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10 CFR 50.55a

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Serial: RA-22-0079

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400/Renewed License No. NPF-63

Subject: Snubber Program Plan

Ladies and Gentlemen:

The enclosed Shearon Harris Nuclear Power Plant, Unit 1 (HNP) Snubber Program Plan is being submitted in accordance with ISTA-3200, Administrative Requirements, of American Society of Mechanical Engineering Code for Operation and Maintenance of Nuclear Power Plants, which is incorporated by reference into 10 CFR 50.55a.

There are no regulatory commitments made in this submittal.

Please refer any questions regarding this submittal to Sarah McDaniel at (984) 229-2002.

Sincerely,

A handwritten signature in black ink, appearing to read "RV", written over a horizontal line.

Richard Vandenberg

Enclosure: Snubber Program Plan

cc: J. Zeiler, NRC Sr. Resident Inspector, HNP
A Hon, NRC Project Manager, HNP
NRC Regional Administrator, Region II

U.S. Nuclear Regulatory Commission
Serial: RA-22-0079
Enclosure

Shearon Harris Nuclear Power Plant, Unit No. 1
Docket No. 50-400/Renewed License No. NPF-63

Snubber Program Plan

Date of Document Completion: February 7, 2022

Name and Address of Owner: Duke Energy Progress, LLC
410 South Wilmington Street
Raleigh, North Carolina 27601

Name and Address of Plant: Shearon Harris Nuclear Power Plant
5413 Shearon Harris Road
New Hill, North Carolina 27562

Name and Number Designation of Unit: Unit No. 1

Commercial Service Date for the Unit: May 2, 1987



Information Use

HARRIS UNIT 1
ADMINISTRATIVE PROCEDURE

AD-EG-HNP-1618

SNUBBER PROGRAM PLAN

REVISION 008

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REVISION SUMMARY	
PRR 2394215 DESCRIPTION	
Technical Revision Incorporates changes requested by Snubber Program Engineer per PRR 2394215.	
1.0.1	Deleted 'Preservice and' from statement.
3.0.8	Added 'without maintenance' to end of sentence.
3.0.10	Replaced 'acceptance criteria' with 'requirements'.
5.7.3	Replaced 'before the Snubber is disconnected or removed for any reason' with 'prior to conducting any maintenance, stroking, or testing, and prior to removal, for any reason, from their installed location' at end of the first sentence.
5.9	Changed '3' to '5' in Step 4. Reformatted 'and equivalent Small-bore Lisega and Anvil piping snubbers' from Step 4a into new Steps 4d & 4e.
5.10	Reformatted 'and equivalent Small-bore Lisega and Anvil piping snubbers' from Step 4a into new steps 4d & 4e and changed from the DTPG 37 Plan to the DTPG 10% plan.
5.16.4	Deleted 'Preservice and' from statement.
5.16.6	Changed 'maintain' to 'monitor' in sentence.
Former Attachment 1 Deleted attachment. It provided instructions related to performance of visual examinations. Visual examinations are not conducted to this Admin procedure. MPT-M0118 and PM-M0147 are the HNP procedures for performance of visual examinations.	
Former Attachment 2 Deleted attachment. This gave general guidance only and determination/documentation of exam categorization is at the discretion of the Program Manager and is done via the Technical Evaluations in MPT-M0118 and PM-M0147. This is also consistent with other sites snubber administrative procedures.	
Attachment 2, page 2 Added functional test acceptance criteria source document information for mechanical snubbers referenced from approved procedure MST-M0033 Rev 15. Hydraulic snubber info was relocated and reformatted from former Attachment 6.	
Former Attachment 5 Deleted attachment. Information is in test procedure MST-M0033. (All other Fleet sites have test acceptance criteria only in the site test procedure.)	
Former Attachment 6 Deleted attachment. Information is in test procedure MST-M0033. (All other Fleet sites have test acceptance criteria only in the site test procedure.)	
Attachment 3 Deleted 'Initial' from attachment title.	
Statement 2	Replaced 'actual/expected' with 'or extended in 2nd sentence. Deleted 'failed or degraded' and 'as those which have been found failed or degraded may also be assigned reduced actual/expected service lives' from 2nd sentence.
Statement 4	Added 4th sentence 'This maintenance includes periodic hand stroking (freedom of motion testing)'
Statement 6	Replaced entire statement.
Statement 7	Replaced 'typically' with 'recommended to be' in 1st sentence. Replaced 'discussions with the vendor' with 'vendor recommendation in VM-NZI' in 2nd sentence. Added 5th and 8th sentences discussing longer periods of service and the PM for monitoring fluid level. Added last sentence discussing seal replacement based on OE when seal was not leaking.

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1.0 PURPOSE

1. The purpose of the Snubber program is to provide a systematic method for identification of periodic examination, testing, and service life monitoring of nuclear power plant dynamic restraints (Snubbers) and to establish the requirements for Inservice testing, examination, and service life monitoring to assess their operational readiness. [7.3.1], [7.3.2]
2. The Snubber program plan identifies:
 - Components subject to testing, examination, and monitoring
 - Responsibilities
 - Methods
 - Intervals
 - Parameters to be measured and evaluated
 - Criteria for evaluating the results
 - Corrective action
 - Record keeping.

2.0 SCOPE

1. These requirements apply to the ASME OM Code scope of Snubbers, which are those Snubbers used in systems that perform a specific function in shutting down a reactor to the safe shutdown condition; in maintaining the safe shutdown condition; in mitigating the consequences of an accident, or to ensure the integrity of the reactor coolant pressure boundary.
2. For Safety or Safety Significant Snubbers, outside of the applicable Code scope above, such as any remaining ASME Code Class (1, 2, and 3) Snubbers, Snubbers which support safety related analytical boundaries, or those non-safety related Snubbers with seismic support responsibilities, these are included within the program scope.
3. In keeping with good engineering practices and to provide reasonable assurance of structural reliability, any remaining Snubbers not identified above (typically Non-Safety related) may be included in the program and at least periodically inspected or monitored.

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2.0 SCOPE (continued)

4. For the fourth HNP interval dating 5/2/2017 to 5/1/2027, the following bases requirements apply:
 - Tech Spec 3/4.7.8
 - [PLP-106](#) Attachment 4
 - ASME OM Code 2004 Edition through 2006 Addenda (includes Code Case OMN-13 Revision 2)
 - Reg Guide 1.192, Rev. 1, August 2014

3.0 DEFINITIONS

1. **Acceptable:** A Snubber that has been examined or tested and is shown to be capable of performing its design function.
2. **Accessible:** Snubbers that can be readily examined or tested during normal plant operations without exposing plant personnel to undue hazards or dose.
3. **Defined Test Plan Group (DTPG):** A population of Snubbers selected for testing in accordance with either of the Snubber testing sample plans.
4. **Degraded:** Any Snubber that has an examination or testing parameter that is approaching, but has not met or exceeded the limits of the acceptance criteria.
5. **Failure Mode Group (FMG):** A group of Snubbers that have failed and those other Snubbers that have similar potential for similar failure.
6. **Inaccessible:** Snubbers that are located in environments which make it impractical for the Snubbers to be examined under normal plant operations without exposing plant personnel to undue hazards (e.g. radiation or extreme heat).
7. **Safety-Significant Snubbers:** Snubbers designated as non-safety but determined that their failure or the failure of the system on which they are installed would have an adverse effect on any safety-related system.
8. **Service Life:** The period of time an item is expected to meet the operational readiness requirements without maintenance.
9. **Transient Dynamic Event:** An unexpected or potentially damaging occurrence, which was determined from, reviews of operating data or during a visual inspection/examination such as a water/steam hammer, earthquake or similar event.

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3.0 DEFINITIONS (continued)

10. **Unacceptable:** Snubbers that do not meet examination or testing requirements.
11. **Test Campaign:** The series of actions required to complete the testing of DTPG samples for a specific cycle.

4.0 RESPONSIBILITIES

NOTE

The general roles and responsibilities for the execution of NGD Engineering Programs are outlined in [AD-EG-ALL-1006](#). Specific activities and responsibilities for those organizations and individuals that are involved with the implementation of the Snubber Program at HNP are outlined below.

4.1 Manager - Fleet Programs Engineering

1. Ensures that the Snubber programs are effectively managed and implemented to meet regulatory, process, and procedure requirements.

4.2 Fleet Snubber Program Manager

1. Establishes, prepares and maintains Snubber testing and examination Program Plans, implementing procedures, and schedules.
2. Identifies examination and testing requirements for Snubbers as identified in the Snubber Program Plan and maintains the IDDEAL Software Suite Database (SnubbWorks) for Snubbers.
3. Coordinates the performance of scheduled and non-scheduled Snubber examination, testing, preventative maintenance, and condition monitoring activities.
4. Selects and identifies Snubbers for examination, testing and service life activities.
5. Reviews test and examination results for acceptability.
6. Evaluates results of examinations and tests found not meeting the parameters required to prove operational readiness.
7. Generates corrective actions; Action Requests (AR's), Condition Reports (CR's), and Work Requests (WR's) as required.
8. Determines the extent of additional examinations, tests, or repairs which may be required following the discovery of an unsatisfactory Snubber condition.

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4.2 Fleet Snubber Program Manager (continued)

9. Establishes, monitors, and tracks the Service Life of installed Snubbers through Service Life Monitoring.
10. Prepares the scope list for Snubber functional testing and visual examination.
11. Selects the Snubber populations to be examined and tested. Identifies the applicable procedures required to satisfy the examination or testing requirements per the Snubber Program Plan.
12. Submits the required outage scope to Outage and Scheduling.
13. Submits the required outage scope to ALARA for development of ALARA Plan.
14. Manages the scope, content, additions, deletions, expansions and corrections of the outage scope.
15. Compares current recorded results with prior results.
16. Identifies Code requirements which cannot be achieved due to impracticality or hardship and initiates actions (Relief Request) necessary to notify the NRC as required.
17. Establishes industry contacts with ASME OM Code committee representatives, peers at other nuclear utilities, and outside consultants, as necessary, to ensure that the Snubber examination and testing Program properly utilizes external operating experience.
18. When notified, reviews plant design changes and revises the Snubber Program Plan, as necessary.
19. Maintains qualifications in accordance with the Program Managers respective Engineering Support Personnel (ESP) Program that they are enrolled. No additional qualifications specific to the Snubber Program Manager position exist at either the Fleet or Site levels.

4.3 Plant Maintenance

1. Performs Snubber functional testing, records results of the Snubber test(s), and reports the findings on the appropriate data sheet(s).
2. Notifies Program Manager of test results.
3. Performs Snubber repairs, rebuilds, or replacement activities under the Snubber Program as required.

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4.4 Qualified Snubber Inspector / Qualified Maintenance Technician / Qualified QC Mechanical Inspector / Certified Non-destructive Examination (NDE) VT-3 Examiners

1. Records the as found or as left conditions of the snubber in accordance with the appropriate station procedures.
2. Reports findings on the appropriate data sheet(s) and notifies the Snubber Program manager. (If no Data Sheet provided, then use the sheet included Attachment 1, Sample Visual Examination Data Sheet.)

4.5 Design Engineering

1. Performs operability evaluations on piping systems or components when unsatisfactory Snubber examination or test results occur.
2. Notifies Program Manager of plant design changes that may impact the Snubber Program, as applicable.

4.6 Regulatory Affairs

1. Processes relief requests and Snubber Program Plan document submittals to the Regulatory Authorities.

4.7 Maintenance Planning Organization

1. Plans WOs associated with Snubber Visual Examination, Testing, or Service Life activities.

4.8 Outage and Scheduling Organization

1. Schedules activities associated with Snubber Visual Examination, Testing, or Service Life requirements.

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5.0 INSTRUCTIONS

5.1 General

1. For the purposes of this procedure, references to Snubber Program Manager means a designee or other person assigned to complete any procedural requirement identified in this procedure.
2. Periodically, the Snubber Program Plan may be subject to revision during the ten-year interval. Reasons for revision include, but are not limited to:
 - Incorporation of Relief Requests
 - Incorporation of Code Cases
 - NRC Regulatory Guides, notices and bulletins, as applicable
 - Augmented examinations
 - Modifications to the plant that impact the Snubber Program
3. Generation and revision to the Snubber Program Plan shall be made in accordance with this procedure.

5.2 Snubber Program Plan

1. 10-year Updates
 - a. Once every 10 years, the Snubber Program requires updating to the edition and addenda as specified in 10 CFR 50.55a.
 - b. Snubber Program Plans shall be filed with the regulatory authorities as required by ASME OM, ISTA-3200. The Plan filing shall have a cover sheet providing the information requested by ISTA-9220.
2. When a change to the plant impacts the Program, revise per Section 5.3.
3. Changes to the program testing or inspection methodologies may require the Snubber Program Plan to be resubmitted to the regulatory authorities.

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5.3 Snubber Program Plan Development and Revision

1. The Snubber Program Plan shall be maintained in EDMS. Initiate and revise the documents via the PRR process per [AD-DC-ALL-0201](#). The Snubber Program Plan may utilize Controlled Supporting Documents (CSDs).
2. The Program Manager and a peer reviewer shall review all revisions of the Snubber Program Plan and CSDs. The supervisor approves revisions.

5.4 IDDEAL Software Suite

1. IDDEAL Software Suite is a non-QA (Level 'E' software per [AD-IT-ALL-0002](#)) software program used as a back-up to store component information, examination and testing history, and examination and testing schedules used to administer and implement the ISI, IST, Snubber, IWE/IWL, and QC BOP Programs. Nuclear Computing Systems maintains the program.
2. Snubbworks®, as one of the IDDEAL applications, is a Microsoft® Access based computer program, is used as a tool to manage the Snubber Program information. This software program is used to organize pertinent data and records to assist with Snubber examination, testing, and service life monitoring purposes. The information contained in Snubbworks® is not QA, but can be used to produce documents or lists which, when verified, can be used as QA records.
3. Examination and test reports may be generated by Snubbworks software to document examination and test results, unless otherwise directed by the Site Implementing Procedures.
4. NDE and Snubber inspection and testing personnel, performing on site work, may have their certifications and qualifications entered into IDDEAL Certworks or SnubbWorks.

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5.5 Test and Examination Scheduling

1. Test and examination scheduling routinely coincide with refueling outages. Performing testing and examinations during refueling outages allows for improved accessibility, environmental conditions conducive for examination methods, reducing exposure (ALARA) and enhanced scheduling.
2. Examinations may be performed during plant operation (on-line) or during refueling outages, as conditions allow.
3. Functional testing, for Test Plan credit, may be performed during plant operation (on-line) or during refueling outages, but must not start more than 60 days prior to the scheduled start of the refueling outage and must be completed prior to the start-up following the refueling outage.

5.6 Snubber Categorization

1. All of the Snubbers shall be considered one population for examination. Alternatively, they may be categorized individually as accessible or inaccessible.
2. The decision to examine the Snubbers as one population or as separate populations may be made during or after the examination. For HNP, all Snubbers are considered one population for examination.
3. When recombining categories into one population, the shorter interval of the categories shall be used.

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5.7 Visual Examination

1. Snubbers shall be visually examined on the required schedule in accordance with ASME OM and evaluated to determine their operational readiness. Snubbers determined to be unacceptable based on the visual examination acceptance criteria at any time during the interval shall be counted in determining the subsequent examination interval. Examination intervals shall be determined in accordance with Table ISTD-4252-1 (reproduced below in Table 1, Visual Examination Intervals), unless alternative intervals are utilized per Code Case OMN-13 (as endorsed by the NRC).

Table 1, Visual Examination Intervals

Population or Category Size [Note 1]	Number of Unacceptable Snubbers		
	Column A (Extended Interval) [Notes 2 and 3]	Column B (Interval Same as Previous) [Notes 2, 4 and 5]	Column C (Interval Reduction to 2/3) [Notes 2, 5 and 6]
1	0	0	1
80	0	0	2
100	0	1	4
150	0	3	8
200	2	5	13
300	5	12	25
400	8	18	36
500	12	24	48
750	20	40	78
≥1000	29	56	109

Notes:

1. Interpolation between population or category sizes and the number of unacceptable snubbers is permissible. The next lower integer shall be used when interpolation results in a fraction.
2. The basic interval shall be the normal fuel cycle up to 24 months. The examination interval may be as great as twice, the same, or as small as fractions of the previous interval as required by the following Notes. The examination interval may vary $\pm 25\%$ of the current interval.
3. If the number of unacceptable snubbers is equal to or less than the number in Column A, then the next examination interval may be increased to twice the previous examination interval, not to exceed 48 months. In that case, the next examination according to the previous interval may be skipped.
4. If the number of unacceptable snubbers exceeds the number in Column A, but is equal to or less than the number in Column B, then the next visual examination shall be conducted at the same interval as the previous interval.
5. If the number of unacceptable snubbers exceeds the number in Column B, but is equal to or less than the number in Column C, then the next examination interval shall be decreased to two-thirds of the previous examination interval or, in accordance with the interpolation between Columns B and C, in proportion to the exact number of unacceptable snubbers.
6. If the number of unacceptable snubbers exceeds the number in Column C, then the next examination interval shall be decreased to two-thirds of the previous interval.

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5.7 Visual Examination (continued)

2. Any unacceptable/unsatisfactory or degraded Snubber condition reported on the applicable inspection/test report sheet, or any noted anomaly identified during the current examination period, shall have an evaluation performed by an individual knowledgeable in Snubber operability requirements.
 - a. Evaluation shall be performed to determine the type and cause of the visual examination discrepancy and effect on the operability of the Snubber and related component(s).
 - b. If the condition is determined to be generic, then additional examinations may be required, or, if an isolated case, a Work Request may be issued to correct any discrepancies found.
 - c. The Program Manager or designee shall initiate a CR on any Snubber determined to be unacceptable/unsatisfactory.
3. The Visual As Found examination for Safety Related/Safety Significant Snubbers shall be performed prior to conducting any maintenance, stroking, or testing, and prior to removal, for any reason, from their installed location. This examination is to determine that there are no visible indications of damage or impaired functional ability due to physical damage, leakage, corrosion, or degradation from environmental exposure or operating conditions.
4. An augmented scope is invoked whenever a visual examination is to be performed as a supplemental scope, outside of the code requirements of this program.
5. Current Interval Requirements:
 - a. In lieu of the requirements of Table ISTD-4252-1, Snubbers are visually examined once every ten years in accordance with Code Case OMN-13.
 - b. If at any time during an examination interval the cumulative number of unacceptable snubbers exceeds the applicable value from Column B in Table ISTD-4252-1, the current examination interval shall end, and all remaining examinations must be completed within the current fuel cycle. The duration of the subsequent examination interval shall be reduced in accordance with Table ISTD-4252-1, using the examination interval prior to implementing the Code Case as the base interval. The beginning of the subsequent fuel cycle shall be the starting date for the new examination interval.

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5.7 Visual Examination (continued)

6. Snubbers with unacceptable visual examination results may be evaluated by performing operational readiness testing (i.e., functional testing). In accordance with ASME OM Code, Article ISTD-4240, snubbers satisfying operational readiness testing acceptance criteria may be reclassified as acceptable visual examinations.
7. Snubber visual examinations are performed from pin to pin only.

5.8 Operational Readiness Testing

1. Safety Related/Safety Significant Snubbers shall be tested for operational readiness during each fuel cycle.
 - a. Tests are required to be in accordance with a specified sampling plan.
 - b. Testing may be performed during normal system operation, or during system or plant outages, however, testing shall begin no earlier than 60 days prior to the scheduled start of a refueling outage (unless otherwise approved by the regulatory authorities) and must be completed prior to the return to power.
 - c. Non-Safety Related Snubbers may be tested at the discretion of the Program Manager.
2. Snubbers shall be tested in their As Found condition regarding the parameters to be tested to the fullest extent practicable.
 - a. Test methods shall not alter the condition of a Snubber to the extent that the results do not represent the As Found Snubber condition.
 - b. Snubbers may be tested in their installed location or may be removed from the field installation and bench tested in accordance with approved procedures.
 - c. Snubbers shall not be subjected to prior preventive or corrective maintenance (pre-conditioning) specifically for the purpose of meeting the applicable examination or testing requirements.
 - Verification of freedom of motion upon snubber removal is not considered to be pre-conditioning.

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5.8 Operational Readiness Testing (continued)

3. Snubbers that are maintained or repaired by removing or adjusting a Snubber part, that can affect the results of the applicable tests required by this program, shall be examined and tested in accordance with the applicable requirements before returning to service. Additionally, the applicable installation requirements shall be met. The requirements selected shall ensure that the parameters that may have been affected are verified to be acceptable by suitable examination and tests.
4. The applicable site maintenance procedures shall govern the removal and reinstallation of plant installed Snubbers. Each Safety Related/Safety Significant Snubber shall have an As Found Visual Examination performed prior to removal activities and an As Left Visual Examination following reinstallation in accordance with any applicable site examination or surveillance instruction(s).
5. For each Safety Related/Safety Significant Snubber determined to be unacceptable by operational readiness testing, additional Snubbers shall be tested.
 - a. Testing scope expansion is required for failed Snubbers that are part of a functional testing sample plan (i.e. 10% or 37 sample plan).
 - b. Unacceptable (i.e., failed) snubbers shall be evaluated and documented in accordance with the Corrective Action Program (NCR). The evaluation shall include review of information related to other unacceptable snubbers found during that test campaign.
 - c. An Engineering Evaluation shall be performed on the components to which the failed Snubbers were attached. The purpose of this Engineering Evaluation will be to determine if the components to which the inoperable Snubbers are attached were adversely affected by the inoperability of the Snubbers in order to ensure that the component remains capable of meeting the designed service.
 - (1) A visual examination is to be performed on the pipe attachment, structure attachment and structural steel of the tested support and also of the pipe, in the general area, and adjacent supports to determine if any deformation, weld cracking and/or general mechanical failures have occurred. If any type of failure and/or deformation (pipe or other) cannot be detected and an operable snubber can be installed to the original as-built condition as shown by the support sketch, then the system can be declared acceptable for future operation. [7.3.6]

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5.8 Operational Readiness Testing (continued)

6. For each Non-Safety Related Snubber determined to be unacceptable by operational readiness testing, additional samples may be required as determined under the Corrective Action Program by the type of failure and extent of condition as warranted.
7. Degraded Snubbers are repaired or replaced as a preventive maintenance action.
 - a. Failure mode grouping and scope expansion is not required for degraded Snubbers.
 - b. Additional Snubbers may be tested or replaced at the discretion of Program Manager based on the cause of the degradation for service life monitoring purposes.
 - c. Information learned from the degraded Snubbers shall be considered in the service life monitoring program as applicable.
8. Unacceptable snubbers shall be adjusted, repaired, modified, or replaced.
9. Test equipment failure during functional testing may invalidate that day's testing.
 - a. Failed testing equipment will be repaired or replaced. If it can be determined exactly when the failure happened, only the affected Snubbers shall be retested.
 - b. If it cannot be determined when the failure happened, then as a minimum, all Snubbers tested with the failed equipment during the day of the equipment failure shall be re-tested.
10. Test results will be reviewed for adverse trends which will help establish the service life of specific Snubbers or locations.
11. Each Snubber in a parallel or multiple-Snubber installation shall be identified and counted individually. Fractional sample sizes shall be rounded up to the next integer.
12. Steam Generator and Main Steam Large Bore hydraulic snubbers may be tested in-place or by removing and testing subcomponents (control valves) that control the parameters to be verified.

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5.9 Defined Test Plan Group (DTPG)

1. The DTPGs shall include all Safety Related/Safety Significant Snubbers except the following; the following shall be exempt from DTPG selection for the concurrent testing interval:
 - a. Replacement Snubbers and Snubbers repaired or adjusted as a result of not meeting acceptance requirements.
 - b. Snubbers placed in the same location as Snubbers that failed the previous Inservice operational readiness test.
2. Except as required in Step 3 below, the total Safety Related/Safety Significant Snubber population may be considered one DTPG, or alternatively, differences in design, application, size, or type may be considered in establishing DTPGs.
3. Snubbers attached to the steam generator shall be a separate DTPG.
4. There are 5 DTPGs for testing:
 - a. Basic-PSA Mechanical Snubbers.
 - b. Steam Generator Hydraulic Snubbers
 - c. Main Steam Large-Bore Hydraulic Snubbers
 - d. Lisega small bore hydraulic snubbers
 - e. Anvil small bore hydraulic snubbers
5. In addition to the testing performed in each DTPG, Snubbers placed in the same location as Snubbers that failed the previous Inservice operational readiness test shall be retested unless the cause of the failure is clearly established and corrected. Any testing done for this purpose shall not be considered part of the DTPG sample selection requirements in Section 5.10, Testing Sample Plans.

5.10 Testing Sample Plans

1. A test plan shall be selected for each DTPG before the scheduled testing begins.
2. The test plan shall be used throughout the refueling outage tests for that DTPG and any failure mode group (FMG) that is derived from it.
3. For unacceptable Snubber(s), the additional testing shall continue in the DTPG or FMG.
4. For HNP DTPGs, the following test plans are chosen:
 - a. Basic-PSA Mechanical Snubbers DTPG: 37 Plan

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5.10 Testing Sample Plans (continued)

- b. Steam Generator Hydraulic DTPG: 10% Plan
- c. Main Steam Large Bore Hydraulic DTPG: 10% Plan
- d. Lisega small bore hydraulic DTPG: 10% Plan
- e. Anvil small bore hydraulic DTPG: 10% Plan

5.11 Testing Sample Plan Selection

NOTE

The Safety Related/Safety Significant Sample Plan for a DTPG functional testing shall be either the 10% or 37 Plan.

5.11.1 The 10% Testing Sample Plan

1. The initial sample shall be 10% of the DTPG.
2. The Safety Related/Safety Significant sample shall include representation from the DTPG based on the significant features (i.e., the various designs, configurations, operating environments, sizes, and capacities) and based on the ratio of the number of Snubbers of each significant feature, to the total number of Snubbers in the DTPG.
3. Selection of the representative Safety Related/Safety Significant Snubbers shall be random.
4. The sample may also be selected from Safety Related/Safety Significant Snubbers concurrently scheduled for seal replacement or other similar activity related to service life monitoring. The Snubbers shall be tested on a generally rotational basis to coincide with the service life monitoring activity.
5. When additional Safety Related/Safety Significant samples are required, they shall be at least one-half the size of the initial sample from that DTGP.
6. The test sample plan is completed when the mathematical expression below is satisfied, or all Snubbers have been tested.

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5.11.1 The 10% Testing Sample Plan (continued)

7. Testing shall satisfy the following mathematical expressions.

a. For each DTPG

$$N \geq 0.1n + C(0.1n / 2)$$

where:

N	=	total number of Snubbers tested that were selected from the DTPG
n	=	number of Snubbers in the DTPG
C	=	total number of unacceptable Snubbers found in the DTPG (excluding those counted for FMG tests)

b. For each FMG:

$$N_f \geq C_f(0.1n / 2)$$

where:

N_f	=	all Snubbers selected and tested from the FMG after the FMG was established from the DTPG
C_f	=	total number of unacceptable Snubbers in the FMG, plus those found in the DTPG and used to establish the FMG
n	=	number of Snubbers in the DTPG

5.11.2 The 37 Testing Sample Plan

1. An initial Safety Related/Safety Significant sample of 37 Snubbers shall be selected randomly from each Snubber plan DTPG.
2. When additional Safety Related/Safety Significant samples are required, then they shall be either 18 or 19 to satisfy the mathematical expression below.
3. The test sample plan is completed when the mathematical expression below is satisfied, or all Snubbers have been tested.

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5.11.2 The 37 Testing Sample Plan (continued)

4. Testing shall satisfy the following mathematical expressions.

a. For each DTPG:

$$N \geq 36.49 + 18.18C$$

where:

N	=	total number of Snubbers tested that were selected from the DTPG
C	=	total number of unacceptable Snubbers found in the DTPG (excluding those counted in FMG tests), plus one for each applicable FMG requiring additional tests

Thus if a FMG has failures which require additional tests, regardless of the number of failures in that FMG, 'C' will only be increased only by a count of 1 for each FMG.

NOTE

For each Snubber removed from 'N' and included in 'NF', another Snubber will need to be selected from the original DTPG and functionally tested for inclusion into 'N' so the mathematical expression can be satisfied.

b. For each FMG requiring additional tests

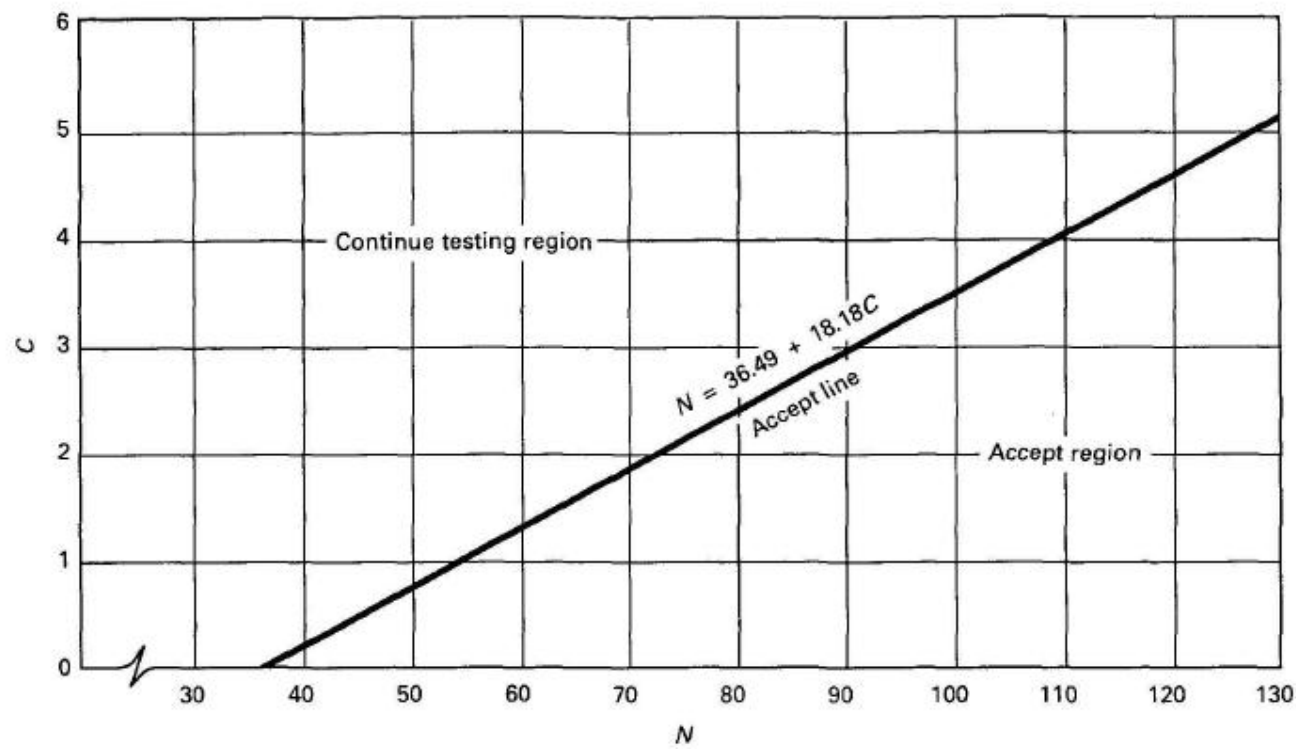
$$N_F \geq 18.18C_F$$

where:

N _F	=	all Snubbers selected and tested AFTER the FMG was established from the DTPG
C _F	=	total number of unacceptable Snubbers in the FMG, plus those found in the DTPG and used to establish the FMG

5.11.2 The 37 Testing Sample Plan (continued)

Figure 1, 37 Test Sample Plan



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5.12 Sample Expansion

1. After determination that a Safety Related/Safety Significant Snubber is unacceptable, an additional test plan sample shall be established. Failures found by the retesting conducted in Section 5.9 Step 5 do not require additional testing in accordance with Section 5.12, Sample Expansion, but shall be evaluated for appropriate corrective action.
2. For the Safety Related/Safety Significant 10% Plan Failures - When an unacceptable Snubber has not been assigned to an FMG, the additional sample shall be taken from the DTPG. As practicable, the additional sample shall include the following:
 - a. Snubbers of the same manufacturer's design;
 - b. Snubbers immediately adjacent to those found unacceptable;
 - c. Snubbers from the same piping system;
 - d. Snubbers from other piping systems that have similar operating conditions such as temperature, humidity, vibration, and radiation; and
 - e. Snubbers that are previously untested.
3. For the Safety Related/Safety Significant 37 Plan Failures - Additional samples shall be selected randomly from the remaining population of the DTPG, or from untested Snubbers of the FMG as applicable.
4. In addition to the required test plan sample expansion an FMG test population may be established. The unacceptable Snubber may be categorized into a failure mode group (FMG), containing all unacceptable Snubbers that have a given failure and all other Snubbers evaluated to be subject to the same failure.

5.13 Snubber Replacement

1. Any replacement or modified Snubber(s) shall have a proven suitability for the application and environment.
2. Replacement or modified Snubbers shall be examined and tested before placing into service. Test results from the manufacturer for new snubbers or from the rebuild vendor may be utilized.

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5.14 Snubber Deletion

1. Snubbers may be deleted from the plant based on analysis of the affected piping system. When an unacceptable Snubber is deleted, the deleted Snubber shall nevertheless be considered in its respective examination population, examination category, or failure mode group (FMG) for determining the corrective action.
2. The number of deleted Snubbers that failed or passed tests or examinations prior to being deleted will be used in determining examination or testing frequencies.

5.15 Transient Dynamic Events

1. If a transient dynamic event (e.g., water hammer, steam hammer) occurs that may affect Snubber operability, then the affected Snubbers and systems shall be reviewed and any appropriate corrective action taken.
2. At a minimum, a visual examination shall be performed on all Snubbers attached to the affected sections of systems that have experienced potentially damaging transients as determined from a review of operational data.
3. In addition to satisfying the visual examination acceptance criteria of this procedure, freedom-of-motion of mechanical Snubbers shall be verified by at least one of the following methods:
 - a. Manually induced Snubber movement
 - b. Evaluation of in-place Snubber piston setting
 - c. Stroking the mechanical Snubber through its full range of travel
 - d. Functional testing of the Snubber
 - e. In some cases, condition monitoring stroke testing which has been planned or completed may sufficiently address concern.

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5.16 Service Life Monitoring

1. The object of service life monitoring is to identify service and environmental conditions that can adversely affect Snubber performance.
 - a. Service life varies with manufacturer recommendations, design limits, installed environmental conditions and materials, and should be adjusted based on plant experience and technical data to ensure that the Snubber(s) operational readiness is achieved throughout its intended install life.
 - b. Service Life Monitoring is required for all Safety Related/Safety Significant Snubbers.
 - c. Service Life Monitoring of Non-Safety Related Snubber is not addressed by the ASME OM Code and is at the discretion of the Program.
2. A record of the service life of each Snubber in the program shall be maintained.
 - a. The Snubber service life record shall include the Snubber installed location, manufacturer/model, serial number, installed date, rebuild date, and service life expiration date for each applicable Snubber.
 - b. When Snubbers are rebuilt or overhauled, then the service life shall be updated which will provide future statistical bases for consideration of Snubber service life.
 - c. Initial predicted service life for all components is listed in Attachment 3, Predicted Service Life.
 - d. Service Life listing is in [CSD-EG-HNP-1618](#).
3. Service life for Snubbers shall be evaluated at least once each fuel cycle and adjustments made as warranted.
 - a. The service life shall be reviewed and necessary actions taken to ensure that the service life of all installed Snubbers will not be exceeded during the next operating cycle.
 - b. This evaluation can be documented in outage reports, summaries, or other methods.

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5.16 Service Life Monitoring (continued)

4. All data from Inservice examinations and tests, maintenance events, transient dynamic events, industry peers, manufacturers, laboratory analysis, and other service life monitoring activities will be evaluated for indications of Snubber degradation or other anomalies.
 - a. Results of this evaluation shall be used to identify Snubbers that are subject to degradation and to identify severe operating environments not previously identified.
 - b. These results may also be used to reduce or extend the service life of Snubbers or any of their subcomponents
5. If the evaluation indicates that service life will be exceeded before the next scheduled system or plant outage, then one of the following actions shall be taken:
 - a. The Snubber shall be replaced with a Snubber for which the service life will not be exceeded before the next scheduled system or plant outage;
 - b. Technical justification shall be documented for extending the service life to or beyond the next scheduled system or plant outage;
 - c. The Snubber shall be reconditioned such that its service life will be extended to or beyond the next scheduled system or plant outage.
6. For Mechanical Snubbers , periodic hand stroking is done in order to redistribute the grease and monitor their service life.
7. If testing is conducted specifically for service life monitoring purposes, the results of such testing do not require testing of additional snubbers.

6.0 RECORDS

1. No records are generated from this procedure.
2. Records of inspections, tests, evaluations, and outage summaries will be maintained within an appropriate Work Order or periodic test procedure. Work Orders and/or PMID histories are searchable in the Consolidated Asset Suite (CAS) application.

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7.0 REFERENCES

7.1 Commitments

None

7.2 Procedures

1. [AD-DC-ALL-0201](#), Development and Maintenance of Controlled Procedure Manual Procedures
2. [AD-EG-ALL-1000](#), Conduct of Engineering
3. [AD-EG-ALL-1006](#), Conduct of Fleet Programs Engineering
4. [AD-EG-ALL-1137](#), Engineering Change Product Selection
5. [AD-EG-ALL-1202](#), Preventive Maintenance and Surveillance Testing Administration
6. [AD-EG-ALL-1450](#), Preconditioning of Structures, Systems & Components
7. [AD-EG-ALL-1618](#), Snubber Program Plan
8. [AD-IT-ALL-0002](#), Software Quality Assurance (SQA) Program Administration
9. [CM-M0231](#), Hydraulic Snubbers
10. [EST-215](#), Snubber Surveillance
11. [MMP-004](#), Installation of Pipe Supports
12. [MPT-M0118](#), Visual Examination of Snubbers
13. [MST-M0033](#), Snubber Functional Test
14. [PLP-106](#), Technical Specification Equipment List Program
15. [PM-M0147](#), Inspection Of Mechanical Snubbers (Freedom-Of-Motion)

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7.3 **Miscellaneous Documents**

1. ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2004 Edition through 2006 Addenda
 - a. Code Case OMN-13 Revision 2, Requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants
2. Code of Federal Regulations: 10 CFR 50.55a, Codes and Standards
3. [CSD-EG-HNP-1618](#), HNP Installed Snubber Listing
4. EC 408444, PSA Mechanical Snubber Replacement with Anvil or Lisega Hydraulic Snubbers
5. INPO EPG-07, Snubbers
6. PCR 4839, Component Cooling Water Mechanical Snubber Failure [DIN 902160098]
7. [VM-AHS](#), Hydraulic Snubbers (Anvil)
8. [VM-NUN](#), Snubbers (Basic-PSA)
9. [VM-NZI](#), Snubbers (Paul Munroe/Enertech)
10. [VM-VOU](#), Snubbers (Lisega, Inc.)
11. Regulatory Guide 1.192, Operation and Maintenance Code Case Applicability, ASME OM Code
12. Regulatory Guide 1.193, ASME Code Cases Not Approved for Use

<< Sample Visual Examination Data Sheet >>



Snubber Visual Examination

This is a QA Record

Report No: _____

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Plant/Unit: _____

Outage No: _____

☐ As Found
 ☐ As Left
 ☐ PSI

Procedure No: _____

Revision: _____

WO/WR No: _____

Exam No: _____

Building/Room: _____

Component No: _____

Mark No: _____

Elevation: _____

Serial No: _____

System: _____

Row/Column: _____

Manufacturer: _____

Line Type: _____

Map No: _____

Model: _____

Line Desc: _____

TPNS No: _____

Size: _____

Resolution	Technique	Equipment	Lighting	Tools
	<input type="radio"/> Direct <input type="radio"/> Remote <input type="radio"/> See Comments	<input type="radio"/> Mirror <input type="radio"/> Magnifier <input type="radio"/> See Comments	<input type="radio"/> Ambient <input type="radio"/> Flashlight <input type="radio"/> Droplight	<input type="radio"/> Scale <input type="radio"/> Tape Measure <input type="radio"/> Level <input type="radio"/> Micrometer <input type="radio"/> Comparator <input type="radio"/> Other <input type="radio"/> Caliper <input type="radio"/> Weld Gauge

	Sat	Unsat	N/A		Sat	Unsat	N/A
Component support identified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Movement obstructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Component installed / orientated per design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Close tolerance surfaces / corrosion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No signs of physical damage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Corrosion / material / scratches on piston rod	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Structural steel attachments / embedment plates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reservoir sightglass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attachment items not bent / damaged / deformed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fluid connections and seals loose / leaking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snubber attachments / connections not loose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Assembly / valve block / body / fittings leaking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Broken / missing cotter pins / load pins / snap rings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reservoir shipping plug not installed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No signs of weak, stripped threads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vent not obstructed or damaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No loose / missing parts / locknuts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reservoir orientation / vent port at top	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supporting structure and foundations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fluid clarity / no suspended solids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Concrete anchors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fluid Level: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No cracked / chipped concrete / grout	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pin to Pin Setting: _____			
Weld integrity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Piston Rod Setting: _____			
Spherical bearings functional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	System Temperature: <input type="radio"/> Hot <input type="radio"/> Cold _____			
End attachment gaps and tolerances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supplemental data attached: <input type="radio"/> Yes <input type="radio"/> No			
Anchor points for binding / excess movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Comments: _____

Examiner Name: _____

Level: _____

Exam Date: _____

Examiner Name: _____

Level: _____

Exam Date: _____

EXAMINATION EVALUATION AND OVERVIEW

Sat Unsat N/A

There are no signs of damage or impaired operability.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attachments to the supporting structure are secure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fasteners for the attachment of the snubber to the component and to the snubber are functional.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

OVERALL RESULTS:
 ☐ ACCEPTABLE
 ☐ DEGRADED
 ☐ UNACCEPTABLE

EVALUATION COMMENTS: _____

Reviewed By: _____

Level: _____

Date: _____

Reviewed By: _____

Date: _____

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<< General Snubber Information >>

Qualification testing of the mechanical Snubbers at HNP was performed by Pacific Scientific Co. in accordance with ASME Boiler and Pressure Bessel Code Section III. Subsection NF, 1977 Edition including Snubber 1978 Addenda and ASME Code Case 16444-4.

Qualification testing of the Paul Munroe hydraulic Snubbers at HNP was performed by Paul Munroe Hydraulics Inc. in accordance with ASME III, Subsection NF, 1980 Edition including winter 1981 Addenda and ASME Code Cases N71-10 and N-249-1.

Anvil Snubbers are constructed in accordance with ASME III, Subsection NF, 1980 Edition including Winter 1981 Addenda and ASME Code Cases in accordance with Regulatory Guide 1.85 (now incorporated in Reg. Guide 1.84).

Lisega Snubbers are constructed in accordance with ASME III, Subsection NF, 1980 Edition including Winter 1981 Addenda, or 1998 Edition up to and including 2000 Addenda, and ASME Code Cases in accordance with Regulatory Guide 1.85 (now incorporated in Reg. Guide 1.84). Load Ratings for PSA mechanical Snubbers:

Many Snubbers were removed from the plant during the SG replacement (ESR 97-807)

Many Snubbers were removed for having < 1/8" thermal movement

Load Ratings for PSA Mechanical Snubbers

PSA Size	Bergen-Patterson Size	Design / Normal / Upset Load (lbs.)	Emergency (lbs.)	Faulted (lbs.)
0.25	0.35	350	450	500
0.50	0.65	650	850	850
1	1.5	1,500	2,000	2,100
3	6	6,000	8,000	9,000
10	15	15,000	20,000	22,100
35	50	50,000	66,600	72,400
100	120	120,000	160,000	160,000

The HNP Snubbers have been added to EDB per EC 70710 by their plant location (e.g., MS-H-0141 or SG-H-0323A).

Historically, various forms of the location identifier (e.g., SG-H-0323A; SG-323A; SG-H-323) have been used throughout the years in the work order and AR titles such that searching for historical information takes trial and error.

The hanger drawings are listed in EDMS under the Controlled Documents Category with format: 1-AF-H-00001

Where:

The first number (1) is the Unit

AF is the system

H signifies hanger

The five digit number is the unique location

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<< General Snubber Information >>

Functional Test Acceptance Criteria Basis Information:

- Mechanical snubber functional test acceptance criteria based on Site Spec. 067 as modified by FCR-H-1718, Revision 2 and PCR 4751 Revision 3.
- Paul Munroe/Enertech hydraulic snubber functional test acceptance criteria is derived from snubber assembly drawing EMDRAC 1364-038363 and from Westinghouse Letter 96-CQL-078. Functional parameters are listed in VM-NZI for each bore size of Paul Munroe/Enertech snubber.
- Lisega hydraulic snubber functional test acceptance criteria is derived from VM-VOU and EC 408444.
- Anvil hydraulic snubber functional test acceptance criteria is derived from VM-AHS and EC 408444.

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<< Predicted Service Life >>

1. Initial snubber service life shall be predicted based on manufacturer's recommendation and design review.
2. Actual service life determinations are made based on the effects of the environment and service conditions on the snubber service life, test and examination results and other applicable factors. Reduced or extended service lives different from the initial service life listed above may be established for Snubbers exposed to similar environmental and service conditions. Reduced service life snubbers may be tested or replaced at a higher frequency. Actual/expected service life may also be extended based on evaluation (i.e., seal life studies, etc.)
3. Environmental or service conditions that exceed the manufacturer's qualification basis for snubber service will be identified and evaluated per [AD-EG-ALL-1137](#).
4. The initial recommended service life of Pacific Scientific mechanical snubbers is 40 years as described in [VM-NUN](#). The initial service life is based on Pacific Scientific Standard Design Specification Report DR1319 that lists the environmental conditions to which the snubbers are qualified. Basic-PSA has since revised DR1319 stating that the service life may be extended to 60 years with appropriate maintenance and operation. This maintenance includes periodic hand stroking (freedom of motion testing). Additional information is found in the 'Mechanical Shock Arrestors Service Life Extension Program & Preventive Maintenance Recommendations' DR3020 on indefinitely extending the service life beyond the initial service life of 40 years.
5. The service life of the Paul Munroe/ENERTECH hydraulic snubbers is 40 years per [VM-NZI](#). The critical components of the hydraulic snubbers are the Tefzel seals that are qualified for 40 years of service and do not require periodic replacement to maintain operability.
6. Harris functionally tests 8", 10", and 14" bore Paul Munroe snubbers by testing the subcomponents (control valves) which control the snubber function rather than performing a test which applies a load to the snubber piston rod as per ISTD-5225. Therefore, the requirements of ISTD-6400 apply as part of service life monitoring.
 - Monitoring of hydraulic fluid particulate, viscosity, and moisture content (ISTD-6400(a)):

The process used at HNP to determine fluid quality is to sample and analyze the fluid from a snubber when it is functionally tested. If the fluid meets the criteria for used fluid per [VM-NZI](#), then it can remain in the snubber. If the fluid does not meet the criteria, then it will be evaluated and may be replaced or reconditioned and reused. The results of the analysis are used to trend snubber degradation. Historically, the larger particle sizes indicate snubber degradation and wear.
 - Monitoring of piston seal, piston rod seal, and cylinder seal integrity (ISTD-6400(b)):

To-date, data from several inputs have been used at HNP to monitor piston seal, piston rod seal, and cylinder integrity. These inputs include condition assessment during rebuild activities of seals which have been in-service, inspection of the corresponding sealing surfaces in the bodies of the snubbers, pressurization testing, and leakage history.

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<< Predicted Service Life >>

7. Paul Munroe Hydraulic snubber rod wiper and chevron seals on the 8", 10" and 14" bore snubbers are recommended to be replaced at 10-year intervals. This interval is based on vendor recommendations in [VM-NZI](#) and the observed condition of these noncritical seals when removed. HNP has experienced no snubber failures as a result of this 10-year replacement interval. The service life of these seals is determined primarily by exposure to radiation and high temperature. [VM-NZI](#) also states that longer periods of service are permissible when the radiation and temperature are not severe, however the snubbers need to be monitored to ensure that there is **NO** evidence of leakage from the seals. The Main Steam system hydraulic snubbers at HNP are not exposed to any radiation and the Steam Generator snubbers receive relatively low levels of exposure. Temperatures in these locations are well under the design limits of the seals. These snubbers are monitored for proper fluid level each refueling outage under PMID 25609-01. Other parts including drain/fill port gaskets, fill valves, relief valves, reservoir seals, and springs are replaced as needed. Additional parts replacement is not necessary unless a problem develops. Some OE shows that replacement seals fail due to maintenance factors when the seal replaced was not originally leaking. It is not always better to replace the seals due to time in service if they are not leaking and ones in similar applications have not failed.
8. Per [VM-AHS](#), Anvil snubbers have an initial recommended service life of 25 years.
9. Per [VM-VOU](#), Lisega snubbers have a primary seal replacement interval of 21 years, unless a problem is observed.

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<< Relief Requests >>

No Relief Requests currently applicable to HNP.