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Attn: Document Control Desk
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

SUBMITTAL OF SNUBBER EXAMINATION AND TESTING PROGRAM FOR H. B.
ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

Ladies and Gentlemen:

Per the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code, Subsection ISTA-3200(a), Administrative Requirements, Duke Energy Progress, Inc. hereby submits the H. B. Robinson Steam Electric Plant, Unit No. 2 Snubber Program Plan (AD-EG-RNP-1618, Revision 0), to the Nuclear Regulatory Commission for information. Should you have any questions regarding this matter, please contact Mr. Richard Hightower, Manager – Nuclear Regulatory Affairs at (843) 857-1329.

This document contains no new Regulatory Commitments.

Sincerely,

Sharon W. Peavyhouse
Director – Nuc Org Effectiveness

SWP/jmw

Attachment

c: V. McCree, NRC, Region II
Ms. Martha C. Barillas, NRC Project Manager, NRR
NRC Resident Inspector, HBRSEP2

United States Nuclear Regulatory Commission
Attachment to Serial: RNP-RA/15-0059
29 Pages (Including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT (HBRSEP), UNIT NO. 2

AD-EG-RNP-1618 – Snubber Program Plan, Revision 0



Information Use

ROBINSON UNIT 2
ADMINISTRATIVE PROCEDURE

AD-EG-RNP-1618

SNUBBER PROGRAM PLAN

REVISION 0

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REVISION SUMMARY
<p>PRR 721520</p> <p>DESCRIPTION</p>
<p>This is a new procedure replacing TMM-006. This procedure is required per the Fleet procedure AD-EG-ALL-1618, Snubber Program.</p>

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1.0 PURPOSE

This procedure describes the methods used to develop, administer, and implement the H. B. Robinson, herein referred to as RNP, Snubber Program Plan for the Fifth 10-Year Interval (07/20/2012 through 07/31/2021).

2.0 SCOPE

1. This plan was developed and prepared to meet the requirements of the American Society of Mechanical Engineers, Operation and Maintenance (OM) of Nuclear Power Plants, 2004 Edition through the 2006 Addenda. This procedure applies to snubbers in the ASME OM scope, and is subject to the limitations and modifications of 10 CFR 50.55a(b)(3), except the design and access provisions and preservice examination requirements. It identifies those snubbers that are subject to examination and testing.
2. The Program Scope includes the following:
 - Snubbers used in systems that perform a specific function in shutting down a reactor to the safe shutdown condition,
 - Snubbers used to maintain the safe shutdown condition,
 - Snubbers employed to mitigate the consequences of an accident,
 - Snubbers used to ensure the integrity of the reactor coolant pressure boundary.
3. The following Safety or Safety Significant snubber types, which are outside of the applicable scope identified in Section 2.0 Step 2, are also included within the program requirements and administered in accordance with this procedure:
 - Any remaining ASME Code Class (1, 2, and 3) snubbers
 - Snubbers which support safety related analytical boundaries
 - Non-safety related snubbers with seismic support responsibilities
4. In keeping with good engineering practice and to provide reasonable assurance of structural reliability, any remaining snubbers not identified above (typically Non-Safety related) are also included in the program for periodic examination, at a minimum, or otherwise monitored and may be tested as augmented tests not required by the OM scope.

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3.0 DEFINITIONS

1. **Acceptable:** A snubber that has been examined or tested, and is shown to meet examination or testing acceptance criteria.
2. **Accessible:** Snubbers that can be readily examined or tested during normal plant operations without exposing plant personnel to undue hazards or dose, or placing operating equipment at risk.
3. **Activation:** The change of condition from passive to active, in which the snubber resists rapid displacement of the attached pipe or component. This is sometimes referred to as lock-up rate when discussing hydraulic snubbers.
4. **Application-Induced Failure:** Failures resulting from environmental conditions or applications of the snubber for which it has not been qualified.
5. **Defined Test Plan Group (DTPG):** A population of snubbers selected for testing in accordance with the snubber testing sample plan.
6. **Degraded:** Any snubber that has an examination or testing parameter that is approaching, but has not exceeded the limits of the acceptance criteria.
7. **Design or Manufacturing Failure:** Failures resulting from a potential defect in manufacturing or design that give cause to suspect other similar snubbers.
8. **Diagnostic Testing:** Testing to determine the cause or mechanism associated with failure, degradation or performance anomaly of a snubber.
9. **Drag Force:** The force that will sustain low velocity snubber movement without activation throughout the working range of the snubber stroke.
10. **Failure Mode Group (FMG):** A group of snubbers that have failed and those other snubbers that have similar potential for similar failure.
11. **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) or putting plant equipment at risk.
12. **Maintenance, Repair and Installation-Induced Failures:** Failures that result from damage during maintenance, repair or installation activities, the nature that causes other snubbers to be suspect.
13. **Normal Operating Conditions:** Operating conditions during reactor start-up, operating at power, hot standby, reactor cooldown and cold shutdown.

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3.0 DEFINITIONS (continued)

14. **Operating Temperature:** The temperature of the environment surrounding a snubber at its installed plant location during the phase of operation for which the snubber is required.
15. **Operational Readiness Testing:** Measurement of the parameters that verify snubber operational readiness.
16. **Release Rate:** The rate of the axial snubber movement under a specified load after activation of the snubber takes place. This is sometimes referred to as bleed rate with hydraulic snubbers.
17. **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.
18. **Service Life:** The period of time a snubber is expected to meet the operational readiness requirements without maintenance.
19. **Service Life Population:** Those snubbers for which the same service life has been established.
20. **Shock Suppressor, Suppressor, Snubber:** Hydraulic and mechanical dynamic restraints designed for use on piping systems or equipment which allow unrestrained thermal growth, but provide controlled restraint during dynamic or cyclic disturbances.
21. **Swing Clearance:** The movement envelope within which the snubber must operate without restriction, from the cold installed position to the hot operating position.
22. **Test Temperature:** The temperature of the snubber, snubber fluid and the environment surrounding the snubber at the time of testing.
23. **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).
24. **Unacceptable:** Snubbers that do not meet examination or testing acceptance criteria.

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4.0 RESPONSIBILITIES

NOTE

- The general roles and responsibilities of NGD Engineering Programs are outlined in [AD-EG-ALL-1600](#), Engineering Programs, [PD-EG-ALL-1618](#), Snubber Program, and [AD-EG-ALL-1618](#), Snubber Program Plan.
- Specific activities and responsibilities for those organizations and individuals that are involved with the implementation of the Snubber Program at RNP are outlined below.

4.1 Engineering Supervisor

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

4.2 Fleet Snubber Program Manager

1. Provides governance and oversight of the Site Snubber Programs.
2. Provides strategic and technical direction to the Site Snubber Program Managers.
3. Develops Fleet Snubber Program Health Report.
4. Reviews site Snubber Program Health reports.

4.3 Snubber Program Manager

1. Maintains qualifications in accordance with RNP training program requirements until a new integrated training program is implemented.
2. Establishes, prepares, and maintains snubber testing and examination Program Plans, implementing procedures and schedules.
3. Assigns examination and testing requirements for snubbers, as identified in the Snubber Program Plan.
4. Maintains the IDDEAL Software Suite Database (SnubbWorks®) for snubbers.
5. Coordinates the performance of scheduled and non-scheduled snubber examination and testing activities.
6. Selects and identifies snubbers for examination, testing and service life activities.
7. Reviews test and examination results for acceptability.
8. Evaluates results of examinations and tests found not meeting the acceptance criteria.

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4.3 Snubber Program Manager (continued)

9. Generates corrective actions:
 - Action Requests (ARs)
 - Condition Reports (CRs)
 - Work Requests (WRs) in support of Program activities
10. Determines the extent of additional examinations, tests or repairs which may be required following the discovery of an unacceptable snubber condition.
11. Establishes, monitors and tracks the service life of installed snubbers.
12. Prepares the scope lists for snubber functional testing and visual examination activities.
13. Provides pertinent information to the implementing work groups.
14. Identifies the applicable procedures required to satisfy the examination or testing requirements, per the Snubber Program Plan.
15. Submits the required snubber work scope to the on-Line work management, outage work management or planning work groups.
16. Submits the outage scope to ALARA for development of the ALARA Plan, as required.
17. Develops the Job Safety Analysis (JSA), if required.
18. Manages the scope, including content, additions, deletions, expansions and corrections of the snubber work scope.
19. Compares current recorded results with the prior or expected results to determine snubber continued service and/or corrective actions.
20. Assists in the identification of contract support resources for outage and non-outage snubber examinations or testing.
21. Identifies Code requirements which cannot be achieved due to impracticality or hardship and initiates actions (Relief Request) necessary to notify the Nuclear Regulatory Commission (NRC).
22. Establishes industry contacts with ASME OM Code committee representatives, peers at other nuclear utilities, and outside consultants to ensure that Snubber examination and testing program properly utilizes external operating experience.

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4.3 Snubber Program Manager (continued)

23. Reviews plant design changes and revises the Snubber Program Plan, accordingly.

4.4 Maintenance

1. When assigned the responsibility, ensures that snubber functional testing is performed in accordance with the applicable station procedure(s).
2. Reports findings on the appropriate data sheet(s); notifying the Snubber Program Manager.
3. Repairs, rebuilds or replaces snubbers as required under the Snubber Program.

4.5 Qualified Snubber Inspectors / Certified Nondestructive Examination (NDE) VT-3 Examiners

1. Record the as-found or as-left conditions of the snubber in accordance with the appropriate station procedures.
2. Report findings on the appropriate data sheet(s); notifying the Snubber Program Manager.

4.6 Design Engineering

1. Performs Operability/Functionality Evaluations on piping systems or components when unsatisfactory snubber examinations and test results occur.
2. Notifies the Snubber Program Manager of plant design changes that may impact the Snubber Program.

4.7 Regulatory Affairs

1. Provides licensing support of the Snubber Program.
2. Processes relief requests.
3. Submits Snubber Program Plan documents to Regulatory Authorities.

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5.0 INSTRUCTIONS

5.1 General

1. For the purposes of this procedure, references to Snubber Program Manager means a (qualified) designee or other person assigned to complete any procedural requirement identified in this procedure.
 - a. Snubber Program Managers shall be qualified in accordance with the DEP training program requirements until a new integrated training program is implemented.
2. The RNP Snubber Program Plan contains the overall details and implementation requirements for snubber examination, testing, and service life monitoring of snubbers. This Plan details the appropriate snubber categorization, the examination and test plan(s) required to be performed each refueling cycle, and service life monitoring of all plant installed snubbers.
3. During the ten-year interval between required program updates, the Snubber Program Plan may periodically be subject to revision. Reasons for revision include, but are not limited to:
 - Incorporation of Relief Requests
 - Incorporation of Code Cases
 - NRC Regulatory Guides, Notices and Bulletins
 - Augmented examinations
 - Organizational/Responsibility changes
 - Plant License changes
 - Snubber replacements
 - Snubber Service Life Monitoring updates
 - Modifications to the plant that impact the Snubber Program
4. Generation and revision to the Snubber Program Plan shall be made in accordance with this procedure.
5. Attachment 1, RNP Snubber Program Listing, contains a list of Snubbers at RNP.

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5.2 **Snubber Program Plan**

1. 10-year Updates:
 - a. Once every 10 years, the Snubber Program requires updating to the edition and addenda specified in 10 CFR 50.55a. {7.1.1}
 - b. Snubber Program Plans shall be filed with the regulatory authorities as required by ASME OM, ISTA-3200.
2. Changes to the program testing or examination methodologies may require the Snubber Program Plan to be re-submitted to the regulatory authorities.

5.3 **Snubber Program Plan Development and Revision**

1. The RNP Snubber Program Plan is developed as a site specific procedure and issued through Passport.
 - a. Initiate to revise this document via the PRR process in accordance with [AD-DC-ALL-0201](#), Development and Maintenance of Controlled Procedure Manual Procedures.
2. During the implementation of the Snubber Program Plan, and within 6 months of completion of a refueling outage, the Snubber Program Plan shall be revised, as applicable. Identify all changes in the Snubber Program Plan's Revision History.

5.4 **IDDEAL Software Suite**

1. IDDEAL Software Suite is a non-QA software program that is governed in accordance with [AD-IT-ALL-0002](#), Software Quality Assurance (SQA) Program Administration, and designated as category "E".
2. IDDEAL Software is used to:
 - a. Store (as a back-up) component information, examination and testing history and examination and testing schedules
 - b. Administer and implement the Inservice Inspection (ISI), Inservice Testing (IST), Snubber and QC Balance of Plant (BOP) Programs
3. Snubbworks® (one of the IDDEAL applications) is a Microsoft® Access based computer program 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.
 - a. 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.

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5.4 IDDEAL Software Suite (continued)

4. Use of the Examination and Test reports generated by the SnubbWorks® software to document examinations results is encouraged, unless otherwise directed by the Site Implementing Procedures.
 - a. When vendor procedures are used to perform examinations and testing (such as In-Place testing of large-bore reactor coolant pump (RCP) and steam generator snubbers) the vendor data sheets shall contain the Code required information for complete examination and testing.

5.5 Test and Examination Scheduling

1. Test and examination scheduling routinely coincides with refueling outages. Performing testing and examinations during refueling outages allows for improved accessibility, environmental conditions conducive for examination methods, reduced 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) within 60 days of the scheduled start of the refueling outage and be completed prior to the start-up following refueling activities.
 - Augmented snubber testing activities performed on suspect snubbers, for Service Life Monitoring reasons, or Non-Safety Snubbers may be performed during on-line or outage periods as authorized in accordance with the applicable site Operational guidelines. Augmented snubber testing activities are not for Program Scope Test Plan credit.

5.6 Snubber Categorization

1. All of the snubbers at RNP are considered one population for examination. The decision to examine the snubbers as one population or as separate categories may be made during or after the examination.

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5.7 Visual Examination

1. Visual examinations shall be performed in order to meet the requirements set forth in Subsection ISTD-4200, and shall be documented per [EST-032](#), Visual Examination of Hydraulic and Mechanical Shock Suppressors.
 - Non-Safety snubber visual examination schedule and requirements are directed in [PM-142](#), Non-Safety Related Shock and Sway Suppressor Visual Inspection.
2. The visual examination boundary shall include snubber assembly from pin to pin, inclusive. Any concerns detected outside of the ISTD examination boundary should also be documented and evaluated.
3. Visual examinations on safety related snubbers shall be performed by a VT-3 (Level II or III) Examiner, certified in accordance with [NDEP-A](#), Nuclear NDE Program and Personnel Process, or approved Vendor Program. VT-3 Certification documentation shall be attached to the associated EST for record retention.
4. The visual as-found examination for Safety Related or Safety Significant snubbers shall be performed before the snubber is disconnected or removed for any reason. 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.
5. An augmented scope is invoked whenever a visual examination is to be performed as a supplemental scope, outside of the ASME OM requirements, or is for Non-Safety related snubbers.

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5.7 Visual Examination (continued)

6. Prior to performing [EST-032](#), Visual Examination of Hydraulic and Mechanical Shock Suppressors, the personnel performing the visual examination shall be provided with the current revision of snubber related calculations that include snubber "as-built" drawings.
 - a. The current revision shall be verified as current via the Document Management System.
 - b. The calculations for the snubbers can be located in the following packages:

Snubber Number	Calculation Number	Snubber Number	Calculation Number
1-12	RNP-C/SPPT-1530	23	CH-4-SN-23
13	RNP-C/SPPT-1297	24	CH-4-SN-24
14	RNP-C/SPPT-1298	25	CH-4-SN-25
15	RC-4-241 (SN)	26	RC-6-218
16	RC-4-241 (SN)	28	FW-6A-1007
17	SI-20-1043	29	FW-6B-44
18	SI-20-1031	30	MS-4-SN-30
19	SI-20-1023	33	AFW-45
20	SI-20-1023	34	AFW-46
21	SI-20-18	35	83038-M-05-F
22	SI-20-18	36	RNP-C/SPPT-1726

- c. The following safety related snubbers are included in the program:

Snub. No.	OEM/Location in Plant	Rating (1000 pounds)	Cylinder Bore (inches)	Stroke (inches)
1-4	Enertech – Steam Generator “A”	470	12	5
5-8	Enertech – Steam Generator “B”	470	12	5
9-12	Enertech – Steam Generator “C”	470	12	5
13	Anvil/Grinnell – CVC-387	3	1 1/2	5
14	Anvil/Grinnell – CVC-387	3	1 1/2	5
15	Bergen-Paterson – Pressurizer Relief Line	20	3.25	6
16	Bergen-Paterson – Pressurizer Relief Line	20	3.25	6

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5.7 Visual Examination (continued)

Snub. No.	OEM/Location in Plant	Rating (1000 pounds)	Cylinder Bore (inches)	Stroke (inches)
17	Anvil/Grinnell – RHR Pump “A” Suction Line	12.5	2 ½	5
18	Anvil/Grinnell – RHR Pump “B” Suction Line	12.5	2 1/2	5
19	Anvil/Grinnell – Upstream of RHR-752B	12.5	2 1/2	5
20	Anvil/Grinnell – Upstream of RHR-752B	12.5	2 1/2	5
21	Anvil/Grinnell – Upstream of SI-862A	12.5	2 1/2	5
22	Anvil/Grinnell – Upstream of SI-862A	12.5	2 1/2	5
23	Anvil/Grinnell – Charging Line Loop 2 Cold Leg	12.5	2 1/2	5
24	Anvil/Grinnell - Charging Line Loop 2 Cold Leg	12.5	2 1/2	5
25	Anvil/Grinnell – Auxiliary Spray Line	12.5	2 1/2	5
26	Anvil/Grinnell – Letdown Line to Non-regenerative HX	3	1 1/2	5
28	Anvil/Grinnell – Feedwater Line “A”	12.5	2 1/2	5
29	Anvil/Grinnell – Feedwater Line “B”	12.5	2 1/2	5
30	Anvil/Grinnell – No. 2 Steam Supply to Aux. Feedwater Pump	3	1 1/2	5
33	Pacific Scientific – FCV-1424	0.650	---	2.5
34	Pacific Scientific – FCV-1425	0.650	---	2.5
35	Anvil/Grinnell – Letdown Line to Letdown Orifice	3	1 1/2	5
36	Pacific Scientific – SI-850D	0.650	---	2.5

- d. Typically visual examinations are performed every refueling outage. However, as an alternative, visual examinations may be performed on a schedule based on the number of unacceptable snubbers found during the previous refueling outage(s) in accordance with Attachment 2, Visual Examination Intervals.

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5.8 Operational Readiness Testing

1. Snubber populations within the program scope shall be tested for operational readiness during each fuel cycle.
2. Tests are required to be in accordance with a specified sampling plan.
3. Testing may be performed 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.
 - Augmented snubber testing activities performed on suspect snubbers, for Service Life Monitoring reasons, or Non-Safety Snubbers may be performed during on-line or outage periods as authorized in accordance with the applicable site Operational guidelines. Augmented snubber testing activities are not for Program Scope Test Plan credit.
4. Snubbers shall be tested in their as-found condition regarding the parameters to be tested to the fullest extent practicable.
 - Test methods shall not alter the condition of a snubber to the extent that the results do not represent the as-found snubber condition.
 - Snubbers may be tested in their installed location or may be removed from the field installation and bench tested in accordance with approved procedures.
 - 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.
5. 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.
6. The applicable site maintenance procedures shall govern the removal and reinstallation of plant installed snubbers.

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5.8 Operational Readiness Testing (continued)

7. Each Safety Related or 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).
 - Non-Safety snubber visual examination schedule and requirements are directed in [PM-142](#), Non-Safety Related Shock and Sway Suppressor Visual Inspection.
8. For each Safety Related or Safety Significant snubber determined to be unacceptable by operational readiness testing, additional snubbers shall be tested as described by the applicable governing basis requirements.
 - a. An evaluation of failed snubbers is required and will be documented in accordance with the Corrective Action Program.
 - b. An Engineering Evaluation shall be performed on the System, Structure, or Component (SSC) to which the failed snubbers were attached.
 - The purpose of this Engineering Evaluation will be to determine if the SSC to which the inoperable snubbers are attached were adversely affected by the inoperability of the snubbers in order to ensure that the SSC remains capable of meeting the designed service.
9. 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.
10. Degraded snubbers are repaired or replaced as a preventive maintenance action. Failure mode grouping and scope expansion is not required for degraded snubbers unless determined to be required for extent of condition concerns. Additional snubbers may be tested or replaced at the discretion of Engineering based on the cause of the degradation for service life monitoring purposes. Information learned from the degraded snubbers shall be considered in the service life monitoring program as applicable.
11. Test equipment failure during functional testing may invalidate that day's testing. 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.
12. Test results will be reviewed for adverse trends which will help establish the service life of specific snubbers or locations.

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5.8 Operational Readiness Testing (continued)

13. 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.

5.9 Defined Test Plan Group (DTPG)

1. The DTPGs shall include all Safety Related or Safety Significant snubbers except replacement snubbers and snubbers repaired or adjusted as a result of not meeting the acceptance requirements, and those which had failed during the previous test interval and are scheduled for testing. These snubbers shall be exempt for the concurrent test interval.
2. Snubbers attached to the steam generator shall be a separate DTPG. There are no snubbers attached to the reactor coolant pump(s).

5.10 Testing Sample Plans

1. Safety Related or Safety Significant snubbers of each DTPG shall be tested in accordance with the Test Plan.

NOTE

If the test plan selection has changed since the Plan submittal to the Regulatory Authorities, then it may be necessary that the revised Snubber Program Plan be re-submitted as specified in Section 5.2.

2. The test plan(s) shall be selected for each DTPG before the scheduled testing begins. Test plan(s) selection for each DTPG shall be documented.
3. The test plan selected for a DTPG shall be used throughout the refueling outage tests for that DTPG and any Failure Mode Group (FMG) that is derived from it.
4. For unacceptable snubber(s), the additional testing shall continue in the DTPG or FMG.

5.11 Testing Sample Plan Selection

1. The Safety Related or Safety Significant Sample Plan for the Defined Test Plan Group (DTPG) functional testing is the 10% Test Plan.

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5.11 Testing Sample Plan Selection (continued)

2. The initial sample selection for the 10% Test Plan(s) shall be as described by [EST-033](#), Functional Testing of Hydraulic and Mechanical Shock Suppressors, and may include the following:
 - a. The Safety Related or Safety Significant sample may 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.
 - b. Selection of the representative Safety Related or Safety Significant snubbers may be random, may also be selected from Safety Related or 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.
 - c. Currently all snubbers have established service life PM's which coordinate with the snubber functional testing requirements. The number of snubbers scheduled for seal life replacement each outage meets the requirements for the 10% Test Plan. Testing of the population in this manner also tests the oldest snubbers installed.
3. For RNP, snubbers are categorized into three DTPG "types/groups" as follows:
 - a. Large bore (Enertech/Anker-Holth) snubbers (SG Snubbers 1-12) [12 total, test 2 (one bank)]
 - b. Small bore hydraulic units [12 total, test 2]:
 - (1) Anvil and Grinnell Figure 200/201, 1½ inch bore (No. 13, 14, 26, 30, 35)
 - (2) Anvil and Grinnell Figure 200/201, 2½ inch bore (No. 17 through 25, 28, 29)
 - (3) Bergen-Paterson HSSA, 3¼ inch bore (No. 15 and 16)
 - c. Mechanical snubbers (PSA ½, No. 33, 34, and 36) [3 total, test 1]

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5.12 Sample Expansion

1. After determination that a Safety Related or Safety Significant snubber is unacceptable, an additional test plan sample shall be established. Additional test sample size shall be at least one-half the size of the initial sample from that DTPG.
2. 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.

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 subsequently deleted prior to the completion of the test campaign, the deleted snubber shall nevertheless be considered in its respective examination population, examination category or 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 an unanticipated dynamic event (e.g., water hammer, steam hammer, beyond Design Basis Event (DBE), etc.) occurs that may affect snubber operability, then the affected snubbers and systems shall be reviewed and any appropriate corrective action taken.

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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 and to estimate appropriate service life limits for installed snubbers. Service life estimates vary and are generally based on factors such as manufacturer recommendations, design limits, environmental conditions, applications and materials, among others. Service life estimates should be adjusted periodically based on plant experience and technical data to ensure that the snubber(s) operational readiness is achieved throughout its intended installed life. Service life monitoring is required for all Safety Related or Safety Significant snubbers. Service life monitoring of Non-Safety Related snubbers is not addressed by the ASME OM Code.
2. A record of the service life of each snubber in the program shall be maintained. The snubber service life record shall include the snubber installed location, manufacturer/model, serial number, installed date, rebuild date or date of manufacture and service life expiration date for each applicable snubber. When snubbers are rebuilt / overhauled or replaced, the service life shall be updated which will provide future statistical bases for consideration of snubber service life.
3. Service life for snubbers shall be evaluated at least once each fuel cycle and adjustments made as warranted. 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.
4. If the evaluation indicates that service life will be exceeded before the next scheduled system or plant outage, 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, or
 - c. The snubber shall be reconditioned such that its service life will be extended to or beyond the next scheduled system or plant outage.

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5.17 Miscellaneous

1. Snubber repair and replacement shall be performed in compliance with [EGR-NGGC-0211](#), ASME Section XI Repair/Replacement Program. Examples of compliance with [EGR-NGGC-0211](#), ASME Section XI Repair/Replacement Program, would include repair and replacement of load pins and studs, mounting brackets, pipe clamps, snubbers, and any other hardware.
2. Any maintenance or testing performed by the OEM/vendor shall be documented with the associated EST, including personnel certification, test procedures and calibration sheets and test results, when applicable.
3. A file for trending snubber reliability concerns shall be maintained in the Program IQ System Health Report for Snubbers.
4. Any examination findings which result in a functional failure, as defined in [ADM-NGGC-0101](#), Maintenance Rule Program, should be addressed per the guidelines in [ADM-NGGC-0101](#), Maintenance Rule Program.

6.0 RECORDS

1. No records are generated by this procedure.

7.0 REFERENCES

7.1 Commitments

1. Code of Federal Regulations, 10 CFR 50.55a, Codes and Standards

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 Technical Program Engineering
4. [AD-EG-ALL-1600](#), Engineering Programs
5. [AD-EG-ALL-1618](#), Snubber Program Plan
6. [AD-IT-ALL-0002](#), Software Quality Assurance (SQA) Program Administration
7. [ADM-NGGC-0101](#), Maintenance Rule Program
8. [ADM-NGGC-0115](#), Preconditioning of Structures, Systems & Components

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7.2 Procedures (continued)

9. [ADM-NGGC-0203](#), Preventive Maintenance and Surveillance Testing Administration
10. [CM-M-GNRL-SNBR-001](#), Grinnell or Anvil Hydraulic Snubber Removal and Reinstallation
11. [CM-M-GNRL-SNBR-004](#), 500K Anker Holth Shock and Sway Suppressor Maintenance
12. [CM-M-GNRL-SNBR-008](#), Bergen-Paterson Hydraulic Snubber Removal and Reinstallation
13. [CM-M-GNRL-SNBR-009](#), Pacific Scientific Mechanical Snubber Removal and Reinstallation
14. [CM-M-SG-SNBR-001](#), SG Snubber Fluid System Pressure Test
15. [CM-M-SG-SNBR-002](#), Steam Generator Hydraulic Snubbers Removal and Reinstallation
16. [EGR-NGGC-0211](#), ASME Section XI Repair/Replacement Program
17. [EST-032](#), Visual Examination of Hydraulic and Mechanical Shock Suppressors
18. [EST-033](#), Functional Testing of Hydraulic and Mechanical Shock Suppressors
19. [PM-142](#), Non-Safety Related Shock and Sway Suppressor Visual Inspection

7.3 Miscellaneous Documents

1. ASME OM, Operation and Maintenance of Nuclear Power Plants, 2004 Edition through the 2006 Addenda
2. EC 51344 R1, Removal of Snubbers 31 and 32
3. ESR 9700613, Service Life For Small Bore Snubbers
4. INPO EPG-07, Snubbers
5. Lake Engineering Report Number LEC-304-R1, "Seal Life Evaluation of Anker-Holth Snubbers, H.B. Robinson Station", dated 8/30/00 (performed during RFO-19)
6. Memo Evaluation of Operating Characteristics of Safety Related Hydraulic Shock Suppressors at H.B. Robinson Unit No. 2, dated July 3, 1979, filed under Outline of Equipment File No. 2-G-1 (bases for small bore hydraulic suppressor functional test acceptance criteria, Number 13 through 26, 28, 29, 30, and 35).

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7.3 Miscellaneous Documents (continued)

7. [NDEP-0613](#), VT-3 Visual Examination of Nuclear Power Plant Components
8. [NDEP-A](#), Nuclear NDE Program and Personnel Process
9. NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants
10. [PD-EG-ALL-1618](#), Snubber Program
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
13. Technical Manual [727-702-17](#), Technical Instruction Manual for Hydraulic Shock Suppressors (bases for functional test acceptance criteria for large bore Anker-Holth/Paul Monroe Suppressors, Number 1-12)
14. Technical Manual [728-626-26](#), Mechanical Shock Arrestors (bases for functional test acceptance criteria for Pacific Scientific Arrestors, Number 33, 34, and 36)
15. Technical Specification [3.0.8](#), Snubbers

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RNP Snubber Program Listing

Mark No	Serial No	Acc	Bldg Elev	Manufacturer	Model	Expected Life	Recom Life	Date Rebuilt	Date Installed	Next Reblid
Safety Related / Safety Significant Snubbers										
Snubber-001	1713	No	CV-3 SG A	Anker-Holth	Paul Monroe	148.8	148.8	3/8/2012	10/1/1999	7/8/2024
Snubber-002	1712	No	CV-3 SG A	Anker-Holth	Paul Monroe	148.8	148.8	3/8/2012	10/1/1999	7/8/2024
Snubber-003	1711	No	CV-3 SG A	Anker-Holth	Paul Monroe	148.8	148.8	3/8/2012	10/1/1999	7/8/2024
Snubber-004	1710	No	CV-3 SG A	Anker-Holth	Paul Monroe	148.8	148.8	3/8/2012	10/1/1999	7/8/2024
Snubber-005	1717	No	CV-3 SG B	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-006	1515	No	CV-3 SG B	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-007	1714	No	CV-3 SG B	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-008	1716	No	CV-3 SG B	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-009	1720	No	CV-3 SG C	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-010	1719	No	CV-3 SG C	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-011	1718	No	CV-3 SG C	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-012	1721	No	CV-3 SG C	Anker-Holth	Paul Monroe	148.8	148.8	10/1/2002	10/1/2002	2/1/2015
Snubber-013	30088	No	CV-RCP BAY B	Grinnell	PH74, Fig 200	144	360	4/14/2007	10/1/1999	4/14/2019
Snubber-014	36767	No	CV-RCP BAY B	Grinnell	PH74, Fig 200	144	360	10/13/2008	10/1/1999	10/13/2020
Snubber-015	ADH 2003-2254	Yes	CV-3 PRZR CUB	Bergen-Patterson	M77	144	360	10/3/2013	10/3/2013	10/3/2025
Snubber-016	ADH 2003-1692	Yes	CV-3 PRZR CUB	Bergen-Patterson	M77	144	360	2/17/2012	2/17/2012	2/17/2024
Snubber-017	36894	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	5/1/2010	4/1/2001	5/1/2022
Snubber-018	38744	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	10/22/2013	10/11/2013	10/22/2025
Snubber-019	37963	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	2/10/2012	2/10/2012	2/10/2024
Snubber-020	34439	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	10/1/2005	10/1/2005	10/1/2017
Snubber-021	35897	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	5/1/2004	5/1/2004	5/1/2016
Snubber-022	30080	Yes	RHR PMP RM	Grinnell	PH74, Fig 200	144	360	10/14/2008	10/1/1999	10/14/2020
Snubber-023	35487	Yes	CV-1 239	Grinnell	PH74, Fig 200 A	144	360	10/1/2005	10/1/2005	10/1/2017

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RNP Snubber Program Listing

Mark No	Serial No	Acc	Bldg Elev		Manufacturer	Model	Expected Life	Recom Life	Date Rebuilt	Date Installed	Next Rebid
Snubber-024	35976	Yes	CV-1	239	Grinnell	PH74, Fig 200	144	360	4/1/2007	10/1/1999	4/1/2019
Snubber-025	37964	Yes	CV-1	241	Grinnell	PH74, Fig 200	144	360	9/26/2013	9/26/2013	9/26/2025
Snubber-026	36775	Yes	CV-1	228.5	Grinnell	PH74, Fig 200	144	360	10/1/2008	4/1/2001	10/1/2020
Snubber-028	35977	Yes	TB	253.5	Grinnell	PH74, Fig 200	144	360	4/12/2007	3/1/1998	4/12/2019
Snubber-029	36766	Yes	TB	249.25	Grinnell	PH74, Fig 200	144	360	4/1/2010	10/1/2002	4/1/2022
Snubber-030	37978	Yes	TB	256.313	Grinnell	PH74, Fig 200	144	360	1/27/2012	1/27/2012	1/27/2024
Snubber-033	19056	Yes	AB	232	PSA	PSA 1/2	480	480	5/1/2010	9/1/2005	9/1/2045
Snubber-034	18692	Yes	AB	232	PSA	PSA 1/2	480	480	2/14/2012	2/14/2012	2/14/2052
Snubber-035	34607	Yes	CV-1	229	Grinnell	PH74, Fig 200	144	360	10/1/2005	10/1/2005	10/1/2017
Snubber-036	17839	Yes	CV-1	247.75	PSA	PSA 1/2	480	480	10/1/2008	9/1/2005	9/1/2045
Non-Safety Snubbers											
Snubber-100	N/S-100	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-101	3276	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-102	N/S-102	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-103	N/S-103	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-104	N/S-104	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-105	3094XX	Yes	TB		Grinnell		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-106	30389	Yes	TB		Grinnell	PH74, Fig 200	360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-107	N/S-107	Yes	TB		Blaw Knox		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-108	770026	Yes	TB		Power Piping		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-110	4177-001	Yes	TB		Blaw Knox		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-111	2500-30-372	Yes	TB		Bergen-Patterson		360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-112	G20968-2-5	Yes	TB		Bergen-Patterson	M77	360	360	7/31/1970	7/31/1970	7/31/2000
Snubber-113	G20969	Yes	TB		Bergen-Patterson		360	360	7/31/1970	7/31/1970	7/31/2000
Misc Snubber Equipment											
Snubber-RSV-A	SG RES. A	No	CV-3		Anker-Holth	Paul Monroe	72	72	9/24/2013	6/26/2007	9/24/2019
Snubber-RSV-B	SG RES. B	No	CV-3		Anker-Holth	Paul Monroe	72	72	2/14/2012	10/11/2005	2/14/2018
Snubber-RSV-C	SG RES. C	No	CV-3		Anker-Holth	Paul Monroe	72	72	9/25/2013	4/30/2007	9/25/2019

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Visual Examination Intervals

Population or Category Size [Note 1]	Number of Unacceptable Snubbers		
	Column A (Extended Interval) [Note 2 and 3]	Column B (Interval Same as Previous) [Note 2, 4 and 5]	Column C (Interval Reduction to 2/3) [Note 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
Note: <ol style="list-style-type: none"> 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. 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. 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. 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. 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. 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. 			