UNIT 1

PREPARED BY

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SECTION I - AUGMENTED SNUBBER PROGRAM

1.0 INTRODUCTION

The Perry Nuclear Power Plant (PNPP) Unit 1 Augmented Inservice Snubber Inspection/Examination and Testing Program has been developed to implement both the proposed PNPP Unit 1 Technical Specifications and the ASME Boiler and Pressure Vessel Code, 1980 Edition through Winter 1981 Addenda, Section XI Article IWF-5000.

The implementing documents to support this program shall be PNPP approved procedures and instructions. This program description provides the guidelines used to develop these procedures and instructions. The listing of safety-related snubbers (Section I Article 3.0) shall require a 10CFR50.59 applicability check.

2.0 DEFINITIONS

AUGMENTED INSERVICE INSPECTION/EXAMINATION AND FUNCTIONAL TESTING PROGRAM (AUGMENTED PROGRAM)

An inservice inspection/examination and testing program which meets additional requirements beyond those of the ASME Boiler and Pressure Vessel Code, Section XI. Augmented inspection/examination requirements are established by regulatory authority or other agencies and do not require complete compliance with the ASME Boiler and Pressure Vessel Code, Section XI. Augmented testing requirements are also established by regulatory or other agencies; these testing requirements shall comply with the ASME Code, Section XI Article IWF-5000, Inservice Test Requirements.

SNUBBER

A device (component) which provides restraint to a component or system during a sudden application of force but allows essentially free motion during thermal movement.

TYPE

Snubbers of the same design (i.e., mechanical or hydraulic) and manufacturer (e.g. Montek or Pacific Scientific Co.), irrespective of capacity (e.g., 20 kips, 30 kips).

3.0 CATEGORIZATION

The categorization of PNPP Unit 1 safety-related snubbers includes conditions and parameters to identify failure analysis groups and develop a representative sampling for visual inspection/examination and functional testing.

Table 1-1 shows a sample from the listing of safety-related snubbers included in the Augmented Program. The information tabulated allows for ease of type identification and failure mode categorization.

Figure 1-1 provides the snubber classification numbers which identify type, accessibility, capacity, service, environment and vibration.

Table 1-1 Format

1. Mark Number - identifies the Unit, System, and unique hanger number.

EXAMPLE: 1B21-H0005 (Unit 1, Nuclear Boiler System, Hanger No.5)

2. Class - identifies the ASME code classification associated with the snubber.

EXAMPLE: 1 (ASME Class 1 Hanger)

NOTE: Class 5 represents nonsafety-related snubbers used to support a safety-related system.

3. Size - Provides the type and capacity of snubber.

EXAMPLE: PSA10 (Mechanical, 15 kip).

4. Location - provides the building, elevation and column or azimuth.

EXAMPLE: D, 609, 61 (Drywell, 609 Feet, 61 Degrees).

5. Accessibility - identifies if the snubber is accessible during normal plant operation.

EXAMPLE: N (NO).

6. Categorization - provides a unique set of integers for grouping snubbers (see Figure 1-1).

4.0 TESTING PERSONNEL QUALIFICATION

Personnel making the observations, measurements, and recording the results required by Article IWF-5000 Inservice Test Requirements shall be qualified in accordance with the owner's (CEI) Quality Assurance Program for training and qualification of plant and contractor personnel. The Quality Assurance Program shall require routine surveillances to be performed by quality control personnel, who should be certified VT-3/VT-4, during snubber testing.

Personnel qualification/certification for performance of ASME Code, Section XI examinations (i.e., visual, surface, and volumetric) shall be in accordance with the ASME Code Section XI, Article IWA-2000 Examination and Inspection.

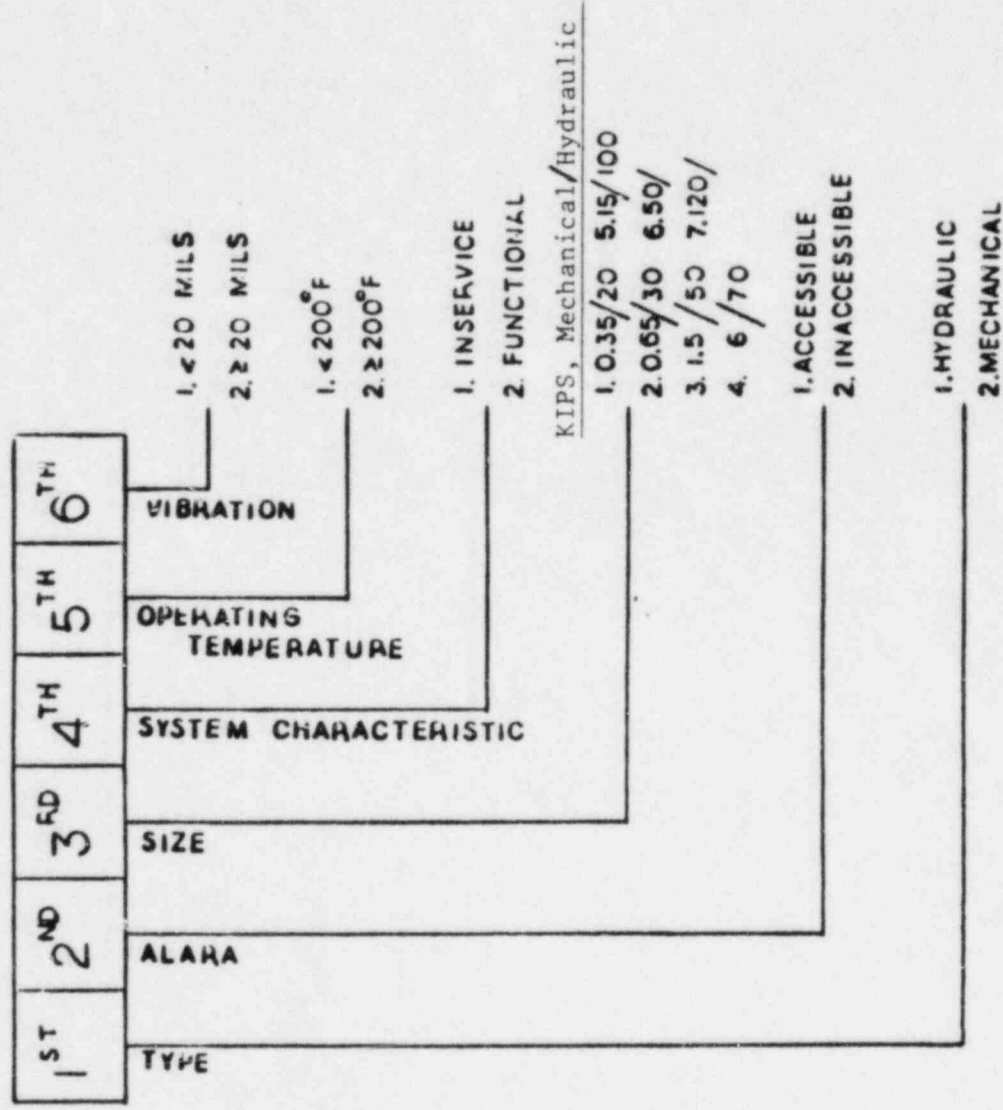
NOTE: ASME Code Section XI, Interpretation: XI-1-82-06R was used for the snubber testing program development: "The qualification of individuals making the observations and measurements and recording the results required by Subsections IWP and IWV shall be in accordance with the Owner's Quality Assurance program for training and qualification of plant and contractor personnel."

TABLE I
Sample Safety-Related Snubber Listing
 (Approximately 1800 Total)

Mark Number	Class	Size	Location		Col/Az	Y/N Access.	Categor.
			Bldg.	Elev.			
1B21-H0002	3	PSA35	D	615	53	N	226221
1B21-H0004	3	PSA35	D	612	65	N	226221
1B21-H0005	3	PSA10	D	609	61	N	225221
1B21-H0006	3	PSA35	D	611	65	N	226221
1B21-H0007*	3	PSA10	D	605	58	N	225221
1B21-H0009*	3	PSA3	D	620	67	N	224221
1B21-H0010*	3	PSA35	D	620	70	N	226221
1B21-H0012	3	PSA10	D	617	76	N	225221
1B21-H0013	3	PSA35	D	615	76	N	226221
1B21-H0014	3	PSA10	D	607	76	N	225221
1B21-H0015	3	PSA10	D	625	247	N	225221
1B21-H0020*	3	PSA35	D	602	98	N	226221
1B21-H0021	3	PSA10	D	615	90	N	225221
1B21-H0022	3	PSA35	D	610	98	N	226221
1B21-H0023	3	PSA10	D	615	98	N	225221
1B21-H0024	3	PSA10	D	615	98	N	225221
1B21-H0025*	3	PSA10	D	625	244	N	225221
1B21-H0029*	3	PSA35	D	605	274	N	226221
1B21-H0031	3	PSA10	D	615	274	N	225221
1B21-H0032	3	PSA35	D	611	265	N	226221
1B21-H0033	3	PSA10	D	613	265	N	225221
1B21-H0038	3	PSA35	D	620	306	N	226221
1B21-H0039	3	PSA35	D	615	286	N	226221
1B21-H0040	3	PSA35	D	613	283	N	226221
1B21-H0041	3	PSA35	D	610	283	N	226221
1B21-H0042*	3	PSA10	D	605	292	N	225221
1B21-H0043	3	PSA10	D	616	259	N	225221
1B21-H0045	3	PSA10	D	621	274	N	225221
1B21-H0046	3	PSA10	D	620	266	N	225221
1B21-H0047	3	PSA35	D	620	263	N	226221
1B21-H0048	3	PSA35	D	614	256	N	226221
1B21-H0049*	3	PSA35	D	608	256	N	226221
1B21-H0051*	3	PSA10	D	625	220	N	225221
1B21-H0054*	3	PSA10	D	604	21	N	225221
1B21-H0056	3	PSA10	D	615	22	N	225221
1B21-H0057	3	PSA35	D	615	13	N	226221
1B21-H0058	3	PSA35	D	612	13	N	226221
1B21-H0059	3	PSA10	D	612	13	N	225221
1B21-H0060	3	PSA3	D	618	202	N	224221
1B21-H0063*	3	PSA10	D	604	346	N	225221
1B21-H0064	3	PSA35	D	615	340	N	226221

* Denotes: Multiple snubbers on the support

FIGURE 1-1
SAFETY-RELATED
SNUBBER CATEGORIZATION



EXAMPLE: 12321 means hydraulic, inaccessible, 50 kips, functional,
> 200°F, < 20 mils

SECTION II - AUGMENTED VISUAL INSPECTION/EXAMINATION

1.0 INTRODUCTION

This section provides the augmented visual inspection/examination requirements to comply with PNPP Unit 1 Technical Specification 4.7.4. The portions of Technical Specification 4.7.4 covered are:

- a. Inspection Types
- b. Visual Inspections
- c. Visual Inspection Acceptance Criteria
- d. Transient Event Inspection
- h. Functional Testing of Repaired and Replaced Snubbers

2.0 PROGRAM PLAN INTERVAL

The Snubber Visual Inspection/Examination Interval must comply with the following frequencies:

1. All safety-related snubbers shall be inspected/examined after four months but within ten months of commencing power operation.
2. Inspections/examinations shall be conducted prior to (as-found) and after (as-left) performance of repairs, replacement or testing of a safety-related snubber.
3. A sample of 10% of snubbers shall be inspected/examined during the first refueling outage and at the frequencies provided within these guidelines:

<u>NO. INOPERABLE SNUBBERS OF EACH TYPE</u>	<u>SUBSEQUENT VISUAL INSPECTION PERIOD</u>
0	18 months + 25%
1	12 months + 25%
2	6 months + 25%
3,4	124 days + 25%
5,6,7	62 days + 25%
8 or more	31 days + 25%

NOTE: The inspection interval for each type of snubber shall not be lengthened more than one step at a time unless a generic problem has been identified and corrected; in that event the inspection interval may be lengthened one step the first time and two steps thereafter if no inoperable snubbers of that type are found.

When performing increased frequency inspection/examinations consideration shall be given to failure location (i.e., accessible or inaccessible).

4. All snubbers attached to sections of systems that have experienced unexpected or potentially damaging transients shall be inspected/examined (accessible systems within 72 hours or inaccessible systems within six months).

3.0 DEFINITIONS

AS-FOUND

The condition of a snubber as it exists in the system prior to any preventive maintenance, corrective maintenance, or disassembly to perform testing.

AS-LEFT

The condition of a snubber as it exists in the system after any preventive maintenance, corrective maintenance, or disassembly to perform testing.

EXAMINATION

Denotes the performance of a visual observation in which the examiner shall be qualified by the owner or his agent in accordance with the comparable levels of competency as defined in ANSI N45.2.6-1973 and/or 1978.

FUNCTIONAL ADEQUACY

A visual examination to confirm operability by verification of the settings or freedom of motion.

INACCESSIBLE SNUBBERS

Those snubbers that are in a high radiation area or other conditions that would render it impractical for the snubbers to be examined during reactor operation without endangering personnel.

INSPECTION

Denotes the performance of a visual observation in which the inspector shall be qualified by the owner or his agent in accordance with the competency levels of SNT-TC-1A or ANSI N45.2.6-1978.

SNUBBER DEVICE (FASTENERS)

A device used to secure the snubber to the component or structure (i.e., bolting, nuts, studs, and cotter pins).

TRANSIENT EVENT

An unexpected or potentially damaging occurrence which was determined from review of operation data or during a visual inspection/examination.

4.0 EXEMPTION CRITERIA

Only snubbers not attached to safety class systems (ASME 1, 2, or 3) or not considered in the design as supporting a safety class system are exempt from the visual inspection/examination requirements.

5.0 INSPECTION/EXAMINATION BOUNDARIES

The visual inspection/examination boundaries shall include the snubber and the attachment snubber devices (reference Figures 2-1, 2-2, 2-3, and 2-4).

6.0 INSPECTION/EXAMINATION REQUIREMENTS

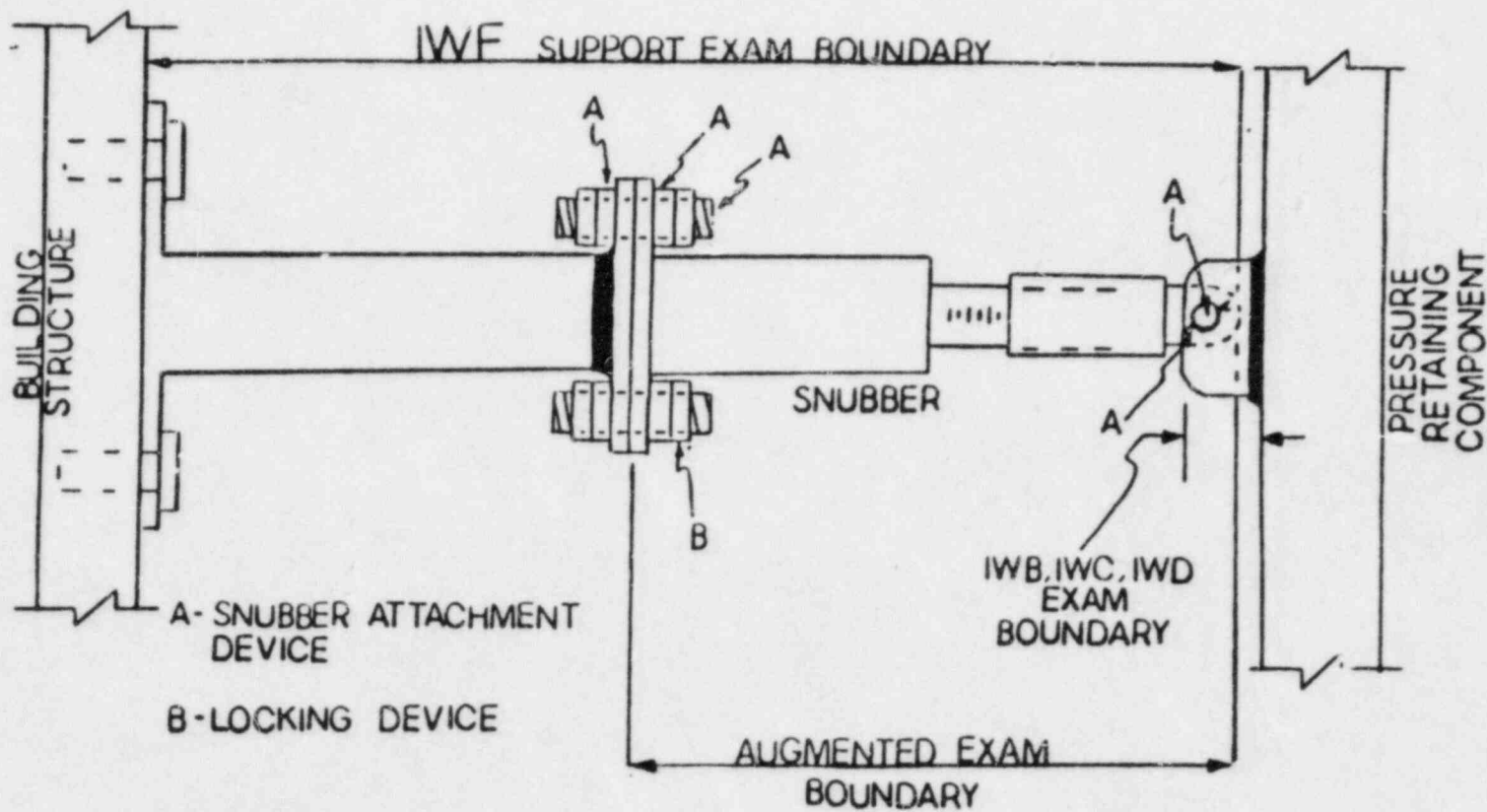
1. To verify the general mechanical and structural condition of the snubber and snubber attachment devices. Conditions can be verified by checking for loose parts, debris, or abnormal corrosion products, wear, erosion, corrosion, and the loss of integrity at bolted or welded connections.
2. To ensure operability of the snubber by confirming functional adequacy, verification of settings, or freedom of motion.

7.0 INSPECTION/EXAMINATION ACCEPTANCE CRITERIA

During the visual inspection/examinations, recorded indications can be placed into three categories of which one category is rejectable and the other two are acceptable. The categories are: inoperable (rejectable), operable relevant (acceptable) and operable nonrelevant (acceptable).

1. Inoperable indications:
 - a. Missing, detached, or loosened snubber or snubber attachment devices.
 - b. ARC strikes, weld spatter, roughness, general corrosion, paint, scoring on close-tolerance machined or sliding surfaces.
 - c. Deformed or structurally degraded snubbers or snubber attachment devices.
 - d. Improper hot or cold settings (causing the snubber to top or bottom out during service).
 - e. Lack of fluid indication (hydraulic snubber only).
2. Operable Relevant:
 - a. Detached, loosened, or missing locking devices.
 - b. Incorrect or missing identification tags.
 - c. Damaged or bound spherical bearings.
 - d. Thread engagement less than flush.
 - e. Fluid loss below 70% (hydraulic snubber only).
3. Operable Nonrelevant:
 - a. Weld spatter, scratches, or surface abrasion marks on other than close tolerance machined or sliding surfaces.
 - b. Roughness or general corrosion showing no visible evidence of snubber or snubber attachment device weakening.
 - c. Fabrication marks.
 - d. Chipped or discolored paint resulting from other than actual snubber degradation.
 - e. Others - as the visual inspector/examiner feels are necessary to record.

FIGURE 2-1



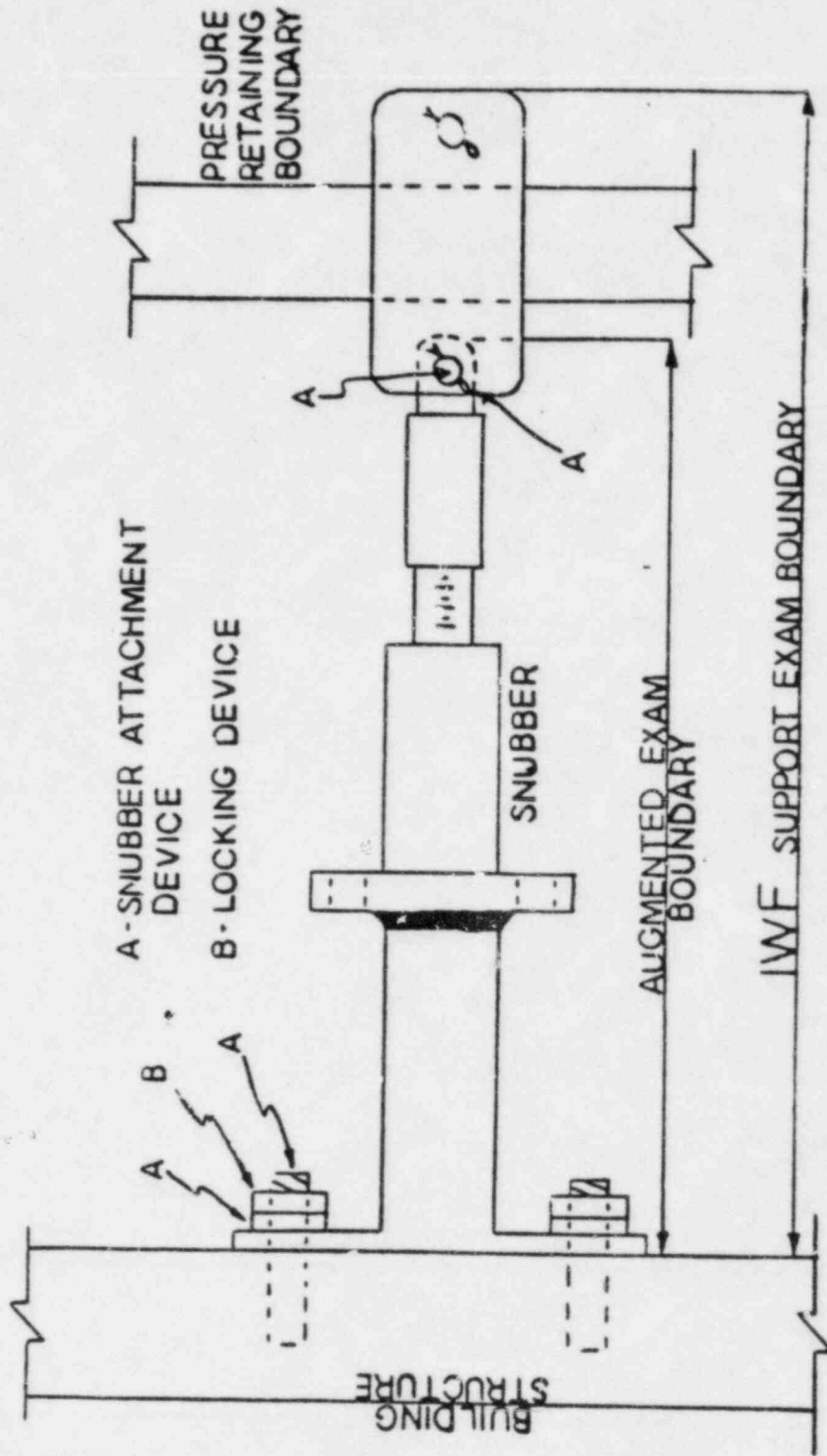


FIGURE 2-2

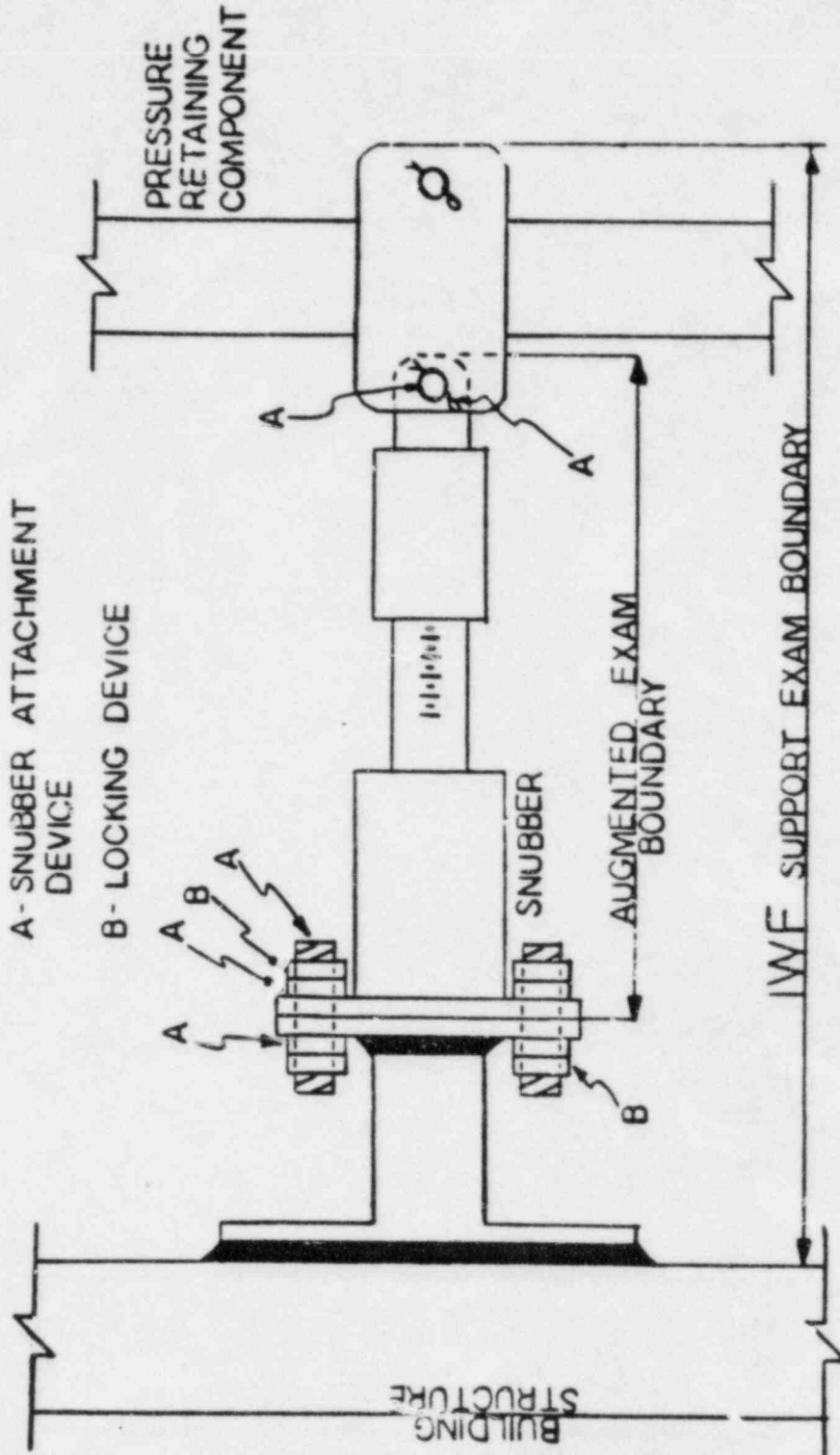


FIGURE 2-3

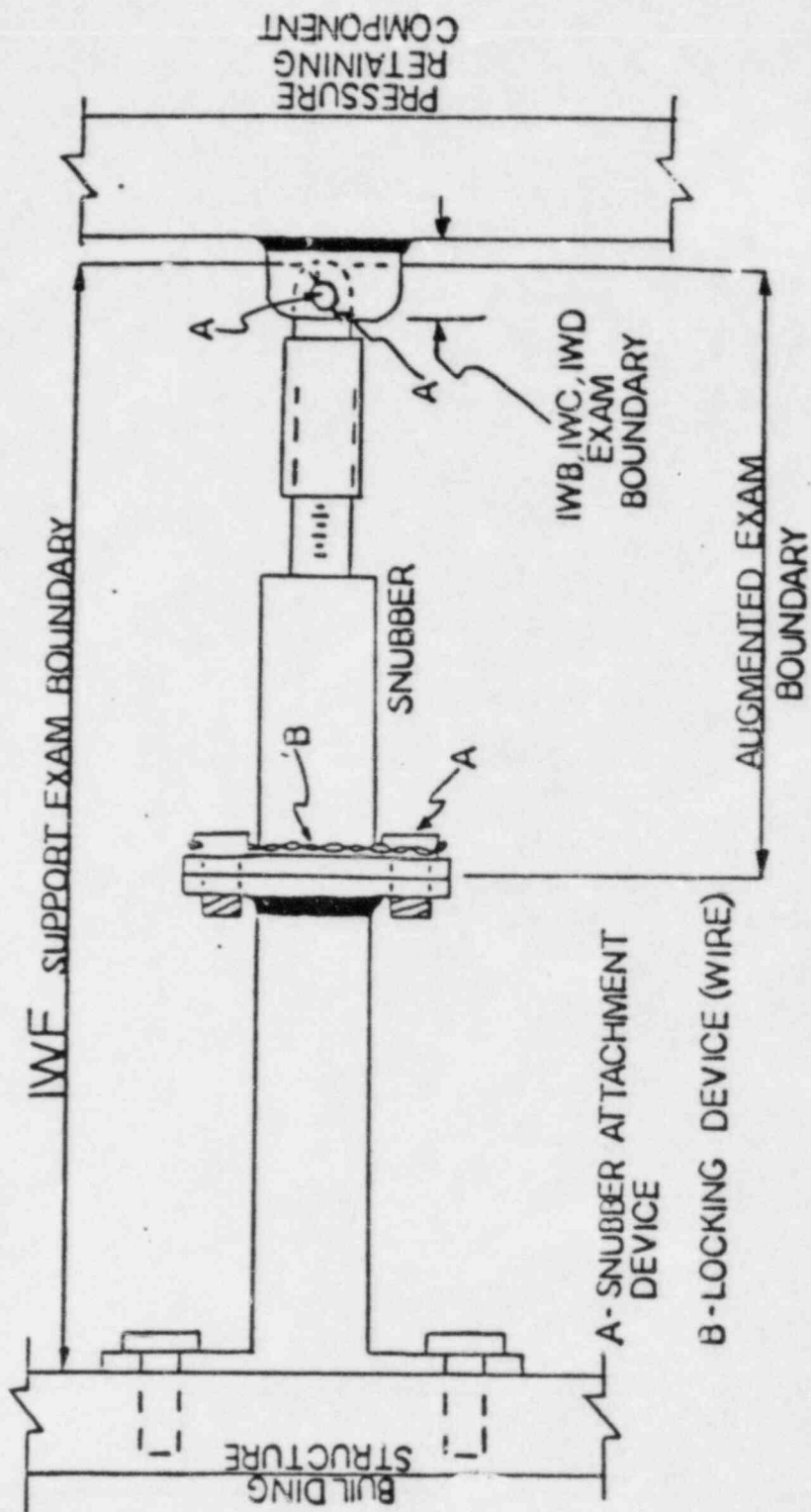


FIGURE 2-4

SECTION III - AUGMENTED FUNCTIONAL TESTING

1.0 INTRODUCTION

This section provides the augmented functional test requirements to comply with ASME Boiler Pressure Vessel Code, Section XI, Article IWF-5000 and the augmented tests of PNPP Unit 1 Technical Specification 4.7.4. The portions of Technical Specification 4.7.4 covered are:

- e - Functional Tests
- f - Functional Test Acceptance Criteria
- g - Functional Test Failure Analysis
- h - Functional Testing of Repaired and Replaced Snubbers

2.0 PROGRAM PLAN INTERVAL

The snubber testing interval must comply with the following frequencies:

1. During the first refueling shutdown and at least once per 18 months thereafter during shutdown a representative sample of snubbers shall be tested. Additional snubbers shall be tested as necessary to comply with the sample plan selected.
2. A snubber installed in place of a failed snubber shall be retested at the time of the next functional test.
3. Snubbers being used as a replacement shall have been tested prior to installation (manufacturer/vendor test data is acceptable for initial service).
4. Snubbers identified as inoperable during the augmented visual inspection/examination may be tested to verify operability.
5. Repaired snubbers shall be tested prior to installation.

3.0 DEFINITIONS

ACTIVATION ACCELERATION

A distinct acceleration for mechanical snubbers which is usually characterized by an abrupt increase in resistive force or reduction in displacement.

ACTIVATION VELOCITY

A distinct velocity for hydraulic snubbers which is usually characterized by an abrupt increase in resistive force or reduction in displacement

BREAKWAY FORCE

The minimum applied force required to initiate extension or retraction of the snubber.

DRAG FORCE

The force required to maintain the snubber movement at a constant velocity prior to activation.

FUNCTIONAL TESTING

An in-place or bench test exercising of a snubber while measuring and observing the required parameters in Article 6.0.

HYDRAULIC SNUBBER

A device which provides restraint to a component or system during a sudden application of force in which the load is transmitted through a hydraulic fluid. The device shall allow essentially free motion during thermal movement.

MECHANICAL SNUBBER

A device which provides restraint to a component or system during a sudden application of force in which the load is transmitted entirely through mechanical parts. The device shall allow essentially free motion during thermal movement.

RELEASE RATE

The velocity of snubber movement under load after activation takes place.

ZERO DISPLACEMENT

Snubber having a required rigid lockup upon activation velocity.

4.0 PROGRAM SAMPLE PLAN

A representative sample of snubbers shall be tested using one of the following sample plans for each type of snubber.

1. At least 10% of the total of each type of snubber is functionally tested either in-place or on a bench tester. For each snubber of a type that fails the acceptance criteria, an additional sample of 10% of the total number of that type of snubber is tested until no more failures are found or until all snubbers of that type have been tested.
2. A representative sample of each type of snubber is tested in accordance with Technical Specification Section 4.7.4e(2) and Figure 4.7.4-1. When test results lie within the "continue testing" region, additional snubbers of that type are tested until the point falls in the "accept" region or the "reject" region, or all the snubbers of that type have been tested.
3. An initial representative sample of 55 snubbers of each type is tested. For each snubber type which does not meet the acceptance

criteria, another sample of at least one-half the size of the initial sample is tested until test results fall on or below the "accept" line generated by the equation $N=55(1+C/2)$ or all the snubbers of that type have been tested.

5.0 EXEMPTION CRITERIA

Only snubbers not attached to safety class systems (ASME 1, 2 or 3) or not considered in the design as supporting a safety class system are exempt from the functional testing requirements.

6.0 FUNCTIONAL TEST REQUIREMENTS

Testing requirements shall exercise the snubber while measuring or observing the following parameters important to operability.

1. Mechanical Snubber

<u>PARAMETER</u>	<u>PNPP UNIT 1 TECH. SPEC.</u>	<u>ASME CODE ARTICLE IWF-5000</u>
Breakway/Drag Force	4.7.4.f.3)	IWF-5400(b)(1)
Activation Acceleration	4.7.4.f.1)	IWF-5400(b)(2)
Release Rate	N/A	IWF-5400(b)(3)

2. Hydraulic Snubber

<u>PARAMETER</u>	<u>PNPP UNIT 1 TECH. SPEC</u>	<u>ASME CODE ARTICLE IWF-5000</u>
Activation Velocity	4.7.4.f.1)	IWF-5400(b)(2)
Bleed/Release Rates	4.7.4.f.2)	IWF-5400(b)(3)
Zero Displacement (if applicable)	4.7.4.f.4)	IWF-5400(b)(3)

7.0 FUNCTIONAL TEST FAILURE ANALYSIS

1. An analysis shall be performed for all snubbers not meeting the acceptance criteria to determine the cause of failure. The analysis shall include a comparison of failure rate to categorization group.
2. Data gained from previous visual inspection/examination of snubbers may be used when performing the functional test failure analysis.
3. Based on the results of an analysis failure mode groups shall be developed. The groups used at PNPP are; isolated, design/manufacturing, application induced and unexplained.
 - a. Isolated Failure: Failures resulting from damage caused during installation or maintenance (e.g., dropping tools or equipment on the snubber, using the snubber as a hoist point). This type of failure can be directly attributed to a known single event and is not an indicator of possible generic snubber problems.
 - b. Design/Manufacturing Failure - Failures resulting from a potential defect in manufacturing and/or design that gives cause to suspect other similar components (e.g., mechanical seal failure, clamp ring

degradation). This includes failures of any snubber that fails to withstand the environment or application for which it was designed.

- c. Application Induced Failures - Failures resulting from environmental conditions for which the snubber has not been designed or qualified. These failures may occur because of repetitive excessive cycling which was not anticipated (e.g., water hammer, flow induced vibrations, valves being rapidly cycled).
 - d. Unexplained Failures - Failures that cannot be categorized as isolated, design/manufacturing or application induced. This includes all failures for which the cause of failure cannot be determined.
4. After the failure mode has been determined a course of action will be established. The additional sampling for other than design/manufacturing failures must include a sample of the same category that has failed.
 5. For a snubber found inoperable, an evaluation shall be performed on the component to which the inoperable snubber is attached. The evaluation shall determine if the component (e.g., vessel, pump, valve, or piping system) to which the inoperable snubber is attached was adversely affected by the inoperability of the snubber.
 6. A snubber that fails to lock up or fails to move (i.e., frozen-in-place) shall have the cause determined. If caused by manufacturer or design deficiency all snubbers of the same type and subject to the same defect (NOTE: Reference PNPP categorization for type and capacity) shall be functionally tested. This testing requirement shall be independent of the requirement for additional testing by sample plan.

8.0 REPAIR, REPLACEMENT AND MAINTENANCE

1. Snubbers may require preventive maintenance (e.g., replace seals or spring at service life), repairs, or replacement upon failure to meet the functional testing acceptance criteria. Replacement snubbers or snubbers which have undergone repair or maintenance which might have affected the functional test results shall be tested to meet the functional test criteria before installation. Mechanical snubbers shall have met the acceptance criteria subsequent to their most recent service, and the freedom-of-motion test must have been performed within 12 months before being installed.
2. Service life of all snubbers shall be monitored to ensure that the service life is not exceeded between surveillance inspections. The maximum expected service life for various seals, springs, and other critical parts shall be extended or shortened based on monitored test results and failure history. Critical parts shall be replaced so that the maximum service life will not be exceeded during a period when the snubber is required to be operable.

RELIEF REQUEST # SR-1

SYSTEM: All

COMPONENTS: Hydraulic and Mechanical Snubbers

CLASS: All

FUNCTION: To provide a restraint to a component or system during a sudden application of force but allow essentially free motion during thermal movement.

TEST REQUIREMENT: IWF-5400(b) Inservice tests for snubbers less than 50 kips- a representative sample of 10% of the total number of nonexempt (IWF-1230) snubbers whose load rating is less than 50 kips shall be tested each inspection period.

IWF-5400(c) - An additional sample of 10% of the total number of snubbers shall also be tested at that time.

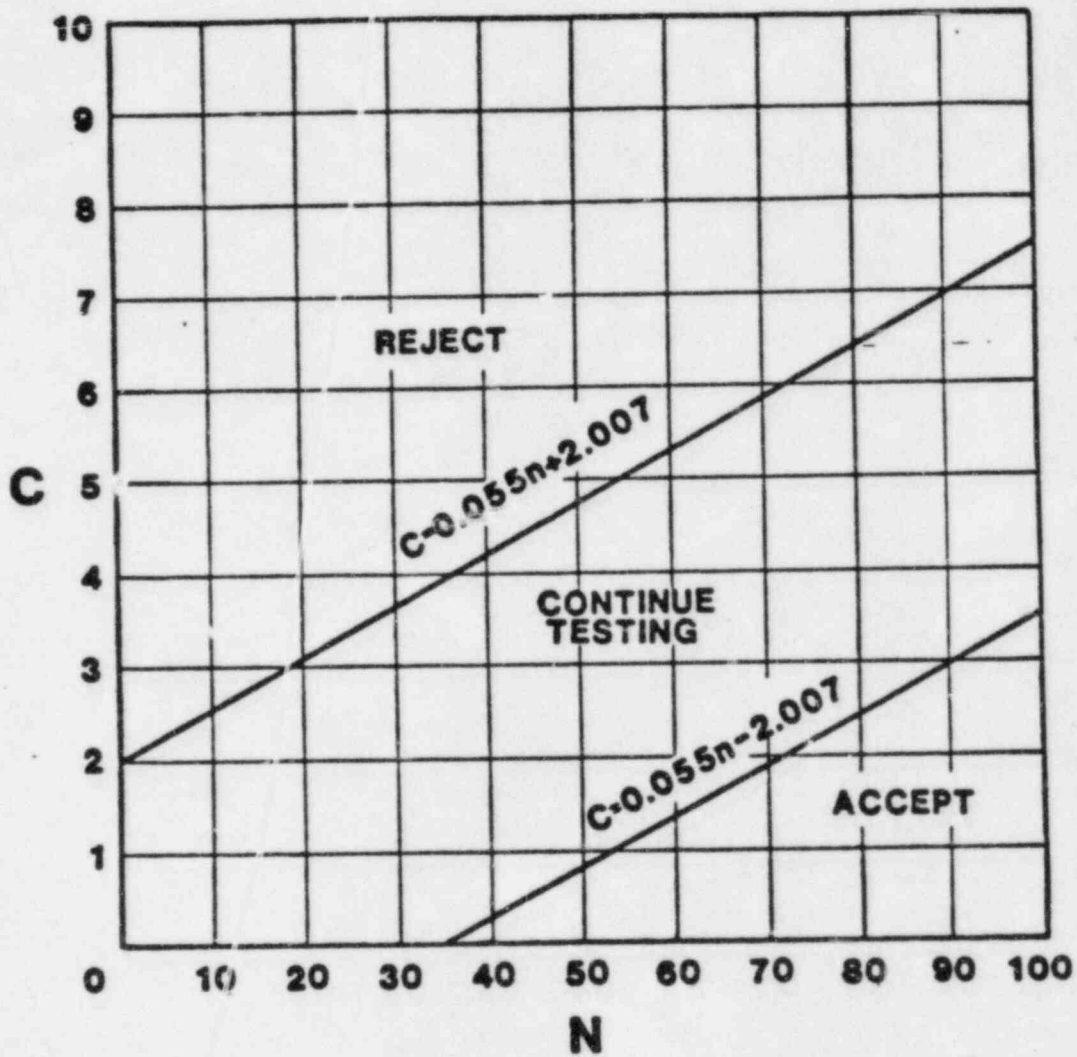
BASIS FOR RELIEF: The PNPP Unit 1 Technical Specification Bases 3/4.7.4 and Section 4.7.4.e prescribe one of three sampling methods to select snubbers for functional testing. The methods used and stated acceptance criteria are:

1. Functionally test 10% of each type of snubber with an additional 10% tested for each functional testing failure, or,
2. Functionally test a sample size and determine sample acceptance or rejection using Technical Specification Figure 4.7.4.-1, or
3. Functionally test a representative sample size and determine sample acceptance or rejection using the stated equation.

PNPP Unit 1 Technical Specification Figure 4.7.4-1 was developed using "Wald's Sequential Probability Ratio Plan" as described in "Quality Control and Industrial Statistics" by Acheson J. Duncan.

ALTERNATE TESTING: During the first refueling shutdown and at least once per 18 months thereafter during refueling, a representative sample of snubbers shall be tested using one of the Technical Specification sample plans for each type of snubber. The sample plan shall be selected prior to the test period and cannot be changed during the test period. The NRC Regional Administrator shall be notified in writing of the sample plan selected prior to the test period, or the sample plan used in the prior test period shall be implemented.

PERRY UNIT 1
TECHNICAL SPECIFICATIONS



SAMPLE PLAN 2) FOR SNUBBER FUNCTIONAL TEST

Figure 4.7.4-1