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10 CFR 50.55a

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

CATAWBA NUCLEAR STATION, UNIT NOS. 1 AND 2
DOCKET NOS. 50-413 AND 50-414,
RENEWED LICENSE NOS. NPF-35 AND NPF-52

SUBJECT: Snubber Program Plan Revision, AD-EG-CNS-1618, "Catawba Nuclear Station Snubber Program Plan"

Pursuant to 10 CFR 50.55a(f)(5)(i), and in accordance with 10 CFR 50.55a(f)(7), Duke Energy Carolinas, LLC (Duke Energy) is submitting the revised snubber program plan, AD-EG-CNS-1618, "Catawba Nuclear Station Snubber Program Plan," for Catawba Nuclear Station, Units 1 and 2 (CNS). Revision 7 of AD-EG-CNS-1618 adopted American Society of Mechanical Engineers Operation and Maintenance (ASME OM) Code 2020 Edition and was issued on August 19, 2025, which is the beginning of the fifth snubber program interval.

This submittal contains no regulatory commitments.

Should you have any questions, please contact Mr. Ryan Treadway, Director Nuclear Fleet Licensing at (980) 373-5873.

Sincerely,

Kevin M. Ellis
General Manager – Nuclear Regulatory Affairs, Policy & Emergency Preparedness

Enclosure:
1. AD-EG-CNS-1618, "Catawba Nuclear Station Snubber Program Plan," Revision 7

cc:
Regional Administrator USNRC Region II
US NRC Project Manager – CNS
USNRC Senior Resident Inspector – CNS

Enclosure 1

AD-EG-CNS-1618, "Catawba Nuclear Station Snubber Program Plan," Revision 7
(54 pages including this cover)

Information Use

CATAWBA UNIT 0

ADMINISTRATIVE PROCEDURE

AD-EG-CNS-1618

CATAWBA NUCLEAR STATION SNUBBER PROGRAM PLAN

REVISION 7

REVISION SUMMARY

PRR 02552869
DESCRIPTION

- Cover Sheet: Updated to current standards.
- Throughout: Updated formatting and terminology throughout.
- Section 2.0: Totally revised to update the applicability to current standards.
- Section 3.0.2: Incorporated examples of radiation or extreme heat and removed dose.
- Section 3.0.8: Deleted without maintenance.
- Section 3.0.9: Added Snubber definition.
- Section 4.1.7: Revised coordinates to develops the scope and monitors.
- Section 4.1.13: Revised to incorporate specific service life documents.
- Section 4.1.16: Incorporated identifies and appropriate.
- Section 4.1.22: Deleted performs.
- Section 4.4.3: Incorporated as required by code or rulemaking.
- Section 5.1.4: Deleted the ten year guidance.
- Section 5.2.2: Incorporated developed and maintained.
- Section 5.2.4: Clarified 10-year Updates to Interval Updates to reflect current standards.
- Section 5.2.4.a: Revised IST to ISI.
- Section 5.3.2.a: Deleted as a back-up.
- Section 5.4.2: Revised 60 days prior to specified by the regulation.
- Section 5.5.1.b: Incorporated before.
- Section 5.6.1: Added visual examinations performed in accordance with industry code.
- Section 5.6.2.a and sub-step: Added updated regulatory guide guidance.
- Section 5.6.4 and sub-step: Added Code Case implementation guidance.
- Section 5.6.10: Incorporated as defined in the noted maintenance procedure.
- Section 5.7.1.e: Updated and incorporated in effect documents.
- Section 5.7.1.e.(1): Added 25-year seal life guidance (PRR 02558088).
- Section 5.7.1.e.(2): Incorporated seal evaluation guidance.
- Section 5.7.1.e.(3).(a) and (b): Added hand stroking guidance.
- Section 5.8.3 and sub-step: Added when testing can occur guidance.
- Section 5.11.3 and sub-steps: Added sample selection guidance.
- Section 5.12.3 and sub-steps: Added additional contingency sample guidance.
- Section 5.14.1 and sub-step: Totally revised snubbers discovered unacceptable guidance.
- Section 6.0.2 and Section 6.0.3: Revised records to updated guidance (PRR 02531064).
- Section 7.2.6: Added AD-EG-ALL-1703, ASME Section XI Repair/Replacement Program as a procedure reference.
- Section 7.3.12: Added SNU-CNS-1618-01, CNS Installed Snubber Listing, as a miscellaneous documents.
- Section 7.3.13: Added EC 425633, Evaluation of ASC/Anvil/Grinnell Document PI 19-02 Rev. 1, Snubber Storage Service Life Impact (PRR 02558088).
- Attachment 1, Page 2: Incorporated (or equivalent 4Y) and (PMCH AR 0239178 change 3R to 4Y)
- Attachment 1, Page 3: Deleted outages performed.

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ATTACHMENTS

1.0 PURPOSE

1. The purpose of the Snubber Program Plan is to define methods used to develop, administer, and implement the Snubber Program at Catawba Nuclear Station (CNS) Units 1 and 2. This document provides a systematic approach for implementing visual examinations, operability testing, and service life monitoring for the snubber population at CNS, as well as general guidelines for executing program responsibilities, corrective actions, and record keeping, for compliance with regulatory requirements.

2.0 SCOPE

1. The NRC endorses the ASME Code for Operation and Maintenance of Nuclear Power Plants for inspection and testing of snubbers, as stipulated in 10CFR50.55a and NUREG-1482.

    a. ASME OM Code, Operation and Maintenance of Nuclear Power Plants, 2020 Edition, is the effective edition for the fifth snubber program interval for both Units 1 and 2.

    b. The new snubber interval will be 12 years in accordance with Code Case OMN-31 and will be aligned with the fifth ISI interval that is scheduled to start August 19, 2025.

    c. ASME OM Code Subsections ISTA and ISTD govern snubber examination and testing activities.

2. The program envelopes the scope described in the ASME OM Code Subsection ISTA, Article ISTA-1100 which is defined as the following:

    a. Snubbers used in systems that perform a specific function in shutting down a reactor to the safe shutdown condition

    b. Snubbers used to maintain the safe shutdown condition

    c. Snubbers employed to mitigate the consequences of an accident

    d. Snubbers used to ensure the integrity of the reactor coolant pressure boundary

3. This procedure also applies to snubbers addressed in CNS Selected Licensee Commitment (SLC) 16.9-13.

    a. CNS SLC 16.9-13 addresses of all snubbers except those snubbers installed on Non-Safety related systems, which may be excluded provided their failure or the failure of the system on which they are installed would not have an adverse effect on any Safety Related system.

2.0 SCOPE (continued)

b. Based upon the design criteria referenced in Design Specification CNS-1206.00-4-0001, all snubbers falling within the SLC scope are enveloped by either the QA Condition 1 or QA Condition 4 classification.

c. The SLC scope conservatively includes all QA 1 and 4 snubbers, including some Seismic Category II snubbers classified as QA Condition 4 which may potentially be excluded based on having no adverse effect on Safety Related systems.

d. Any such exclusions from SLC activities will be documented on a case by case basis.

4. In keeping with good engineering practice and to provide reasonable assurance of structural reliability, any remaining snubbers not identified above (i.e., Non-Safety Related) may be included and inspected or monitored in the program.

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 (e.g., radiation or extreme heat) or placing operating equipment at risk.

3. **Defined Test Plan Group (DTPG):** A population of snubbers selected for testing in accordance with the snubber testing sample plan.

4. **Degraded:** Any snubber that has an examination or testing parameter that is approaching but has not 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) or putting plant equipment at risk.

7. **Safety-Significant Snubbers:** Snubbers designated as Non-Safety Related but it is determined that their failure or the failure of the system on which they are installed would have an adverse effect on a Safety-Related system.

8. **Service Life:** The period of time a snubber is expected to meet the operational readiness requirements.

9. **Snubber:** Dynamic restraints that are utilized to allow slow, constant movement of an attached component while providing rigid restraint against rapid motion due to dynamic loads.

10. **Test Campaign:** The series of actions required to complete the testing of DTPG samples for a specific cycle.

11. **Transient Dynamic Event:** An unexpected or potentially damaging occurrence (e.g., a water/steam hammer, earthquake or similar event) which was determined from reviews of operating data or during a visual inspection/examination.

12. **Unacceptable:** Snubbers that do not meet examination or testing acceptance criteria.

4.0 RESPONSIBILITIES

NOTE

- The general roles and responsibilities for the execution of NGD Engineering Programs are outlined in AD-EG-ALL-1600, Engineering Programs and AD-EG-ALL-1618, Snubber Program.
- Specific activities and responsibilities for those organizations and individuals that are involved with the implementation of the Snubber Program at the CNS plant site are outlined below.

4.1 Fleet Engineering Programs - Snubber Program Manager

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

2. Provides governance and oversight of the Snubber Program and provides strategic and technical direction to the site.

3. Maintains qualifications in accordance with the Program Managers respective ESP Program in which they are enrolled. No additional qualifications specific to the Snubber Program Manager position exist at either the Fleet or Site levels.

4. Establishes, prepares, and maintains snubber testing and examination Program Plans, implementing procedures, and schedules.

5. Assigns examination and testing requirements for snubbers, as identified in the Snubber Program Plan.

6. Maintains the IDDEAL Software Suite Database (SnubbWorks®) for snubbers.

7. Develops the scope and monitors the performance of scheduled and non-scheduled snubber examination and testing activities preventive maintenance and condition monitoring activities.

8. Selects and identifies snubbers for examination, testing and service life activities.

9. Reviews test and examination results for acceptability.

10. Evaluates results of examinations and tests which fail to meet the acceptance criteria.

4.1 Fleet Engineering Programs - Snubber Program Manager (continued)

11. Generates corrective actions:

    - Action Requests (ARs)
    - Nuclear Condition Reports (NCRs)
    - Work Requests (WRs) in support of Program activities

12. Determines the extent of additional examinations, tests, or repairs which may be required following the discovery of an unacceptable snubber condition.

13. Establishes, monitors and tracks the service life of installed snubbers and maintains the controlled listing in program document SNU-CNS-1618-01, CNS Installed Snubber Listing.

14. Provides pertinent information to the implementing work groups.

15. Identifies the applicable procedures required to satisfy the examination or testing requirements, per the Snubber Program Plan.

16. Identifies and submits the required snubber work scope to the appropriate On-Line work management, Outage work management, and Planning work groups.

17. Manages the snubber work scope, including content, additions, deletions, expansions and corrections.

18. Compares current recorded results with the prior or expected results to determine snubber continued service and/or corrective actions.

19. Identifies Licensing or Code requirements which cannot be achieved due to impracticality or hardship and initiates actions (Relief Request) necessary to notify the Nuclear Regulatory Commission (NRC).

20. Establishes industry contacts with ASME OM Code committee representatives, peers at other nuclear utilities, and outside consultants to ensure that the Snubber Program effectively utilizes external Operating Experience (OE).

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

22. Assists with Operability Evaluations for snubbers as required.

4.2 Site Maintenance

1. Ensures that snubber functional testing is performed in accordance with the applicable station procedures.

2. Records the results of the snubber tests, examinations, and as-found or as-left conditions of the snubber in accordance with the appropriate station procedures.

3. Reports findings on the appropriate data sheet(s); notifying the Snubber Program Manager.

4. Repairs, rebuilds, or replaces snubbers as required under the Snubber Program.

4.3 Site Design Engineering

1. Performs Operability Evaluations on piping systems or components per AD-OP-ALL-0105, Operability Determinations.

2. Notifies the Snubber Program Manager of plant design changes that may impact the Snubber Program.

4.4 Site Regulatory Affairs

1. Provides licensing support of the Snubber Program.

2. Processes relief requests.

3. Submits Snubber Program Plan documents to Regulatory Authorities as required by code or rulemaking.

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. ASME OM Code requirements are identified and administered by the implementation of this document.

3. This document (the Snubber Program Plan) contains the overall details and implementation requirements for snubber examination, testing, and service life monitoring of snubbers. The 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.

4. During the interval between required program updates, the Snubber Program Plan may periodically be subject to revision. Reasons for revision include, but are not limited to:

   a. Incorporation of Relief Requests

   b. Incorporation of Code Cases

   c. NRC Regulatory Guides, Notices and Bulletins

   d. Augmented examinations

   e. Organizational/Responsibility changes

   f. Plant License changes

   g. Snubber replacements

   h. Snubber Service Life Monitoring updates

   i. Modifications to the plant that impact the Snubber Program

5. Generation and revision to the Snubber Program Plan shall be made in accordance with applicable corporate and site processes.

5.2 Snubber Program Plan

1. Each NGD site is responsible for implementation activities of the site Snubber Program Plan, herein referred to as the Program.

2. The Snubber Program Plan is developed and maintained in accordance with AD-DC-ALL-0201, Development and Maintenance of Controlled Procedure Manual Procedures.

3. On a periodic basis the Snubber Program Plan may be revised as applicable to update pertinent information. All updates shall be documented in the Snubber Program Plan's Revision History.

4. Interval updates:

    a. The Snubber Program requires updating the code of record interval of latest ASME Code edition and addenda as specified in 10 CFR 50.55 a(f)(4)(ii), as defined in 10 CFR 50.55 a(y)(2) the code of record interval is two consecutive ISI intervals.

    b. Snubber Program Plans for each code of record interval update shall be in accordance with ASME OM Code and 10 CFR 50.55a requirements, as applicable. Submittal shall consist of the latest revision to this document (AD-EG-CNS-1618) with cover sheet information as required by ASME OM Code, Article ISTA-3200. Other pertinent articles of ASME OM Code Subsection ISTA include ISTA-1300, 3110. 9220, and 9230.

5. Changes to the program testing or inspection methodologies may require the Snubber Program Plan to be re-submitted to the regulatory authorities. Changes that may require resubmittal include code revision updates, utilization of code cases or regulatory relief, revised test sample plans, or any changes that significantly alter the plan implementation from existing commitments. Routine periodic revisions to address items such as organizational changes or editorial items (updated references, correct typographical errors, formatting) do not require resubmittal but may be submitted as a courtesy notification.

5.3 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.

2. IDDEAL Software is used to:

   a. Store- component information, examination and testing history, and examination and testing schedules

   b. Administer and implement the Inservice Inspection (ISI), Inservice Testing (IST), Snubber, and 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.

   b. Examination and Test reports may be generated by the SnubbWorks® software to document examination and test results.

5.4 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 and functional testing may be performed during plant operation or during refueling outages, as conditions allow. Functional testing for test plan credit may begin no earlier than specified by ASME OM ISTD-5240 unless approved by regulatory relief .

3. Snubber examination and testing activities at CNS are scheduled via predefined model work orders against the Equipment ID MSE HG SNUBBERS. PMID 02033094 addresses Unit 1 scope and PMID 02033095 addresses Unit 2. Attachment 1 provides information regarding definitions and scheduling of PMID work items.

5.5 Snubber Categorization

1. For Examination purposes snubbers at CNS are categorized individually as accessible or inaccessible. The categories of accessible and inaccessible snubbers are generally considered separately for examination. Alternatively, all of the snubbers may be combined together and considered as one population for examination.

    a. A decision to examine the snubbers as one population in lieu of separate categories shall be clearly documented.

    b. This determination may be made before, during or after the examination.

    c. When recombining categories into one population, the shorter interval of the categories shall be used.

    d. Categorization is in accordance with ASME OM ISTD-4220.

5.6 Visual Examination

1. Visual examinations shall be performed in accordance with ASME OM Code, Subsection ISTD, to verify that are no Deficient Conditions or visible indications of damage and attachments to foundation or support structure are secure.

2. Code Case OMN-13 Revision 3 shall be utilized to conduct Visual Examinations of snubbers for each unit. The Code Case allows for examinations to be conducted on an interval beyond the maximum allowed in Table ISTD-4252-1 but not to exceed 10 years for any snubber.

    a. Revision 3 of OMN-13 was approved by Regulatory Guide 1.192, Revision 3.

        (1) The changes in OMN-13 from revision 2 to revision 3 do not affect implementation as described in this procedure.

3. 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.

5.6 Visual Examination (continued)

4. At the time of Code Case implementation OMN-13 Revision 2 was the latest revision endorsed by NRC Rulemaking, therefore the following references to prerequisites are made in context of that revision.

   a. Subsequent revision of the code case did not alter the prerequisites.

   b. As described in OMN-13 Revision 2 the prerequisites for utilizing the Code Case are:

      (1) Requirements of ISTD-4251 and ISTD-4252 have been satisfied with the preceding examination interval performed at the maximum interval of two fuel cycles per Table ISTD-4252-1.

      (2) Requirements of Code Case OMN-13 paragraphs 3.1 through 3.6 shall have been satisfied for one interval prior to extending the examination interval in accordance with the Code Case.

5. Verification of satisfying OMN-13 Prerequisites:

   a. During the Third ISI Interval snubbers were visually examined on the required schedule noted in SLC-16.9-13 (current at that time) and evaluated to determine their operational readiness. The SLC Visual Examination Interval table in place during the Third ISI Interval was identical to Table ISTD-4252-1. In accordance with the SLC table, the frequency of examination was determined by the total number of snubbers in the examination category and the number of unacceptable examinations recorded during the previous examination period. The maximum interval of two cycles was successfully utilized for the intervals which encompassed cycles 20/21 for Unit 1 and 18/19 for Unit 2. For Unit 1 zero snubbers were identified during the interval as being Unacceptable in accordance with the Visual Examination Acceptance Criteria. For Unit 2 only one snubber was identified as Unacceptable during the interval, which is within the Table Column B allowable limit of 5 unacceptable snubbers for a population of greater than 200 snubbers (The smallest population is Unit 2 Inaccessible snubbers which numbers greater than 250 snubbers). Therefore it is acceptable to extend the interval in accordance with OMN-13 for this prerequisite. [ASME OM ISTD-4252] (NOTE: Zero visual failures have been recorded on Unit 1 and only 1 on Unit 2 in the last 12 fuel cycles for each unit - with examinations performed every other cycle.)

5.6 Visual Examination (continued)

b. OMN-13 paragraph 3.1 through 3.6 requirements:

(1) OMN-13 paragraph 3.1 states: “Examinations per paras. ISTD-4210, ISTD-4220, ISTD-4230, and ISTD-4240 shall include examination for indications of degradation and severe operating environments.” All snubber examinations were/are performed using procedures MP/0/A/7650/059, MP/0/A/7650/085, or MP/0/A/7650/095 which include such indications in the examination checklist.

(2) OMN-13 paragraph 3.2 states: “All snubbers shall be examined in accordance with the requirements of paras. ISTD-4210, ISTD-4220, ISTD-4230, and ISTD-4240 and para. 3.1 of this Code Case prior to conducting any maintenance, stroking, or testing, and prior to removal, for any reason, from their installed location.” All snubber removal or stroking is performed using either procedure MP/0/A/7650/059 or MP/0/A/7650/095. Both procedures require the prerequisite examinations as described in the referenced paragraphs.

(3) OMN-13 paragraph 3.3 states: "Fluid level in hydraulic snubber reservoirs shall be sufficient to ensure that the snubber is acceptable for continued service to the next examination interval." Procedures MP/0/A/7650/059, MP/0/A/7650/085, and MP/0/A/7650/095 include requirements for verifying snubber fluid levels within acceptable limits.

(4) OMN-13 paragraph 3.4 requires that inservice test data be evaluated for pertinent indications and anomalies indicative of progressive degradation. This evaluation is included within the Service Life Monitoring activities as described in Section 5.7 and Attachment 3 of this document (AD-EG-CNS-1618).

(5) OMN-13 paragraph 3.5 states: " Snubbers and snubber parts shall be examined for indications of degradation and severe operating environments during disassembly (e.g., during failure evaluation, refurbishment).” This evaluation is included within the Service Life Monitoring activities as described in Section 5.7 and Attachment 3 of this document (AD-EG-CNS-1618), as well as included in corrective actions required in accordance with Section 5.8.

5.6 Visual Examination (continued)

(6) OMN-13 paragraph 3.6 states: " The service life evaluation required by para. 2.1 of this Code Case shall include any transient dynamic event and actions taken under ISTD-1750." As described in Section 5.7, 5.15, and Attachment 3 of this document (AD-EG-CNS-1618) all failures are accounted for within the scope of Service Life Monitoring activities.

6. The start date for the 10 year OMN-13 Code Case interval is conservatively set as the start date for the last series of examinations completed prior to the start of the Fourth ISI Interval. These dates are January 6, 2014 for Unit 1 (Ref. PMID# 02033094 - 7,8,9,10) and January 7, 2013 for Unit 2 (Ref. PMID# 02033095 - 7,8,9,10). Unless the period is truncated in accordance with OMN-13, 3.7(b) all snubbers shall be examined at least once within 10 years of these dates. Should such truncation be required this document (AD-EG-CNS-1618) shall be revised to document the required inspection interval.

7. Visual Examinations are conducted using Procedure MP/0/A/7650/085 in circumstances where only an examination is required and no other work is performed.

8. Snubber removal and restoration for any reason is performed in accordance with Procedure MP/0/A/7650/059. The procedure includes requirements and criteria for Visual Examinations prior to and following hands-on work.

9. Snubber stroking (Freedom of Motion) is performed in accordance with Procedure MP/0/A/7650/095. The procedure includes requirements and criteria for Visual Examinations prior to and following hands-on work. As noted in Section 5.7 and Attachment 1 of this document (AD-EG-CNS-1618) the entire snubber population is stroked in three rotating groups, which results in the entire population being stroked at least once every five years. Since the procedure includes a Visual Examination prior to performing the stroke this activity can be used to credit towards the required Visual Examinations (which are required every ten years per OMN-13).

10. All snubbers identified during the period that do not meet the visual examination acceptance criteria as defined in the noted maintenance procedures shall be considered as "Unacceptable" when determining the length of the following period in accordance with Table ISTD-4242-1. This includes snubbers identified outside of the scheduled examination process.

5.6 Visual Examination (continued)

11. Any unacceptable snubber identified shall have an evaluation performed by the Snubber Program Manager or a designated individual knowledgeable in snubber operability requirements. [ASME OM ISTD-4270 & 4280]

    a. This 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. For any snubber determined to be unacceptable or unsatisfactory, the Snubber Program Manager or designee shall initiate a Condition Report (CR).

12. Snubbers with unacceptable visual examination results may be evaluated by performing operational readiness testing (functional testing) in the as-found condition. Snubbers satisfying the operational readiness testing acceptance criteria may be reclassified as acceptable visual examinations. [ASME OM ISTD-4240]

13. The Visual As-Found examination 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.

14. An augmented scope is invoked whenever a visual examination is to be performed as a supplemental scope outside of the program requirements.

15. For purposes of defining unacceptable snubbers in accordance with Table ISTD 4242 1 examination boundaries shall include the snubber assembly from pin to pin, inclusive. Procedural guidance may include examination outside of this boundary as good practice but is not an ASME OM requirement. Discrepancies outside of the pin to pin boundary that are not directly related to snubber function are not considered to render the snubber unacceptable for the purposes of ISTD-4242-1.

5.7 Service Life Monitoring

1. The snubber program includes a Service Life Monitoring component that addresses the following (See Attachment 5 for further explanation) [ASME OM ISTD-6000]:

    a. Each installed snubber within the program scope has an estimated service life established and documented in Snubbworks®.

    b. A report providing the estimated service life value of each snubber is available in the Snubbworks® software.

    c. Snubber service life values shall be reviewed by the Program Manager each cycle and those snubbers that will reach end of life during the upcoming cycle are to be identified for replacement or refurbishment.

    d. Previously established Service Life values for every installed snubber shall be evaluated each fuel cycle for continued applicability. Based upon the evaluation the estimated service life values may remain as previously established, reduced, or increased.

    e. The snubber Service Life listing is documented in SNU-CNS-1618-01 and shall be periodically updated to reflect the evaluation results (updates generally occur on an annual basis). The evaluation methodology and basis for conclusions are to be documented in the data base and/or in outage summary documentation.

5.7 Service Life Monitoring (continued)

(1) For hydraulic snubbers the estimated seal life is generally the governing factor for overall service life. Seal life is based upon OEM recommendations, actual experience, or seal life studies. Currently a 24 year minimum seal life is generically assumed for Lisega pipe snubbers based upon Lisega document SLR-001. The 24-year seal life is applied to the installation date of each snubber and is adjusted based upon the time the snubber was in storage prior to installation. Lisega policy is that each snubber is delivered with a 24-year seal life from date of delivery, however site policy is to consider any elapsed time from initial snubber factory assembly or rebuild date to be considered as storage. Unless more specific information is readily available the assumed date of assembly is January 1 of the year of manufacture (as determined from the serial number information). Snubbers in storage up to 3 years have an assumed seal life of 24 years from date of installation. From 3 - 6 years storage the seal life is set at 23 years, and over 6 years the life is reduced one year for each additional year in storage. A 25-year seal life is generically assumed for Grinnell/Anvil snubbers. The effects of time spent in storage, between the initial seal pressurization and the initial installation, have been evaluated by EC 425633 based on ASC Bulletin PI 19-02 Rev.1, and were determined to have a negligible impact on installed service life. Therefore, the 25 year service life for Anvil & Grinnell snubbers is set to begin at the time of initial installation rather than on the date the snubber was pressurized/rebuilt. The listing provides expected life values for each location based upon the generic values and storage time as described, with certain exceptions as noted in the listing due to actual experience under severe or unique conditions.

5.7 Service Life Monitoring (continued)

(2) For SG snubbers a seal life of 41.6 years was established based upon a study performed on identical components at McGuire Nuclear Station (Ref. CNC-1232.00-00-0151). Per the OEM no specific pressurization testing or monitoring are required during this seal life period, but all visual examination results and results of any fluid sampling that may be performed shall be evaluated for adverse indications. Additionally, the seals are evaluated by comparison with those utilized in other snubber models that are similar except for the overall seal diameter. Large pipe snubbers that utilize the same seal material and design are periodically included in the general population testing and examination activities and the resultant data is applicable to the SG snubber applications. This addresses OM ISTD-6400 which states: “The service life evaluation for hydraulic snubbers that are tested without applying a load to the snubber piston rod shall consider the results from fluid sampling and monitoring of seal integrity".

(3) For mechanical snubbers a generic service life of 40 years from the date of manufacture was initially assumed as a baseline value per initial OEM recommendations. To date this generic assumption has been validated based largely upon the condition monitoring trending performed using stroke testing per Procedure MP/0/A/7650/095. Data is insufficient to accurately predict an exact end of life, however the entire population is hand stroked over a 3-cycle period and the results evaluated to validate suitability for the next 3-cycle period. Based upon this program a generic administrative value of 60 years is used in the Iddeal database for PSA mechanical snubbers, although actual acceptability is confirmed through the rolling 3 cycle evaluation. Certain snubbers in severe (high vibration) applications have previously been replaced with hydraulic snubbers, and this will continue to be the practice as applicable.

(a) The practice of regularly hand stroking mechanical snubbers ensures that the installed population remains functional.

(b) Hand stroking serves to distribute internal lubricant of mechanical snubbers, thus extending service life.

(4) Historical data should be reviewed to identify any trends regarding service life values. Attachments 3 and 4 contain listings of past failed and significantly degraded snubbers for Units 1 and 2 respectively.

5.7 Service Life Monitoring (continued)

f. If the evaluation indicates that the service life of any snubber or snubbers will be exceeded before the next scheduled system or plant outage, one of the following actions shall be taken:

(1) The snubber(s) shall be replaced with a snubber for which the service life will not be exceeded before the next scheduled system or plant outage.

(2) Technical justification shall be documented for extending the service life to or beyond the next scheduled system or plant outage.

(3) The snubber(s) shall be reconditioned such that its service life will be extended to or beyond the next scheduled system or plant outage.

g. Prior to the beginning of each fuel cycle (startup following refueling), it shall be documented that all installed snubbers have a service life that will not be exceeded prior to either the next refuel outage or next scheduled maintenance activity for that snubber. This is documented by a signed step in Procedure PT/0/A/4200/084 (Engineering Check List for Mode Change). See Attachment 5 for an Outage Summary Template example.

h. If testing is conducted specifically for service life monitoring purposes the results of such testing do not require testing of additional snubbers (ref. ISTD-6500).

5.8 <u>Operational Readiness Testing</u>

1. Snubber populations within the program scope shall be tested for operational readiness during each fuel cycle. Testing will be performed in accordance with the specified sampling plan as designated in Sections 5.9 and 5.10. [ASME OM ISTD-5260]

2. Testing is required to be performed each cycle, based upon the plant licensing requirements in SLC 16.9-13 and ASME OM.

3. Testing may be performed during normal system operation, during system or plant outages, depending on the plant licensing requirements.

   a. Unless otherwise approved by the regulatory authorities, for ASME OM program scope, sample testing shall begin no earlier than permitted by ASME OM ISTD and must be completed prior to the return to power.

4. Non-Safety Related Snubbers may be tested at the discretion of the Program Manager.

5.8 Operational Readiness Testing (continued)

5. Snubbers shall be tested in their as-found condition regarding the parameters to be tested to the fullest extent practicable.

6. Test methods shall not alter the condition of a snubber to the extent that the results do not represent the as-found snubber condition.

7. Pipe snubbers are to be removed from the field installation and bench tested in accordance with Procedure MP/0/A/7650/131.

8. 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.

9. Large Bore Steam Generator snubbers are tested by removal of control valves which are then bench tested in a surrogate snubber using Procedure SM/0/A/8100/003. Correlation of surrogate test data to actual service criteria is performed in accordance with site specifications and Original Equipment Manufacturer (OEM) recommendations.

10. Operational Readiness Test acceptance criteria is defined in Appendix H of CNS-1206.00-04-0003. Evaluation of test results not satisfying the criteria shall be performed by the Snubber Program Manager for determination of acceptability.

11. 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.

12. The applicable site maintenance procedures shall govern the removal and reinstallation of plant installed snubbers. Procedure MP/0/A/7650/059 is the governing procedure for all support/restraint removal/restoration activities.

13. Each snubber shall have an As-Found Visual Examination performed prior to removal activities and an As-Left Visual Examination following reinstallation in accordance with Procedure MP/0/A/7650/059.

14. Non-Safety snubber visual examination requirements shall be as directed by the Program Manager if the procedure is not utilized.

5.8 Operational Readiness Testing (continued)

15. For each snubber determined to be unacceptable by operational readiness testing, additional snubbers shall be tested as described by ASME OM ISTD-5270. The number of additional snubbers tested is dependent upon the sample plan being utilized.

16. An evaluation of unacceptable (failed) snubbers is required and will be documented in accordance with the Corrective Action Program (CR). The evaluation shall include review of information related to other unacceptable snubbers found during that test campaign.

16. An Engineering Evaluation shall be performed on the System, Structure, or Component (SSC) to which the unacceptable snubbers were attached.

    a. 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.

17. For each Non-Safety Related snubber determined to be unacceptable by operational readiness testing, additional tests may be required as determined by the Program Manager. This will be performed as warranted to address extent of condition and service life concerns in accordance with the Corrective Action Program.

18. Degraded snubbers are typically replaced with new snubbers as a preventive maintenance action. 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 the Program Manager based on the cause of the degradation and the potential impact on service life assumptions. Information learned from the degraded snubbers shall be considered in the service life monitoring program as applicable.

19. 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.

20. The initial test performed for an in-service snubber test shall be maintained as the As-found test of record. If multiple tests are performed for any reason, all test results are to be saved and documented. Copies of all tests are to be included with the test procedure records along with notations as to the reason for multiple tests. The Program Manager may provide additional comments or justification as an attachment to the procedure as required.

21. Test results will be reviewed for adverse trends which will help establish the service life of specific snubbers or locations.

5.8 Operational Readiness Testing (continued)

22. 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.

23. Unacceptable snubbers shall be adjusted, repaired, modified, or replaced.

24. Snubbers placed in same locations as snubbers which failed previous functional test shall be retested at time of next scheduled functional test, unless cause of failure is clearly established and corrected. Such snubbers shall not be considered as part of functional testing sample.

5.9 Defined Test Plan Group (DTPG)

1. The DTPGs shall include all Safety Related (QA Condition 1 or 4) snubbers except replacement snubbers and snubbers repaired or adjusted as a result of not meeting the acceptance requirements. These snubbers shall be exempt for the concurrent test period.

2. In accordance with ASME OM ISTD-5252 the total Safety Related snubber population is divided into DTPGs based upon type. All PSA (Pacific Scientific) mechanical snubbers make up one DTPG, Anchor Darling mechanical snubbers are a second DTPG, and all small bore Lisega pipe snubbers are a third DTPG.

3. The large bore steam generator snubbers shall be tested as a separate DTPG.

5.10 Testing Sample Plans

1. Safety Related snubbers of each DTPG shall be tested using the following sample plans as described in ASME OM ISTD:

   a. The 10% testing sample plan is utilized for Anchor Darling, Lisega, and Steam Generator DTPGs. [ASME OM ISTD-5300]

   b. The 37 testing sample plan is used for PSA snubbers. [ASME OM ISTD-5400]

NOTE

If the test plan selection is changed subsequent to Plan submittal to the Regulatory Authorities, then it may be necessary that the revised Snubber Program Plan be re-submitted.

2. A test plan shall be selected for each DTPG before the scheduled testing begins.

3. The test plan selected for a DTPG shall be used throughout the refueling outage campaign for that DTPG and any Failure Mode Group (FMG) that is derived from it.

5.10 Testing Sample Plans (continued)

4. For unacceptable snubber(s), the additional testing shall continue in the DTPG or FMG.

5.11 <u>Testing Sample Plan Selection</u>

1. The initial sample selection shall be random as described in ASME OM ISTD-5311 & 5411.

2. Selection of the representative 10% Plan samples may also be selected from 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.

3. The sample selection is intended to represent snubbers that have been in service for at least one fuel cycle.

    a. New or replacement snubbers that have been installed since the previous test campaign are not included in the sampled population (this includes snubbers installed to replace snubbers found unacceptable in the previous cycle testing).

    b. Snubbers that have had maintenance activities perform which could affect test results are to be excluded.

        (1) Exceptions would be where a special DTPG is identified consisting solely of snubbers that have been newly installed or maintained.

5.12 <u>Sample Expansion</u>

1. After determination that a snubber is unacceptable, an additional test plan sample shall be established. Additional test sample size shall be as required per ASME OM ISTD-5312 & 5412.

    a. 37 Plan supplemental samples shall consist of either 18 or 19 snubbers based upon the number of unacceptable snubbers and calculated using the numerical expression in the SLC. [ASME OM ISTD-5431]

    b. 10% Plan supplemental samples shall consist of an additional 10% of the DTPG population. [ASME OM ISTD-5331]

2. In addition to the required test plan sample expansion a Failure Mode Group (FMG) test population may be established. The unacceptable snubber(s) may be categorized into a FMG containing all unacceptable snubbers that have a given failure cause and all other snubbers evaluated to be vulnerable to the same cause. [ASME OM ISTD-5272 & 5273]

5.12 Sample Expansion (continued)

3. A contingency additional sample may be selected prior to the start of testing to facilitate early planning to reduce emergent outage resource impact.

   a. If this option is chosen and an initial sample test is unacceptable, then the acceptability of the contingency sample per ISTD-5313 composition requirements must be validated for the 10% plan and the acceptability documented in the Corrective Action Program (CAP).

   b. For the 37 Plan, the first additional sample is randomly selected so a random contingency sample is appropriate.

   c. In the event of an initial sample failure all contingency snubbers tested as unacceptable must be counted as failures in the completion equations for the DTPG regardless of when tested.

   d. If no initial sample snubber fails, then any contingency snubber tests performed are counted only as Service Life Monitoring tests.

5.13 <u>Snubber Replacement</u>

1. Any replacement or modified snubber(s) shall have a proven suitability for the application and environment. Documentation of the suitability evaluation shall be made in the Work Order documentation and appropriate procedure sign-offs per Procedure MP/0/A/7650/059.

2. Replacement or modified snubbers shall be examined and tested before placing into service. Test results from the manufacturer for new snubbers may be utilized. Testing may be waived as documented in the appropriate installation procedure MP/0/A/7650/059.

5.14 <u>Snubber Deletion</u>

1. As a corrective action, snubbers discovered to be unacceptable may subsequently be deleted from the plant based on analysis of the affected piping system.

   a. In such cases, the deleted snubber shall still be counted as unacceptable in the respective examination population, examination category, or test group (DTPG/FMG) until the current test campaign or visual examination interval is completed.

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. The event information, scope of review, and actions taken shall be documented in the Corrective Action Program (CR).

    a. The Program Manager shall contact the System Engineer and/or Design Engineering to define the extent of evaluation for the affected system.

    b. Snubbers within the affected region shall be examined, stroked, or tested as deemed appropriate to address the concern.

    c. In many cases, the condition monitoring stroke testing that has already been planned or completed may sufficiently address the concern.

2. Per CNS SLC TR 16.9-13-2 it is required to perform an inspection, during shutdown, to determine if there has been a severe dynamic event for systems which have the potential for such events. The freedom of motion (strokes) performed in accordance with the service life monitoring program discussed in 5.7.4.c of this procedure satisfy this requirement.

6.0 RECORDS AND REPORTS

1. No records are generated by this procedure.

2. Records and documentation in accordance with AD-EG-ALL-1618, Snubber Program Plan.

3. Documentation of outage summary reports for outages C1R26, C1R27, C2R24, C2R25, and C2R26 can be found in outage work orders generated from task 02 of Model WOs 877583 and 877584 (PMIDs 02033094-13 and PMID 02033095-13). Earlier outage summaries are documented in the Corrective Action Program.

4. Corrective Actions for Conditions adverse to Quality are documented within the site Corrective Action Program (AD-PI-ALL-0100).

7.0 REFERENCES

7.1 Commitments

1. 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 Technical Program Engineering
4. AD-EG-ALL-1600, Engineering Programs
5. AD-EG-ALL-1618, Snubber Program Plan
6. AD-EG-ALL-1703, ASME Section XI Repair/Replacement Program
7. AD-PI-ALL-0100, Corrective Action Program
8. ADM-NGGC-0115, Preconditioning of Structures, Systems & Components
9. ADM-NGGC-0203, Preventive Maintenance and Surveillance Testing Administration
10. CSP-NGGC-2505, Software Quality Assurance and Configuration Control of Business Computer Systems Vendor/Technical Manuals
11. NSD 800, Software and Data Quality Assurance (SDQA) Program
12. MP/0/A/7650/059, Controlling Procedure for S/R Maintenance Activities
13. MP/0/A/7650/085, Visual Examination of Snubbers
14. MP/0/A/76750/095, Post Transient Inspection (Stroke Procedure)
15. MP/0/A/7650/131, Operation of Snubber Test Machine
16. SM/0/A/8100/003, SG Snubber Examination and Testing

7.3 Miscellaneous Documents

1. ASME OM: Operation and Maintenance of Nuclear Power Plants
2. Regulatory Guide 1.192, Operation and Maintenance Code Case Applicability, ASME OM Code
3. Regulatory Guide 1.193, ASME Code Cases Not Approved for Use
4. INPO EPG-07, Snubbers (Historical)
5. NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants

7.3 Miscellaneous Documents (continued)

6. CNS-1206.00-04-0001, Design Specification for Nuclear Safety Related (QA Condition 1) and QA Condition 4 Component Supports

7. CNS-1206.00-04-0003, Procedure Requirements for Fabrication and Erection of Hangers, Supports, and Seismic Control

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

9. CNS UFSAR Section 3.9.3

10. CNS Technical Specification Section 3.0.8

11. CNS Selected Licensee Commitment SLC 16.9-13

12. SNU-CNS-1618-01, CNS Installed Snubber Listing

13. EC 425633, Evaluation of ASC/Anvil/Grinnell Document PI 19-02 Rev. 1, Snubber Storage Service Life Impact

<< Predefined Model Work Order Descriptions >>

Unit 1

Innage Work Scope:

PMID 02033094-07, Visual Non-Train (Visual examination of all non-train accessible snubbers) Retired
PMID 02033094-08, Visual A Train (Visual examination of all accessible snubbers on Train A) Retired
PMID 02033094-09, Visual B Train (Visual examination of all accessible snubbers on Train B) Retired

Outage Related Work Scope:

PMID 02033094-10, Visual Inaccessible (Visual examination of all inaccessible snubbers) Retired
PMID 02033094-11, Removal and Restoration of pipe snubbers from Aux. building for testing
PMID 02033094-12, Removal and Restoration of pipe snubbers from containment for testing
PMID 02033094-13, Perform Functional Testing (Testing of all pipe snubbers on test bench) (see Model WO Task 02 for documentation of all snubber outage requirement completion)
PMID 02033094-14, Inspection of SG snubbers; Removal and Testing of control valves
PMID 02033094-15, Post-Outage FOM strokes of accessible ND system Train A snubbers
PMID 02033094-16, Post-Outage FOM strokes of accessible ND system Train B snubbers

Unit 2

Innage Work Scope:

PMID 02033095-07, Visual Non-Train (Visual examination of all non-train accessible snubbers) Retired
PMID 02033095-08, Visual A Train (Visual examination of all accessible snubbers on Train A) Retired
PMID 02033095-09, Visual B Train (Visual examination of all accessible snubbers on Train B) Retired

Outage Related Work Scope:

PMID 02033095-10, Visual Inaccessible (Visual examination of all inaccessible snubbers) Retired
PMID 02033095-11, Removal and Restoration of pipe snubbers from Aux. building for testing
PMID 02033095-12, Removal and Restoration of pipe snubbers from containment for testing
PMID 02033095-13, Perform Functional Testing (Testing of all pipe snubbers on test bench) (see Model WO Task 02 for documentation of all snubber outage requirement completion)
PMID 02033095-14, Inspection of SG snubbers; Removal and Testing of control valves
PMID 02033095-15, Post-Outage FOM strokes of accessible ND system Train A snubbers
PMID 02033095-16, Post-Outage FOM strokes of accessible ND system Train B snubbers

The above models are performed every cycle. Due to the implementation of Code Case OMN-13 the visual examination PMs are no longer required, since the FOM PMs can be credited to satisfy the visual examination criteria and are performed on a 3-cycle frequency that envelops the required 10 year interval of the code case. PMIDs 02033094-07, 08, 09, 10 and 02033095-07, 08, 09, 10 are retired.

<< Predefined Model Work Order Descriptions >>

The following model work orders address stroke testing of all snubbers not included in the above mentioned FOM models. The following models divide the remaining population into three groupings to be performed on a rotating 3-cycle (or equivalent 4Y) basis.

Cycle A

PMID Unit 1	Unit 2	
02033094-17	02033095-40	Outage A FOM NonTrain
02033094-18	02033095-29	Outage A FOM Train A
02033094-19	02033095-30	Outage A FOM Train B
02033094-20	02033095-31	Outage A FOM Train A/B
02033094-21	02033095-17	Innage A FOM Train A (PMCH AR 0239178 change 3R to 4Y)
02033094-22	02033095-18	Innage A FOM Train B (PMCH AR 0239178 change 3R to 4Y)
02033094-23	02033095-19	Innage A FOM Train A/B
02033094-24	02033095-20	Innage A FOM Non Train

Cycle B

PMID Unit 1	Unit 2	
02033094-25	02033095-32	Outage B FOM Train A
02033094-26	02033095-33	Outage B FOM Train B
02033094-27	02033095-39	Outage B FOM Train A/B
02033094-28	02033095-34	Outage B FOM NonTrain
02033094-29	02033095-21	Innage B FOM Train A
02033094-30	02033095-22	Innage B FOM Train B
02033094-31	02033095-23	Innage B FOM Train A/B
02033094-32	02033095-24	Innage B FOM Non Train

Cycle C

PMID Unit 1	Unit 2	
02033094-33	02033095-35	Outage C FOM Train A
02033094-34	02033095-36	Outage C FOM Train B
02033094-35	02033095-37	Outage C FOM Train A/B
02033094-36	02033095-38	Outage C FOM NonTrain
02033094-37	02033095-25	Innage C FOM Train A
02033094-38	02033095-26	Innage C FOM Train B
02033094-39	02033095-27	Innage C FOM Train A/B
02033094-40	02033095-28	Innage C FOM Non Train

<< Predefined Model Work Order Descriptions >>

The following tables list the rotating FOM PMIDs associated with each innage/outage period.

Cycle/Outage #	FOM Group	PMID #
U1-27	A	02033094-21,22,23, 24
C1R27	A	02033094-17,18,19, 20
U1-28	B	02033094-29,30,31, 32
C1R28	B	02033094-25,26,27, 28
U1-29	C	02033094-37,38,39, 40
C1R29	C	02033094-33,34,35, 36
U1-30	A	02033094-21,22,23, 24
C1R30	A	02033094-17,18,19, 20
U1-31	B	02033094-29,30,31, 32
C1R31	B	02033094-25,26,27, 28
U1-32	C	02033094-37,38,39, 40
C1R32	C	02033094-33,34,35, 36
U1-33	A	02033094-21,22,23, 24
C1R33	A	02033094-17,18,19, 20
U1-34	B	02033094-29,30,31, 32
C1R34	B	02033094-25,26,27, 28
U1-35	C	02033094-37,38,39, 40
C1R35	C	02033094-33,34,35, 36

Cycle/Outage #	FOM Group	PMID #
U2-26	A	02033095-17,18,19 ,20
C2R26	A	02033095-29,30,31 ,40
U2-27	B	02033095-21,22,23 ,24
C2R27	B	02033095-32,33,34 ,39
U2-28	C	02033095-25,26,27 ,28
C2R28	C	02033095-35,36,37 ,38
U2-29	A	02033095-17,18,19 ,20
C2R29	A	02033095-29,30,31 ,40
U2-30	B	02033095-21,22,23 ,24
C2R30	B	02033095-32,33,34 ,39
U2-31	C	02033095-25,26,27 ,28
C2R31	C	02033095-35,36,37 ,38
U2-32	A	02033095-17,18,19 ,20
C2R32	A	02033095-29,30,31 ,40
U2-33	B	02033095-21,22,23 ,24
C2R33	B	02033095-32,33,34 ,39
U2-34	C	02033095-25,26,27 ,28
C2R34	C	02033095-35,36,37 ,38

<< Typical Outage Work Process >>

Stroke Testing

Stroke testing is a Condition Monitoring activity that is performed on all installed mechanical snubbers on a defined periodic basis. Hand stroking of mechanical snubbers is an excellent method to quickly identify significantly degraded or inoperable snubbers. Based upon manufacturer recommendations it also serves to extend the service life of most mechanical snubbers by distributing internal lubricant. However, stroking does not "fix" an inoperable snubber or enhance the ability of a degraded snubber to pass a functional bench test. Since all installed mechanical snubbers undergo the same activity on the same frequency, stroking is not judged to affect the integrity of inservice sample testing as the stroking itself is actually part of the service conditions experienced by each snubber.

Prior to the start of a Refueling Outage the Responsible Engineer will provide a list of snubbers to be stroke tested per each model work order to the Job Supervisor and planner (per outage planning milestone dates). This list is to be verified against any existing equipment list generated from the model work orders. Stroke testing consists of unpinning the individual snubber in place and manually inducing motion to verify freedom of motion. For smaller snubbers this is done by hand, while the larger models may require the use of a special tool to induce movement. The Job Supervisor coordinates with the Work Window Manager and Work Control Center to determine the best time frame to stroke each snubber, usually by system. Predefined Model work orders and tasks exist which categorize the stroke testing by operating train, system, and accessibility category. Typically the accessible train related snubbers can be stroked during the appropriate train work weeks immediately prior to the outage. Inaccessible snubbers are usually stroked as soon as possible once the outage starts. The non-train or multiple train related snubbers are generally stroked after the Unit has entered Mode 5 or in windows identified by work control. Due to issues associated with system transients during outages and start up, ND train related snubbers are generally stroked following unit re-start, depending upon ALARA concerns and dose decay rates.

<< Typical Outage Work Process >>

Functional Testing

Functional testing on a random sample of snubbers is performed using the Barker/Diacon test bench. Currently four samples are drawn, one for PSA units, one for Anchor/Darling snubbers, one for Lisega snubbers, and one for the steam generator snubbers. 37 snubbers are selected for the PSA tests, while 10% of the others are selected.

Once the snubbers for testing are identified they are listed and supplied to the planner and outage scheduling personnel. Information provided includes location information, impacted equipment, train affected, and LCO implications. The WWM/WCC uses this information to schedule the work orders to remove individual snubbers for testing and enter into TSAIL as applicable. One work order task is written for each snubber to be removed and replaced. Functional testing requires that the subject snubber be removed from the installation location and transported to the test bench for testing.

The removal and reinstallation of the snubber is performed under one work order, while the testing itself is performed under another unique work order. In accordance with the maintenance procedure MP/0/A/7650/059 each snubber is stroked enough to verify freedom of motion immediately upon removal from the installed location. This is done to immediately identify any obvious operability concerns and is not considered to significantly affect subsequent functional test results. The MNT snubber/hanger crew performs all the physical tasks associated with the snubber testing. Assistance is provided as required by the Responsible Engineer throughout the process

Should a failure occur during testing of the initial sample an additional sample must be drawn and tested, as required per the SLC and ASME Code. Further failures result in more testing, until no more failures are observed or the entire population is tested. The Responsible Engineer is accountable for ensuring that all SLC and ASME Code requirements are satisfied.

In very rare instances it may become necessary to substitute another snubber for one that was originally identified in the sample list. One must be very careful when substituting, since it impacts the viability of the statistical sampling methodology. Substitutions should only be considered when accessing the original snubber presents a danger to personnel or plant equipment, or removing it imposes increased operational risk to the plant. The substitute snubber should be similar to the original. It should be shown to have been exposed to similar or more severe service conditions as the original snubber. Both snubbers should be the same design, size, and age if possible. They should have similar time in service, environmental conditions, orientation, operating conditions, etc. The basis for the substitution should be clearly documented in both the work order documentation and in the corrective action program. Corrective actions should include a plan of action to validate the reliability of the original snubber at the earliest opportunity, or to remove it from the scope of the testing program.

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-A-WG-8534	WG		1	Funct	F	Dropped
<<1-R-CF-1669>>	CF		1	FOM	F	Dropped
1-R-CF-1710	CF		1	FOM	F	Hit or stepped on
1-R-CF-1728	CF		1	FOM	F	Pitting/Corrosion
1-R-ND-0269	ND		1	FOM	F	Overload
1-R-SA-0016	SA		1	FOM	F	Transient 1-C89-026
1-R-SA-0022	SA		1	FOM	F	Transient 1-C89-026
1-R-SA-0062	SA		1	FOM	F	Transient 1-C89-026
1-R-SA-0062	SA		1	FOM	F	Transient 1-C89-026
1-A-FD-3007	FD		2	Funct	F	Installation damage
1-A-KC-3224	KC		2	Funct	F	
1-A-KC-3253	KC		2	Funct	F	
1-A-KC-3716	KC		2	Funct	F	Lubricant
1-A-KC-3725	KC		2	Funct	F	Dynamic Environment (vibration)
1-A-KC-3731	KC		2	Funct	F	
1-A-KC-3738	KC		2	Funct	F	
1-A-KC-3742	KC		2	Funct	F	Paint
1-A-KC-3744	KC		2	Funct	F	
1-A-KC-3751	KC		2	Funct	F	
1-A-KC-3757	KC		2	Funct	F	
1-A-KC-4122	KC		2	Funct	F	Paint
1-A-KC-4161	KC		2	Funct	F	Paint
1-A-KC-4955	KC		2	Funct	F	
1-A-NB-3086	NB		2	Funct	F	Manufacturing Defect
1-A-NB-3935	NB		2	Funct	F	
1-A-NB-8072	NB		2	Funct	F	
1-A-NB-8082	NB		2	Funct	F	
1-A-NC-3058	NC		2	Funct	F	
1-A-NI-4145	NI		2	Funct	F	
1-A-NI-4179	NI		2	Funct	F	
1-A-NI-4184	NI		2	Funct	F	
1-A-NI-4188	NI		2	Funct	F	Paint
1-A-NI-4219	NI		2	Funct	F	
1-A-NI-4389	NI		2	Funct	F	
1-A-NS-3040	NS		2	Funct	F	
1-A-NV-3049	NV		2	Funct	F	
1-A-VG-3086	VG		2	Funct	F	
1-A-VI-3046	VI		2	Funct	F	
1-A-WG-3357	WG		2	Funct	F	Paint
1-A-WG-8619	WG		2	Funct	F	
1-A-WP-3002	WP		2	Funct	F	
1-R-AS-0142	AS		2	Funct	F	
1-R-BB-1428	BB		2	Funct	F	

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-BB-1439	BB		2	Funct	F	
1-R-BB-1487	BB		2	Funct	F	
1-R-BB-1506	BB		2	Funct	F	
1-R-BB-1517	BB		2	Funct	F	
1-R-BB-1520	BB		2	Funct	F	
1-R-BB-1573	BB		2	Funct	F	
1-R-BB-1710	BB		2	Funct	F	
1-R-BB-1742	BB		2	Funct	F	
1-R-BB-1835	BB		2	Funct	F	
1-R-BW-1559	BW		2	Funct	F	
1-R-CA-1665	CA		2	Funct	F	
1-R-CA-1689	CA		2	Funct	F	
1-R-CA-1697	CA		2	Funct	F	
1-R-CF-1566	CF		2	Funct	F	
1-R-CF-1669	CF		2	Funct	F	
1-R-CF-1710	CF		2	Funct	F	
1-R-CF-1731	CF		2	Funct	F	
1-R-KC-0073	KC		2	Funct	F	
1-R-KC-0649	KC		2	Funct	F	
1-R-KC-0814	KC		2	Funct	F	
1-R-KC-0829	KC		2	Funct	F	
1-R-KC-0846	KC		2	Funct	F	
1-R-KC-0848	KC		2	Funct	F	
1-R-KC-0854	KC		2	Funct	F	
1-R-LD-0074	LD		2	Funct	F	
1-R-NB-0190	NB		2	Funct	F	
1-R-NC-1224	NC		2	Funct	F	
1-R-NC-1273	NC		2	Funct	F	
1-R-NC-1312	NC		2	Funct	F	
1-R-NC-1488	NC		2	Funct	F	Paint
1-R-NC-1806	NC		2	Funct	F	
1-R-NC-2176	NC		2	Funct	F	Paint
1-R-NC-2184	NC		2	Funct	F	Paint
1-R-ND-0226	ND		2	FOM	F	Transient (overload)
1-R-ND-0265	ND		2	FOM	F	
1-R-ND-0557	ND		2	Funct	F	
1-R-ND-0596	ND		2	Funct	F	
1-R-NI-2262	NI		2	Funct	F	
1-R-NI-2353	NI		2	Funct	F	
1-R-NI-2404	NI		2	Funct	F	
1-R-NM-1081	NM		2	Funct	F	
1-R-NM-1351	NM		2	Funct	F	
1-R-NS-0115	NS		2	Funct	F	
1-R-NV-0565	NV		2	Funct	F	
1-R-NV-1007	NV		2	FOM	F	

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-SM-1650	SM		2	Funct	F	
1-R-WL-1172	WL		2	Funct	F	
1-S-NR-5013	NR		2	Funct	F	
1-R-BB-1517	BB		3	Funct	F	
1-R-KC-0846	KC		3	Funct	F	
1-R-LD-0074	LD		3	Funct	F	
1-R-NC-2176	NC		3	Funct	F	
1-R-NI-2334	NI		3	FOM	F	
1-R-NS-0115	NS		3	Funct	F	
1-R-NV-0221	NV		3	FOM	F	
1-A-KC-8009	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8010	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8187	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8194	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8218	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8246	KC		4	Funct	F	Defect in gear clearances
1-A-KC-8259	KC		4	Funct	F	Defect in gear clearances
1-A-NV-8312	NV		4	Funct	F	Defect in gear clearances
1-A-NV-8426	NV		4	Funct	F	Defect in gear clearances
1-A-NV-8478	NV		4	Funct	F	Defect in gear clearances
1-A-WS-8067	WS		4	Funct	F	Defect in gear clearances
1-R-KC-0803	KC		4	Funct	F	Defect in gear clearances
1-R-KC-0846	KC		4	Funct	F	
1-R-ND-0072	ND		4	Funct	F	Defect in gear clearances
1-R-ND-0226	ND		4	FOM	F	Transient (overload)
1-R-NI-2334	NI		4	FOM	F	
1-R-NS-0102	NS		4	FOM	F	
1-R-NV-1702	NV		4	Vis	F	Load pin missing
1-R-ND-0596	ND		5	FOM	F	
1-R-SM-1606	SM		5	FOM	F	Improper installation of capstan spring
1-A-NV-8115	NV		6	FOM	D	
1-R-CF-1519	CF		6	FOM	D	
1-R-CF-1726	CF		6	FOM	F	
1-R-NC-1655	NC		6	FOM	F	
1-R-ND-0391	ND		6	FOM	D	
1-R-NI-1314	NI		6	FOM	F	
1-R-NI-1384	NI		6	Funct	F	
1-R-SA-0022	SA		6	FOM	D	
1-R-SA-1503	SA		6	FOM	D	
1-R-SM-1011	SM		6	FOM	D	
1-R-SM-1545	SM		6	FOM	D	
1-R-SM-1578	SM		6	FOM	D	
1-R-SM-1650	SM		6	FOM	F	
1-R-ND-0226	ND		6	FOM	F	Transient (overload)

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-ND-0596	ND		6	FOM	F	
1-R-BB-1762	BB		7	FOM	F	
1-R-BB-1827	BB		7	FOM	F	
1-R-BB-1830	BB		7	FOM	F	
1-R-CF-1502	CF		7	FOM	D	
1-R-CF-1705	CF		7	FOM	D	Pipe Clamp rotated
1-R-CF-1728	CF		7	FOM	F	
1-R-CF-1731	CF		7	FOM	D	
1-R-KC-0814	KC		7	Funct	F	
1-R-ND-0226	ND		7	FOM	F	Transient (overload)
1-R-ND-0596	ND		7	FOM	F	
1-R-ND-0624	ND		7	FOM	D	
1-R-CA-1505	CA		8	FOM	D	Spherical Bearing unstaked
1-R-CF-1003	CF		8	FOM	D	Spherical Bearing unstaked
1-R-CF-1539	CF	4786	8	FOM	D	
1-R-CF-1539	CF	4979	8	FOM	D	
1-R-CF-1544	CF	19880	8	FOM	D	
1-R-NC-1655	NC	18153	8	FOM	F	Changed to Lisega
1-A-KC-3219	KC		9	VIS	D	Misaligned clamp
1-A-KC-4228	KC		9	VIS	D	
1-A-WG-8663	WG		9	VIS	D	
1-R-CF-1517	CF		9	VIS	D	
1-R-CF-1562	CF		9	VIS	D	
1-R-LD-0085	LD	12019	9	Funct	F	Stepped on, corrosion.
1-R-NC-1071	NC		9	VIS	D	
1-R-NC-1628	NC		9	Funct	D	Arc strike
1-R-NC-1655	NC	18169	9	FOM	F	Changed to Lisega
1-R-NC-2302	NC	8868	9	Funct	D	
1-R-SM-1606	SM	322/80	9	FOM	D	
1-S-NR-5002	NR		9	VIS	D	
1-S-NR-5007	NR		9	VIS	D	Misaligned clamp
1-R-KD-0022	KD		9	FOM	D	Vibration (rough stroke)
1-R-NV-1007	NV		9	FOM	F	
1-R-SA-1530	SA		9	Vis	F	Pivot pin missing
1-A-NI-4378	NI		10	Funct	F	Shaft bent, stepped on
1-R-BB-1492	NA	7150	10	FOM	D	Spare from stock was corroded
1-R-CF-1022	CF	18220	10	FOM	D	Possibly used rebuilt parts
1-R-NC-0042	NC	7239/79	10	Funct	D	Small spikes on drag test
1-R-NV-0274	NV	12284/81	10	Funct	D	Drag > 3%, but < 5%
1-R-VN-0007	VN	17466/81	10	Funct	D	Had been water filled at some point
1-R-VN-0048	VN	9786/80	10	FOM	F	Extreme corrosion, had been water-filled.
1-R-CF-1726	CF	16357/82	11	FOM	F	Damaged by craft (twisted) during outage

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-KC-0038	KC	4230/78	11	Funct	D	Fretting corrosion
1-R-NV-0004	NV		11	Funct	D	Tube unstaked
1-R-SM-1590	SM	4791/79	11	Funct	D	Fretting corrosion
1-R-ND-0226	ND	40121/98	12	FOM	F	Transient (overload)
1-A-NV-3188	NV		12	FOM	D	Fretting corrosion
1-R-CF-1562	CF		12	FOM	D	Fretting corrosion
1-R-CF-1564	CF		12	FOM	D	Fretting corrosion
1-R-ND-1191	ND		12	FOM	D	Transient
1-R-SM-1542	SM		12	FOM	D	Fretting corrosion
1-R-ND-0226	ND	3448/78	12	FOM	F	Transient (overload)
1-R-ND-0268	ND	10012/1979	12	FOM	D	Damaged by hammer strikes on tube cover
1-R-ND-0596	ND	5486/79	12	FOM	F	Transient (overload in tension)
1-R-KC-0111	KC	4199/78	13	FOM	D	Fretting corrosion
1-R-ND-0226	ND	40263/99	13	FOM	F	Transient (overload)
1-R-ND-0596	ND	17604/83	13	FOM	F	Transient (overload in tension)
1-R-SM-1680	SM		13	FOM	D	Fretting corrosion
1-R-VN-0051	VN		13	FOM	D	Rough drag(tested OK - WO 98490666)
1-R-ND-0397	ND	9800/1998	13	FOM	D	Transient
1-R-VN-0094	VN		13	FOM	D	Replaced as follow up to 1EOC12
1-A-KC-3353	KC	10671/80	14	Funct	F	Extreme corrosion, had been water-filled.
1-A-KC-4930	KC	13262/81	14	Funct	D	Boron corrosion (wo 98580366-02)
1-R-CF-1543	CF	8721/79	14	Funct	D	Internal corrosion (replace 1EOC15)
1-R-CF-1681	CF	3019/78	14	FOM	D	Rough Drag (replaced wo 98635714)
1-R-ND-0226	ND	41709/01	14	FOM	F	Transient (overload) PIP C-03-7095
1-R-ND-0596	ND		14	FOM	F	Transient (overload) PIP C-03-7095
1-R-RN-0195	RN	2828/77	14	Funct	D	Paddle end loose (replaced wo 98580367)
1-R-SM-1549	SM	12054/81	14	FOM	D	Rough drag (replaced wo 98635713)
1-R-SM-1578	SM	4987/78	14	FOM	F	Locked (replaced wo 98635803)
1-R-VN-0051	VN		14	FOM	D	Rough drag (tested OK - WO 98628388)
1-A-NV-8475	NV		15	FOM	D	Corroded, some vibration
1-A-VG-3158	VG	14192/82	15	Funct	D	Erratic Acceleration test
1-R-BB-1573	BB	10146/80	15	FOM	F	Internal corrosion (previous installation?)
1-R-NC-2227	NC	9886/80	15	Funct	D	Stroked erratic
1-R-NI-1353	NI	8707/79	15	FOM	D	Erratic acceleration test
1-R-NI-2337	NI	5512/79	15	FOM	F	High drag -replaced with Lisega

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-NI-2338	NI	7630/80	15	FOM	F	very high drag - replaced with Lisega
1-R-NI-2405	NI	2467/78	15	FOM	D	Hard to stroke during PM
1-R-VN-0015	VN	9788/80	15	Funct	D	Degraded drag test
1-R-CF-1562	CF	4709/78	16	Funct	D	Tension Test Load low (replaced)
1-R-ND-0226	ND		16	FOM	F	Transient (overload) PIP C-06-08283
1-R-NV-1415	NV		16	FOM	D	Rough Stroke (replaced as PM)
1-R-NV-1577	NV		16	FOM	D	Rough Stroke (replaced as PM)
1-A-NB-3513	NB		16	FOM	D	PIP C-06-05906
1-A-NB-3514	NB		16	FOM	D	PIP C-06-05906 (locks after 1/8")
1-R-KC-0811	KC		16	FOM	D	Rough stroke, PIP C-06-04983
1-R-ND-0226	ND	41725/00	16	FOM	F	Transient (overload) PIP C-05-4153
1-R-ND-0596	ND	3040000206	16	FOM	D	Paddle End Loose (PIP C-06-06104)
1-A-NI-4147	NI	11186/79	17	FOM	F	Locked - PIP C-08-3001 (repl. w/ Lisega
1-R-FW-0001	FW	4344/78	17	FOM	D	Submerged in trench C-08-03061
1-R-NC-1536	NC		17	FOM	D	Locks @ full ext, repl w/Lis C-08-2768
1-R-ND-0181	ND	6044/79	17	Funct	D	erratic drag, rep/lis C-08-03040
1-R-RN-0130	RN		17	FOM	D	twisted by CMP personnel C-08-3513
1-R-SB-2044	SB	12019/81	17	FOM	F	C-08-02996
1-R-SM-1542	SM	3466/78	17	FOM	D	C-08-03041
1-A-KC-8011	KC	8835/80	18	Funct	D	C-09-06872 (replace w/ Lisega)
1-A-KC-8652	KC	10107/80	18	Funct	D	C-09-06783 (replace w/ Lisega)
1-A-NI-4137	NI	7235/79	18	FOM	D	C-09-06855 (replace w/ Lisega)
1-R-NC-1633	NC		18	Funct	D	C-09-06872 (replace w/ Lisega)
1-R-NI-2404	NI	15697/82	18	Funct	D	C-09-06797 (replace w/ Lisega)
1-R-SM-1566	SM	3305/1978	18	Funct	D	replaced with new PSA 35 as PM
1-R-KC-1477	KC	5450/1978	19	FOM	F	C-11-3619; mass loose - dropped?
1-A-KC-4232	KC	3493/1978	20	FOM	D	C-12-10318 (replace w/ Lisega)
1-R-KC-0592	KC	8570/1979	20	Funct	D	C-12-10193 (replace w/ Lisega)
1-R-ND-0341	ND	9679/1980	20	Funct	D	C-12-10439 (replace w/ Lisega)
1-R-NC-1655	NC	6129706/93	21	Funct	D	Leaking, low fluid C-14-5326
1-R-CF-1728	CF	14400/1982	22	FOM	D	Noisy, replaced as PM, AR 1981215
1-R-NI-2403	NI	13763/1981	23	FOM	D	Locked at end of stroke, replaced, AR2123907
1-R-SB-2045	SB	9422/1980	23	FOM	D	Hard to stroke (non QA), replaced AR2121561
1-R-SM-2037	SM	5746/1980	23	FOM	D	rough, repl next outage, AR2125081
1-R-SM-2037	SM	5746/1980	24	FOM	U	unable to stroke, repl. AR 2246141

<< Unit 1 Failure History >>

HNGNUMB	Sys	Serial No.	Cycle	Test Type	F/D	Comments
1-R-SM-2035b	SM	236/1980	24	VIS	U	locked at heatup, repl. AR 2248472

<< Unit 2 Failure History >>

HNGNUMB	SYSTEM	S/N	EOC	Test Type	F/D	Size	Comments
2-A-CF-4001	CF	1112	1	Funct	F	PSA 1/2	Mishandling
2-A-FW-4005	FW	12050	1	Funct	F	PSA 1/2	
2-A-KC-4167	KC	11740	1	Funct	F	PSA 1/2	
2-A-NI-4269	NI	12198	1	Funct	F	PSA 1/2	
2-A-NI-4278	NI	15358	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-A-NV-3629	NV	13822	1	Funct	F	PSA 1/2	
2-A-NV-3840	NV	12054	1	Funct	F	PSA 1/2	Mishandling
2-R-BB-1062	BB	13656	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-BB-1092	BB	15707	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-BB-1095	BB	15527	1	Funct	F	PSA 1/2	
2-R-BB-1518	BB	7219	1	Funct	F	PSA 1/2	Corrosion
2-R-BB-1527	BB	16370	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-BB-1529	BB	13723	1	Funct	F	PSA 1/2	
2-R-BB-1529	BB	12038	1	Funct	F	PSA 1/2	
2-R-BB-1529	BB	16468	1	Funct	F	PSA 1/2	
2-R-BB-1531	BB	15691	1	Funct	F	PSA 1/2	
2-R-BB-1541	BB	17423	1	Funct	F	PSA 1/2	
2-R-BB-1546	BB	14200	1	Funct	F	PSA 1/2	
2-R-BB-1547	BB	13762	1	Funct	F	PSA 1/2	
2-R-BB-1569	BB	16469	1	Funct	F	PSA 1/2	Mishandling
2-R-CA-1530	CA	14261	1	Funct	F	PSA 1/2	Insulation on cylinder
2-R-CA-1681	CA	17394	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-CF-1626	CF	16348	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-CF-1628	CF	10618	1	FOM	F	PSA 1/2	
2-R-CF-1686	CF	17493	1	Funct	F	PSA 1/2	Mishandling
2-R-CF-1706	CF	17395	1	Funct	F	PSA 1/2	Weld Spatter
2-R-FW-0039	FW	15533	1	Funct	F	PSA 1/2	
2-R-FW-0057	FW	13503	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-KD-0039	KD	15949	1	Funct	F	PSA 1/2	
2-R-LD-0003	LD	13209	1	Funct	F	PSA 1/2	
2-R-NC-1007	NC	13263	1	Funct	F	PSA 1/2	
2-R-NC-1035	NC	14811	1	Funct	F	PSA 1/2	
2-R-ND-0440	ND	15825	1	Funct	F	PSA 1/2	Mishandling
2-R-NI-1027	NI	16445	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-NI-1585	NI	13278	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-NI-1626	NI	16388	1	Funct	F	PSA 1/2	Mishandling
2-R-NI-1865	NI	11124	1	Funct	F	PSA 1/2	
2-R-NR-0011	NR	13246	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-NV-0243	NV	14252	1	Funct	F	PSA 1/2	
2-R-NV-0266	NV	13508	1	FOM	F	PSA 1/2	

<< Unit 2 Failure History >>

HNGNUMB	SYSTEM	S/N	EOC	Test Type	F/D	Size	Comments
2-R-NV-1899	NV	15699	1	Funct	F	PSA 1/2	Mishandling - Twisted guide rods
2-R-SA-1503	SA	4613	1	FOM	F	PSA 1	
2-R-TE-0050	TE	14299	1	Funct	F	PSA 1/2	
2-R-YC-0048	YC	14611	1	Funct	F	PSA 1/2	Paint on cylinder
2-A-CA-4040	CA	1036	2	Funct	F	AD-70R	
2-A-NV-3629	NV	17424	2	Funct	F	PSA 1/2	
2-R-BB-1095	BB	10181	2	Funct	F	PSA 1/2	
2-R-BB-1527	BB	9905	2	Funct	F	PSA 1/2	Inadequate staking
2-R-BB-1529	BB	12051	2	Funct	F	PSA 1/2	
2-R-BB-1529	BB	15338	2	Funct	F	PSA 1/2	
2-R-BB-1531	BB	14326	2	Funct	F	PSA 1/2	
2-R-BB-1546	BB	1030	2	Funct	F	AD-70R	
2-R-BB-1547	BB	1028	2	Funct	F	AD-70R	
2-R-BB-1547	BB	1031	2	Funct	F	AD-70R	
2-R-BB-1567	BB	1038	2	Funct	F	AD-70R	
2-R-CA-1589	CA	1025	2	Funct	F	AD-70R	
2-R-CA-1592	CA	1029	2	Funct	F	AD-70R	
2-R-CA-1625	CA	1021	2	Funct	F	AD-70R	
2-R-CA-1646	CA	1018	2	Funct	F	AD-70R	
2-R-CA-1650	CA	1019	2	Funct	F	AD-70R	
2-R-CA-1660	CA	1027	2	Funct	F	AD-70R	
2-R-CA-1662	CA	1033	2	Funct	F	AD-70R	
2-R-CA-1671	CA	1032	2	Funct	F	AD-70R	
2-R-CA-1673	CA	1041	2	FOM	F	AD-70R	
2-R-CF-1628	CF	1020	2	Funct	F	AD-70R	
2-R-FW-0039	FW	1026	2	Funct	F	AD-70R	
2-R-KC-0276	KC	6421	2	Funct	F	PSA 3	
2-R-ND-0165	ND	1045	2	Funct	F	AD-70R	
2-R-ND-0195	ND		2	FOM	F	PSA 1/2	
2-R-ND-0277	ND	8043	2	FOM	F	PSA 1	
2-R-ND-0407	ND	1039	2	Funct	F	AD-70R	
2-R-NV-0266	NV	1034	2	Funct	F	AD-70R	
2-R-NV-1074	NV	13577	2	FOM	F	PSA 1/2	
2-R-SA-1503	SA		2	FOM	F	PSA 1	
2-R-SM-1721	SM		2	FOM	F	PSA 1/2	
2-R-CA-1586	CA	9447	3	Funct	F	PSA 1	
2-R-ND-0277	ND	3373	3	FOM	F	PSA 1	
2-R-ND-0326	ND	16387	3	FOM	F	PSA 1/2	Insufficient staking
2-R-SA-1503	SA	17446	3	FOM	F	PSA 1	
2-R-NC-1026	NC	12887	4	Funct	F	PSA 3	
2-R-NC-1527	NC	10047	4	Funct	F	PSA 3	
2-R-NI-1005	NI	12873	4	Funct	F	PSA 3	

<< Unit 2 Failure History >>

HNGNUMB	SYSTEM	S/N	EOC	Test Type	F/D	Size	Comments
2-R-RN-0006	RN	4978	4	Funct	F	PSA 10	
2-R-SM-1553	SM		6	FOM	D	PSA 10	Loose bearing, snubber good
2-R-SM-1557	SM		6	FOM	D	PSA 10	Loose bearing, snubber good
2-R-SM-1668	SM		6	FOM	D	PSA 3	Rod eye bent, snubber good
2-R-ND-0370	ND		7	FOM	D		Anchors loose, snubber good
2-R-NV-1074	NV	13577	7	FOM	D	PSA 1/2	Rough stroke
2-R-NC-1724	NC	11956	7.5	FOM	F	PSA 10	LOOP Transient
2-R-AS-2115	AS	9778	8	FOM	F	PSA 1	Non-QA, obvious hammer load
2-R-LD-0003	LD	14673	8	FOM	D	PSA 1/2	Rough stroke, vibration induced
2-R-LD-0019	LD	16386	8	FOM	D	PSA 1/2	Rough stroke, vibration induced
2-R-NI-1872	NI	8376	8	Funct	D	PSA 1	Tests OK, end rotates (set screws)
2-R-SM-1606	SM	503	8	FOM	D	PSA 10	Rough stroke, test OK, very rusty
2-R-SM-1608	SM	11966	8	FOM	D	PSA 10	Rough stroke, High drag, rusty
2-R-VN-0010	VN	1091	8	Funct	D	PSA 1	Dent on tube, some rubbing evident
2-A-KC-3637	KC	19921	9	Funct	F	PSA 3	No lock-up, vibration failure
2-R-NV-0245	NV	9641	9	Funct	D	PSA 3	Erratic spikes, locked on 2nd test
2-R-SA-1519	SA	8483/79	9	Funct	D	PSA 3	Fretting
2-R-KC-0553	KC	17507/83	9.5	Funct	F	PSA 1/2	High drag, fretting due to vibration
2-R-CA-0132	CA	15274/82	10	Funct	D	PSA 1/2	Transient (PIP C00-1138)
2-R-NC-1704	NC	12050/81	10	Funct	D	PSA 10	
2-R-NV-0243	NV	15806/82	10	Funct	D	PSA 1/2	Fretting (PIP C00-1327)
2-R-SM-1610	SM	11939/81	10	FOM	F	PSA 10	Replace
2-A-NV-3631	NV	15885/82	11	FOM	D	PSA 1/2	Rough drag - fretting corrosion
2-R-CF-1523	CF	2585/77	11	PM	D	PSA 10	Rough stroke, test OK, very rusty
2-R-CF-1586	CF	8685/79	11	PM	D	PSA 3	Rough stroke, test OK, very rusty
2-R-NC-1707	NC	12843/80	11	Funct	D	PSA 3	Boron intrusion/corrosion
2-R-ND-0277	ND	4364/1978	11	FOM	F	PSA 1	PIP C-01-3425 (Transient)
2-R-NM-1079	NM	3341/1978	11	PM	D	PSA 1	fretting corrosion
2-R-NM-1158	NM	10144/80	11	PM	D	PSA 1/2	bent paddle end PIP C-01-5124
2-R-RN-0036	RN	8595/79	11	FOM	D	PSA 1	Paddle end unstaked - Test OK
2-R-SA-1504	SA	17527/81	11	FOM	D	PSA 1	Rough drag - High heat paddle end
2-R-SM-1537	SM		11	FOM	D	PSA 35	Paddle end unstaked - restaked
2-R-SM-1612	SM	343/1980	11	PM	D	PSA 10	WO 98265762
2-R-VN-0051	VN	8040/80	11	FOM	D	PSA 1	2EOC10 follow up (WO 98247648)
2-R-CF-1584	CF	12023/81	12	Funct	D	PSA 10	Very rusty - replaced
2-R-SM-1606	SM	566/1991	12	FOM	D	PSA 10L	Very rusty
2-R-VN-0007	VN	7201/1980	12	FOM	D	PSA 1	Loose bearing, snubber good
2-R-VN-0012	VN	2691/1980	12	FOM	D	PSA 1	Follow up test OK (WO 98577942-01)

<< Unit 2 Failure History >>

HNGNUMB	SYSTEM	S/N	EOC	Test Type	F/D	Size	Comments
2-R-VN-0053	VN	8606/1980	12	FOM	D	PSA 1	Pipe attachment misaligned
2-R-KC-0541	KC	13993/1981	13	Funct	F	PSA 1/2	Fretting (PIP C-04-04944)
2-R-NC-1520	NC	11953/1980	13	Funct	D	PSA 3	Replace
2-R-NV-1905	NV	9845/1979	13	Funct	D	PSA 1	Replace
2-R-SM-2021	SM		13	FOM	D	PSA100L	Replace
2-R-LD-0003	LD	14404/1982	13.5	FOM	D	PSA 1/2	Rough stroke, vibration induced
2-R-VN-0053	VN	8606/1980	13.5	FOM	D	PSA 1	Rough, to be replaced later as PM
2-R-BB-1033	BB		14	FOM	D	PSA 1/2	Sticks at 1"; repl. w/lisega(C-06-2862)
2-R-CF-1002	CF	9311/1979	14	Funct	D	PSA 3	Replace w/ Lisega (C-06-2218)
2-R-KC-0541	KC	41793/2001	14	Funct	F	PSA 1/2	Fretting (PIP C-06-02557);repl. w/lisega
2-R-KD-0067	KD	5462/1978	14	Funct	D	PSA 1	Replace w/ Lisega (C-06-2161)
2-R-NC-1675	NC	10048/1979	14	Funct	D	PSA 3	Erratic drag, replace as PM
2-R-NC-1717	NC	11565/1981	14	Funct	D	PSA 10	Final drag erratic, replace w/ Lisega
2-R-ND-0277	ND	8718/1979	14	FOM	F	PSA 1	PIP C-06-02961
2-R-NV-1905	NV	41726/2000	14	Funct	D	PSA 1	Replace w/ Lisega (C-06-2219)
2-R-SA-0062	SA	16406/1982	14	Funct	D	PSA 1/2	Replace w/ Lisega (C-06-2137)
2-A-NV-3631	NV	41241/1999	14.5	FOM	D	PSA 1/2	initial stroke difficult (PIP C-07-0777)
2-R-KF-0029	KF	19746/1981	14.5	FOM	D	PSA 3	PIP C-07-3851, replace w/ Lisega
2-R-ND-0457	ND	13022/1981	14.5	FOM	F	PSA 1/2	Stroke ok for 1/2", PIP C-06-4843
2-A-NV-3840	NV	12988/1981	15	FOM	D	PSA 1/2	High drag
2-R-NR-0013	NR	9909/1980	15	Funct	D	PSA 1/2	Rough Drag, Replace as PM
2-S-NR-5524(b)	NR	12036/1980	15	Funct	F	PSA 1/2	Dropped - not service related
2-A-NI-4349	NI	15823/1982	16	FOM	F	PSA 1/2	Dropped C-09-02017
2-A-RN-3209	RN	20812/1994	16	Funct	F	PSA 1/2	CMP Improper handling C-09-01661
2-A-RN-3213	RN	20813/1994	16	Funct	F	PSA 1/2	CMP Improper handling C-09-01958
2-R-BB-1081	BB	13761/1981	16	FOM	F	PSA 1/2	Twisted PIP C-09-02073
2-R-FW-0003(a)	FW	11552/1981	16	FOM	F	PSA 10	PIP C-09-1890
2-R-FW-0003(b)	FW	11568/1981	16	FOM	F	PSA 10	PIP C-09-1890
2-R-SB-2040	SB	28201/1983	16	FOM	F	PSA 3	PIP C-09-1982
2-R-TL-2083	TL	8476/1980	16	FOM	F	PSA 1	PIP C-09-1982
2-A-CA-4040	CA	1072/1988	19	Funct	F	AD70R	PIP C-13-07911 (mishandling)
2-R-HR-2083	HR	8745/1979	19	FOM	D	PSA 3	no hand drag less than 1" C-13-8178
2-R-NI-1862	NI		19	VIS	F	PSA 1/2	unpinned C-13-08674
2-R-SB-2041	SB	25221/1982	19	FOM	D	PSA 3	hand stroke only 1/4" C-13-7971

<< Unit 2 Failure History >>

HNGNUMB	SYSTEM	S/N	EOC	Test Type	F/D	Size	Comments
2-R-SM-2025	SM		19	FOM	D	PSA 100	Spherical bearing cracked C-13-8951
2-R-SM-2039	SM	42254C/2005	19	FOM	D	PSA 100	Rough. High drag C-13-8972
2-R-AS-2115	AS	40035/1998	20	FOM	F	PSA 1	Overstroked C-15-1903
2-R-BB-1546	BB	1056/1988	20	Funct	D	AD70R	Degraded bleed tension, C-15-2234
2-R-CF-1588	CF	12058/1981	20	Funct	D	PSA 10	Tube rotated after test, C-15-2237
2-R-NV-0095	NV	15553/1982	20	Funct	D	PSA 1/2	Degraded tension drag, C-15-1911
2-R-SM-1654	SM	8271/1979	21	Funct	D	PSA 1	Drag rough after test, AR2060797
2 R NC 1674	NC	9493/1981	21	Funct	D	PSA 10	paddle loose, repl, AR2062624
2-R-SM-1550	SM	19882/1981	22	Funct	D	PSA 3	Drag degraded, repl., AR 2194915
2-R-SM-2038	SM	42252/2002	22	FOM	F	PSA 100	fails drag, repl., AR 2196649
2-R-SM-2033	SM	181/1984	22	FOM	D	PSA 100L	high drag, repl., AR 2196649
2-R-CF-1727	CF	8235	24	Funt	D	PSA 1	Degraded by testing

<< Outage Summary Template >>

At the start of Outage # _____ the snubber population was as described below:

- Total number of PSA snubbers installed: ____
- Number of Safety Related PSA snubbers installed: ____
- Total number of Anchor/Darling snubbers installed: ____
- Number of Safety Related Anchor/Darling snubbers installed: ____
- Total number of Lisega pipe snubbers installed: ____
- Number of Safety Related Lisega snubbers installed: ____
- Total number of SG snubbers installed: ____
- Total number of snubbers installed: ____

Functional Test Details (TR 16.9-13 & ISTD-5000)

The Test Population consists of Safety Related snubbers only. Functional testing per ISTD-5000 requires that an initial test sample consist of the following number of snubbers relative to the Test Population:

- 37 PSA snubbers (ISTD-5400)
- 10% of Anchor/Darling = ___ snubbers (ISTD-5300)
- 10% of Lisega pipe snubbers = ____ snubbers (ISTD-5300)
- 10% of SG snubbers = ____ snubber (ISTD-5253, ISTD-5300)

The above numbers are compared to the sample snubbers listed as actually tested in Work Orders _____ and _____.

Testing pipe snubbers, WO # _____

- Number of PSA snubbers tested: ____ Failures: ____
- Number of Anchor/Darling snubbers tested: ____ Failures: ____
- Number of Lisega pipe snubbers tested: ____ Failures: ____

Testing SG snubbers, WO # _____

- Number of SG snubbers tested: ____ Failures: ____

<< Outage Summary Template >>

Visual Examination Details (TR 16.9-13 & ISTD-4200):

- Accessible Snubbers
  - Number of Accessible snubbers: ____
  - Latest Work Orders
    - Train A WO# _____ Completed Date: _____
    - Train B WO# _____ Completed Date: _____
    - Non-trainWO# _____ Completed Date: _____
  - No. of visual failures in current interval: ____
  - Previous Interval: ____ months
  - Next Interval Duration: ____ months
    - (per ASME OM Table ISTD-4252-1and previous examination results)
  - Next due _____
- Inaccessible Snubbers
  - Number of Inaccessible snubbers: ____
  - Latest Work Order # _____ Completed Date: _____
  - No. of visual failures in current interval: ____
  - Previous Interval: ____ cycles (___ months)
    - Next Interval Duration:____ cycles (____ months)
    - (per ASME OM Table ISTD-4252-1and previous examination results)
  - Next due Outage _____

Freedom of Motion Details (TR 16.9-13 & ISTD-6000)

- Service Life Monitoring/PM Stroke Program
  - No. of snubbers stroked current outage: ____
  - No. of snubbers stroked non-outage prior to current outage: ____
  - No. of snubbers failed: ____
  - No. of snubbers degraded: ____
- Strokes due to suspected transient(s) = ____

Service Life Acceptability (TR 16.9-13 & ISTD-6200)

Service Life of Installed Snubbers has not been exceeded and will not be exceeded prior to the next scheduled surveillance.

Verified by: _____ Date: _____

<< Outage Summary Template >>

Basis Comments (review of pertinent data, seal life, etc...):
Review of data indicates approximately ____% of snubbers physically worked (tests + strokes) during _____ showed indications of degradation. Actual count was ___ out of ____ snubbers worked. Including the non-outage scope the total percentage is even less. The rate for Safety Related snubbers was much less than 0.5%. This is a decreasing trend from previous cycles where 3% to 5% where degraded or replaced as PM. One third of all snubbers are stroked each cycle on a repeating 3-cycle rotation. This was the third rotation for this group of snubbers and the results indicate that this practice is improving population reliability. All results indicate that the population is acceptable for service through the next cycle.

General Comments

Specific Snubber Functional Test Notes

<< General Service Life Monitoring Information >>

ISTD-6200 Requirements (OM-2014 Proposal)

The service life for each location where a snubber is installed shall be reevaluated at least once each fuel cycle. Reevaluation shall be based on examination, maintenance, performance, and operating service life history data associated with representative snubbers that have been in service in the plant, as well as other information related to service life. Completion of this reevaluation shall be documented in accordance with ISTD-9300(b). Examples of methods that can be used to obtain such data are described in Non-mandatory Appendix F of this Division. Based on the results of the reevaluation, each snubber's service life shall be increased, decreased, or left unchanged. If any snubber's reevaluated service life will be exceeded before the next scheduled system or plant outage, one of the following actions shall be taken prior to the start of the cycle:

(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 is extended to or beyond the next scheduled system or plant outage

General Requirements

The snubber program shall include a Service Life Monitoring component that addresses the following:

1. Each installed snubber within the program scope shall have an estimated service life established and documented.
2. A listing providing the service life value of each snubber is to be maintained.
3. Snubber service life values shall be reviewed each cycle and those snubbers that will reach end of life during the upcoming cycle are to be identified for replacement or refurbishment.
4. Previously established Service Life values for every installed snubber shall be evaluated each fuel cycle for continued applicability. Based upon the evaluation the estimated service life values may remain as previously established, reduced, or increased. The snubber listing shall be updated to reflect the evaluation results. The evaluation methodology and basis for conclusions are to be clearly documented in an appropriate site process and available for retrieval and review.
5. Prior to the beginning of each fuel cycle (start up following refueling), it must be documented that all installed snubbers have a service life that will not be exceeded prior to either the next refuel outage or next scheduled maintenance activity for that snubber.

<< General Service Life Monitoring Information >>

Implementation

1. Establishing Initial Service Life
   An initial service life value should be established for each installed snubber. Historically the industry practice was for establishing the initial value was simply an estimated life based upon recommendations of the OEM (Original Equipment Manufacturer). It should be recognized that these recommended values are generally based upon ideal conditions and often used as marketing tools rather than factual experience. Some manufacturers have published revised expectations and/or added caveats regarding maintenance practices. If establishing an initial base line service life value the manufacturer's recommendations should be combined with industry and site operating experience to develop a realistic value. Application and location specific conditions should be considered to adjust the service life according to the actual operating environment of individual snubbers.

   Governing parameters for service life should be clearly identified. For instance, in most cases the most critical component for the service life of a hydraulic snubber can be assumed to be the seals. The seal life as defined by the supplier will typically govern the snubber life expectancy. However, other components such as the fluid or poppet springs should be considered. For mechanical snubbers it may be that the lubricant is a governing part, or possibly a bearing or spring element - depending upon the design and application.

2. Snubber Listing
   The snubber listing should provide sufficient details to readily identify the remaining service life expected for any given snubber installed in the plant. The list may be reported from a comprehensive data base or may be summary information compiled from other available program sources (record keeping spreadsheets, maintenance records, etc.). Information that should be retrievable and/or calculable for each snubber includes:

   a. Manufacture date
   b. Installation date
   c. Actual refurbishment dates (if applicable)
   d. Projected service life (expected duration)
   e. Projected date for replacement/refurbishment

<< General Service Life Monitoring Information >>

3. Scheduling Review
   Data from the snubber listing shall be reviewed each cycle and all snubbers that will be due for either refurbishment or replacement during the next cycle are to be identified. This review should be completed early enough prior to the next outage to allow for proper planning and scheduling of the end of life activities. All snubbers that will reach their service life limit during the next cycle must be identified in order to complete the required actions during the outage preceding the end of life date. Accessible snubbers should be also be included and reviewed to ensure that the required service life activities can be scheduled and completed during non-outage periods prior to the end of life date. It may be that operational or logistical considerations make it desirable to perform those activities during the outage even though the snubbers are accessible at power.

4. Service Life Reevaluation
   Each cycle the actual expected service life values for each snubber must be reviewed and evaluated for the installed location. The purpose of this evaluation is to either validate the current established value, develop a basis to extend the service life, or to reduce the estimated service life expectancy. This is done for each and every snubber installed in the plant, and the snubber listing must be updated as appropriate. The evaluation is to be completed prior to the unit restart from the outage. Although each snubber service life must be evaluated, it is possible to use groupings of similar snubbers in similar applications to develop a basis for multiple snubbers concurrently. It is important to note that in the event the reevaluation reduces the service life of any snubber an complete extent of condition review must be performed to ensure that all other installed snubbers subject to a reduced life are adequately addressed prior to restart.

   A methodology and basis for reevaluation should be developed and documented. Results of functional testing should be considered for trending. A program of periodic disassembly examinations for the purpose of evaluating service life may prove helpful. The maintenance history of each snubber should be included and utilized to evaluate the service life. When snubbers are refurbished the internal components should be inspected and evaluated for trending input. Seals that are replaced should be inspected and possibly tested to determine if the replacement interval is appropriate for the wear /aging that is actually seen. Results of preventive maintenance testing or other monitoring activities should be included in the service life reevaluation process.

5. Documentation
   Prior to restart following each outage the reevaluation of service life shall be documented. The documentation should clearly state the results of the reevaluation and that all snubbers in the subject population are acceptable for the duration of the upcoming cycle (or, in the case of accessible snubbers, until their next scheduled maintenance). Reference to or discussion of the basis for this determination should be included.

The exact form and format of this documentation depends upon site specific processes. Some examples might be incorporated into a startup procedure, an inspection procedure sign off, a formal report, or an entry into the Corrective Action Program.