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RA-19-0383

October 3, 2019

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Duke Energy Carolinas, LLC  
Oconee Nuclear Station, Units 1, 2 and 3  
Docket Numbers: 50-269, 50-270 and 50-287  
Renewed Operating Licenses: DPR-38, DPR-47 and DPR-55

Subject: Oconee Nuclear Station Snubber Program Plan for Fifth 10-Year Interval Inservice Testing Program

In accordance with the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code), Subsection ISTA-3200(a), "Administrative Requirements," Duke Energy Carolinas, LLC (Duke Energy) is enclosing, for your information, a copy of Administrative Procedure AD-EG-ONS-1618, Oconee Nuclear Plant Snubber Program Plan, Revision 1.

The program has been developed to satisfy the snubber preservice and inservice testing and examination requirements of the ASME OM Code, 2004 Edition through 2006 Addenda, and applicable to the fifth 10-year interval for Oconee Nuclear Station (ONS), Units 1, 2 and 3.

As reported in Duke Energy letter to the NRC dated July 2, 2012 (ADAMS Accession #ML12195A321), the fifth 10-year IST interval for ONS began on July 1, 2012. The fifth 10-year interval IST program will follow the requirements of the ASME OM Code, 2004 Edition with Addenda through OM-2006.

Please refer any questions regarding this submittal to Mr. Christopher Wasik, Fleet Nuclear Licensing, at (864) 873-5789.

Sincerely,

A handwritten signature in black ink that reads "Sheila Dalton". The signature is written in a cursive, flowing style.

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Enclosure

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Information Use

OCONEE UNIT 0  
ADMINISTRATIVE PROCEDURE  
NON-SAFETY RELATED  
**AD-EG-ONS-1618**

**OCONEE NUCLEAR STATION  
SNUBBER PROGRAM PLAN**

REVISION 001

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REVISION SUMMARY	
PRR 02045864	
DESCRIPTION	
<p>The changes below are made to reflect actual field conditions:</p> <ul style="list-style-type: none"> <li>• Revised 2.0.1 to reflect 5th Interval</li> <li>• Revised Section 4 to reflect organizational changes</li> <li>• Revised 5.2.3 to change annual to periodic</li> <li>• Revised 5.2 4.b to reflect 5th Interval</li> <li>• Revised 5.4.3 to reference Table ISTD 4252 1</li> <li>• Added Section 5.6.4 to cover the SSF snubbers</li> <li>• Revised 5.10.1 to delete SD reference</li> <li>• Deleted 5.13.3b</li> <li>• Revised 5.13.3d (new "c") to reference CSD</li> <li>• Added 7.4.20 to reference CSD</li> <li>• MP/0/A/3018/028 and MP/0/A/3018/063 removed from Table in Step 5.5.7 due to it not being applicable to that section.</li> <li>• Deleted old Attachments 3 and 4</li> <li>• Added new Attachment 3 for Test Sample Plan Completion</li> <li>• relocated Section for model work orders to new attachment 4</li> </ul>	

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## 1.0 PURPOSE

1. This procedure standardizes the methods used to develop, administer, and implement the Snubber Program at the Oconee Nuclear Station (ONS).

## 2.0 SCOPE

1. This procedure is applicable to Snubbers in the ASME Operation and Maintenance of Nuclear Power Plants (ASME OM) Program scope. Specifically, ONS snubber population fall under the sections and subsections as described below:
  - a. 10CFR50.55a stipulates the ASME Code for Operation and Maintenance of Nuclear Power Plants, 2004 edition through 2006 addenda, for the inspection and testing of snubbers. Specifically, Subsections ISTA and ISTD will govern snubber examination and testing activities. This is effective for the fifth 10-year ISI interval for all 3 units, which had a start date of 7/15/2014.
  - b. The scope of this plan is as described in the ASME Code for Operation and Maintenance of Nuclear Power Plants, 2004 edition through 2006 addenda, Subsection ISTA, Article ISTA-1100 and is defined as the following:
    - (1) Snubbers used in systems that perform a specific function in shutting down a reactor to the safe shutdown condition
    - (2) Snubbers used to maintain the safe shutdown condition
    - (3) Snubbers employed to mitigate the consequences of an accident
    - (4) Snubbers used to ensure the integrity of the reactor coolant pressure boundary
2. The scope of this plan also applies to snubbers in the Selected Licensee Commitment (SLC) 16.9.18 scope. Snubber scope as identified in SLC 16.9.18 consists 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. Based upon the design criteria referenced in Design Specification OSS-0027.00-00-0001, all snubbers falling within the SLC scope are enveloped by either the QA Condition 1 or QA Condition 4 classification. The SLC test, examination, and service life monitoring scope conservatively includes all QA 1 and 4 snubbers, even though some Seismic Category II snubbers classified as QA Condition 4 potentially may be excluded due to not adversely affecting a safety related system. Any such exclusions from SLC activities will be documented on a case by case basis.

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## 2.0 SCOPE (continued)

3. In keeping with good engineering practice and to provide reasonable assurance of structural reliability, any remaining snubbers not identified above (typically Non-Safety related) may be included in the program and, at a minimum, inspected or monitored periodically.

## 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 them 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 but determined that their failure or the failure of the system on which they are installed would have an adverse effect on any safety-related system.
8. **Service Life:** The period of time 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.

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### 3.0 DEFINITIONS (continued)

10. **Transient Dynamic Event:** An unexpected or potentially damaging occurrence, which was determined from reviews of operating data or during a visual inspection/examination (such as a water/steam hammer, earthquake or similar event).
11. **Unacceptable:** Snubbers that do not meet examination or testing acceptance criteria.

### 4.0 RESPONSIBILITIES

#### 4.1 General

Responsibilities delineated within AD-EG-ALL-1600, Engineering Programs, AD-EG-ALL-1618, Snubber Program Plan, and PD-EG-ALL-1618, Snubber Program, additionally apply

#### 4.2 Fleet Engineering Programs - Snubber Program Manager

1. Ensures that the Snubber Programs are effectively managed and implemented to meet regulatory, process, and procedure requirements.
2. Provides governance and oversight of the Snubber Program
3. Sets strategic and technical direction of the Snubber Program.
4. Maintains qualifications in accordance with training program requirements.
5. Establishes, prepares, and maintains snubber testing and examination Program Plans, implementing procedures, and schedules.
6. Assigns examination and testing requirements for snubbers, as identified in the Snubber Program Plan.
7. Maintains the IDDEAL Software Suite Database (SnubbWorks®) for snubbers.
8. Coordinates the performance of scheduled and non-scheduled snubber examination, testing activities, preventive maintenance and condition monitoring activities.
9. Selects and identifies snubbers for examination, testing and service life activities.
10. Reviews test and examination results for acceptability.
11. Evaluates results of examinations and tests found not meeting the acceptance criteria.



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#### **4.2 Fleet Engineering Programs - Snubber Program Manager (continued)**

12. Generates corrective actions:
  - a. Action Requests (ARs)
  - b. Nuclear Condition Reports (NCRs)
  - c. Work Requests (WRs) in support of Program activities
13. Determines the extent of additional examinations, tests, or repairs which may be required following the discovery of an unacceptable snubber condition.
14. Establishes, monitors and tracks the service life of installed snubbers.
15. Prepares the scope lists for snubber functional testing and visual examination activities.
16. Provides pertinent information to the implementing work groups.
17. Identifies the applicable procedures required to satisfy the examination or testing requirements, per the Snubber Program Plan.
18. Submits the required snubber work scope to the appropriate On-Line work management, Outage work management, or Planning work groups.
19. Manages the scope, including content, additions, deletions, expansions and corrections of the snubber work scope.
20. Compares current recorded results with the prior or expected results to determine snubber continued service and/or corrective actions.
21. 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).
22. 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.
23. Reviews plant design changes and revises the Snubber Program Plan, accordingly.
24. Performs or assists with Operability/Functionality Evaluations for snubbers as required.

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#### **4.3 Site Maintenance**

1. Ensures that snubber functional testing is performed in accordance with the applicable station procedures.
2. Records the results of snubber tests, examinations, and as-found or as-left conditions in accordance with the appropriate station procedures.
3. Reports findings on the appropriate data sheets and notifies the Snubber Program Manager.
4. Repairs, rebuilds, or replaces snubbers as required under the Snubber Program.

#### **4.4 Site Design Engineering**

1. Performs Operability/Functionality Evaluations on piping systems or components per AD-OP-ALL-0105, Operability Determinations and Functionality Assessments.
2. Notifies the Snubber Program Manager of plant design changes that may impact the Snubber Program.

#### **4.5 Site Regulatory Affairs**

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

#### **4.6 Qualified Snubber Inspector/Qualified Snubber Maintenance Technician/Qualified QC Mechanical Inspector/Certified Nondestructive Examination (NDE)VT-3 Examiner**

1. Records the as-found or as-left conditions of the snubber in accordance with the appropriate station procedures.
2. Reports findings on the appropriate datasheets and notify the Snubber Program Manager.

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## 5.0 INSTRUCTIONS

### 5.1 General

1. For the purposes of this procedure, references to Snubber Program Manager means a (qualified) designee or other person assigned to complete any procedural requirement identified in this procedure. Snubber Program Managers shall be qualified in accordance with the applicable Program Engineering requirements. [Ref. ISTA-1500(e)]
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 ten-year interval between required program updates, the Snubber Program Plan may be subject to revisions. 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.

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## 5.2 **Snubber Program Plan**

1. Each NGD site is responsible for generation and maintenance 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. During implementation of the ONS Snubber Program Plan, the Plan and any corresponding CSD documents will be periodically updated. All updates will be documented in the ONS Snubber Program Plan or CSD Revision History.
4. The Snubber Program Plan additionally uses a Controlled Supporting Document (CSD-EG-ONS-1618) to provide supplemental information.
5. Snubber Program Plan related CSDs are controlled in accordance with Fleet Procedure AD-EG-ALL-1618.
6. 10-year Updates:
  - a. Once every 10 years, the Snubber Program requires updating to the edition and addenda specified in 10 CFR 50.55a.
  - b. The snubber program intervals are concurrent with the ASME Section XI 10-year intervals. The fifth interval for all three units began on 7/15/2014, at which time the program and this document was updated to incorporate the 2004 edition and 2006 addenda of ASME OM code as the governing commitment.
  - c. Snubber Program Plans for each 10-year interval shall be filed with the regulatory authorities in accordance with the ASME OM code. Submittal shall consist of the latest revision to this document (AD-EG-ONS-1618) with cover sheet information as required by ISTA-3200. Other pertinent articles include ISTA-1300, 3110. 9220, and 9230.
7. Changes to the program testing or inspection methodologies may require the Snubber Program Plan to be re-submitted to the regulatory authorities.

## 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. IDDEAL Software is used to:
  - a. Store (as a back-up) component information, examination and testing history, and examination and testing schedules

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### 5.3 IDDEAL Software Suite (continued)

2. 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 Visual Examinations

1. For examination purposes, snubbers at ONS 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 during or after the examination.
  - c. If recombining categories into one population, then the shortest interval of the categories shall be used.
  - d. Categorization is in accordance with ASME OM ISTD-4220.
2. Snubber examination activities are scheduled via predefined model work orders that direct the use of the appropriate procedure for visual inspections. (See Attachment 4, Model Work Orders)
3. The examination interval shall be reviewed at the end of each cycle to verify interval duration information and examination scheduling and shall be documented. If examination results dictate truncation of an extended interval in accordance with Table ISTD 4552-1, then appropriate corrective actions are to be taken.
4. Visual Examinations are conducted using the following procedures:

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#### 5.4 Visual Examinations (continued)

Procedure No.	Title
MP/0/A/3018/026	Snubbers - Pacific Scientific - Mechanical - SSF Accessible Inspection-
MP/0/B/3018/012	Snubbers - Grinnell - Hydraulic - Non Safety Related - Inspection-
MP/1/A/3018/010	Snubbers - Hydraulic - Unit 1 Inaccessible Inspection-
MP/1/A/3018/011	Snubbers - Hydraulic - Unit 1 - Accessible Inspection-
MP/1/A/3018/019	Snubbers - Pacific Scientific - Mechanical - Unit 1 Inaccessible Inspection-
MP/1/A/3018/020	Snubbers - Pacific Scientific - Mechanical - Unit 1 Accessible Inspection-
MP/2/A/3018/010	Snubbers - Hydraulic - Unit 2 Inaccessible Inspection-
MP/2/A/3018/011	Snubbers - Hydraulic - Unit 2 - Accessible Inspection-
MP/2/A/3018/019	Snubbers - Pacific Scientific - Mechanical - Unit 2 Inaccessible Inspection-
MP/2/A/3018/020	Snubbers - Pacific Scientific - Mechanical - Unit 2 Accessible Inspection-
MP/3/A/3018/010	Snubbers - Hydraulic - Unit 3 Inaccessible Inspection-
MP/3/A/3018/011	Snubbers - Hydraulic - Unit 3 - Accessible Inspection-
MP/3/A/3018/019	Snubbers - Pacific Scientific - Mechanical - Unit 3 Inaccessible Inspection-
MP/3/A/3018/020	Snubbers - Pacific Scientific - Mechanical - Unit 3 Accessible Inspection-

5. All snubbers identified during the interval that do not meet the visual examination acceptance criteria shall be considered when determining the length of the following interval. This includes snubbers identified outside of the scheduled examination process.
6. Any unacceptable snubber identified shall have an evaluation performed by the Snubber Program Manager or a designated individual knowledgeable in snubber operability requirements. [Ref. 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

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#### **5.4 Visual Examinations (continued)**

- c. If the condition is an isolated case, then a Work Request may be issued to correct any discrepancies found.
  - d. If any snubber is determined to be unacceptable or unsatisfactory, then the Snubber Program Manager or designee shall initiate a Nuclear Condition Report (NCR).
- 7. 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.
- 8. 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.
- 9. An augmented scope is invoked whenever a visual examination is to be performed as a supplemental scope outside of the program requirements.

#### **5.5 Operational Readiness Testing**

- 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 Section 5.8 and Section 5.9. [Ref. ISTD-5260]
- 2. Functional testing per the ASME OM Code is required to be performed each refueling cycle. Snubber testing may begin no earlier than 60 days prior to the start of the refueling outage and must be completed prior to start of the next operating cycle.
- 3. Snubber testing activities are scheduled via predefined model work orders and performed according to maintenance procedures. (See Attachment 4, Model Work Orders)
- 4. Non-Safety Related Snubbers may be tested at the discretion of the Program Manager.
- 5. Snubbers shall be tested in their as-found condition regarding the parameters to be tested to the fullest extent possible.
- 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.

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## 5.5 Operational Readiness Testing (continued)

7. Snubbers are to be removed from the field installation and bench tested in accordance with following applicable procedures:

Procedure No.	Title
MP/0/A/3018/002	Snubbers - Grinnell/Anvil Fig. 200/201 - Removal And Replacement-
MP/0/A/3018/058	Snubbers - Pacific Scientific - Mechanical - Removal And Installation-
MP/0/A/3018/062	Snubbers - Lisega - Hydraulic - Removal And Installation-
MP/0/A/3018/063	Operation Of Barker/Diacon S 2000 NM Snubber Test Machine-
MP/0/A/3018/064	Snubbers - Anvil Figure 3306/3307 Hydraulic - Removal And Installation-
MP/0/A/3018/029	ITT Grinnell Model 5434-3 Snubber Test Bench Calibration-(
MP/0/A/3018/025	Operability Testing Of Hydraulic Snubbers-

8. Snubbers shall not be subjected to prior preventive or corrective maintenance (i.e., 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. Acceptance criteria for Operational Readiness Test is defined in specification OSS-0027.00-00-0002, Procedures, Supplemental Requirements and Tolerances for Fabrication and Erection of Pipe Supports and Restraints.
10. 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.
11. The applicable site maintenance procedures shall govern the removal and reinstallation of plant installed snubbers.



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## 5.5 Operational Readiness Testing (continued)

12. 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 applicable removal, replacement, and installation procedures.
13. If Snubber Testing procedures were not utilized (i.e. for Non-Safety snubbers), then visual examination requirements shall be as directed by the Program Manager if the procedure is not utilized.
14. For each snubber determined to be unacceptable by operational readiness testing, an additional sample shall be tested as described by the ASME OM code.
  - a. An evaluation of unacceptable (failed) snubbers is required and will be documented in accordance with the Corrective Action Program (CAP).
  - b. An Engineering Evaluation shall be performed on the System, Structure, or Component (SSC) to which the unacceptable snubbers were attached.
    - (1) 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 its design function.
15. 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.
16. 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.
17. 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.

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## 5.5 Operational Readiness Testing (continued)

18. The initial test performed for an in-service operational readiness snubber test shall be maintained as the as-found test of record.
  - a. If multiple tests are performed for any reason, then all test results are to be saved and documented.
  - b. Ensure copies of all tests are to be included with the test procedure records along with notations as to the reason for multiple tests.
  - c. The Program Manager may provide additional comments or justification as an attachment to the procedure as required.
19. To assist in establishing the service shelf life of specific snubbers or locations, test results will be reviewed for adverse trends.
20. Each snubber in a parallel or multiple-snubber installation shall be identified and counted individually.
  - Fractional sample sizes shall be rounded up to the next integer.

## 5.6 Defined Test Plan Group (DTPG)

1. The DTPGs shall include all Safety Related or Safety Significant snubbers except replacement snubbers and snubbers repaired or adjusted during the current operating cycle as a result of not meeting the acceptance requirements. These snubbers shall be exempt for the concurrent test interval.

### NOTE

Typically ONS utilizes separate DTPGs for hydraulic pipe snubbers and mechanical pipe snubbers.

2. Except as required in Step 3 and Step 4 below, the total Safety Related or Safety Significant snubber population may be considered one DTPG, or alternatively, differences in design, application, size, or type may be considered in establishing DTPGs.
3. Safety Related or Safety Significant Snubbers attached to the reactor coolant pumps shall be at least one separate DTPG.

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## 5.6 Defined Test Plan Group (DTPG) (continued)

4. The Standby Shutdown Facility (SSF) is a safety system at Oconee that is shared by all three units.
  - The SSF has been assigned as Unit 0 for tracking purposes in the Snubber Program.
  - It contains two Safety Related snubbers that are not included in individual unit DTPGs.
  - These snubbers are visually inspected, functionally tested, and replaced every 2 years during an SSF outage.
  - Replacement of the snubbers during each test cycle is due to the short time frame in which the SSF outages are performed.

## 5.7 Testing Sample Plans

1. Safety Related or Safety Significant snubbers of each DTPG shall be tested using the 10% Plan.

### NOTE

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

2. A test plan shall be selected for each DTPG before the scheduled testing begins and shall be documented in this plan.
3. The 10% plan for the DTPG shall be used throughout the refueling outage tests for that DTPG and any Failure Mode Group (FMG) that is derived from it.
4. For unacceptable snubber(s), the additional testing shall continue in the DTPG or FMG.

## 5.8 Testing Sample Plan Selection

1. The initial sample selection shall be representative as described by the ASME OM Code ISTD-5311.
  - a. The sample includes representation from the DTPG dependent on size and location and based on the ratio of the number of snubbers of each to the total number of snubbers in the DTPG.

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## 5.8 Testing Sample Plan Selection (continued)

- b. The sample shall be reviewed to ensure, as far as practicable, that it is representative of the various configurations, operating environments, range of sizes, and capacity of the snubbers of each type.
2. Alternatively, 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. 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.) Likewise, snubbers that have had maintenance activities performed which could affect test results are to be excluded. An exception to this would be where a special DTPG is identified consisting solely of snubbers that have been newly installed or maintained.
4. 10% Sample Plan completion criteria is located in Attachment 3, 10% Sample Plan Completion Criteria.

## 5.9 Sample Expansion

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 the ASME OM Code.
  - a. 10% Plan supplemental samples shall consist of an additional sample of at least one-half the size of the initial sample for the DTPG population.
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. Any use of FMG testing at ONS must be carefully detailed and justified within the Corrective Action Program (CAP). [Ref. ISTD-5272 & ISTD-5273]

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#### **5.10 Snubber Replacement**

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.
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.
  - On-site testing may be waived as documented in the appropriate installation procedure.

#### **5.11 Snubber Deletion**

1. Snubbers may be deleted from the plant based on analysis of the affected piping system. If an unacceptable snubber is subsequently deleted prior to the completion of the test campaign, then the deleted snubber shall nevertheless be considered in its respective examination population, examination category, or Failure Mode Group (FMG) for determining the corrective action.
2. The number of deleted snubbers that failed or passed tests or examinations prior to being deleted will be used in determining examination or testing frequencies.

#### **5.12 Transient Dynamic Events**

1. If an unanticipated dynamic event (e.g., water hammer, steam hammer, beyond Design Basis Event (DBE)) occurs that may affect snubber operability, then the affected snubbers and systems shall be evaluated and any appropriate corrective actions taken.
  - a. The event information, scope of review, and actions taken shall be documented in the Corrective Action Program (CAP).
  - b. The Program Manager shall contact the System Engineer or Design Engineering to define the extent of evaluation for the affected system.
  - c. Snubbers within the affected region shall be examined, stroked, or tested as deemed appropriate to address the concern.
  - d. In many cases, the condition monitoring stroke testing that has already been planned or completed may sufficiently address the concern.

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### 5.13 Service Life Monitoring

1. The object of service life monitoring is to identify service and environmental conditions that can adversely affect snubber performance and to estimate appropriate service life limits for installed snubbers.
  - Service life estimates vary and are generally based on factors such as manufacturer recommendations, design limits, environmental conditions, applications and materials, among others.
2. Service Life estimates should be adjusted periodically based on plant experience and technical data to ensure that the snubber(s) operational readiness is achieved throughout its intended install life.
  - Service Life Monitoring is required for all Safety Related and Safety Significant snubbers.
  - Service Life Monitoring of Non-Safety Related snubbers is not addressed by the ASME OM Code and is at the discretion of the Program Manager.
3. Service Life Monitoring encompasses the following:
  - a. A record of the service life of each snubber in the program shall be maintained. The snubber service life record shall include the snubber installed location, manufacturer/model, serial number, installed date, rebuild date, and service life expiration date for each applicable snubber.
    - If snubbers are rebuilt or overhauled, then the service life shall be updated which will provide future statistical bases for consideration of snubber service life.
    - Each installed snubber within the program scope has this information documented in Snubbworks®.
  - b. 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.
  - c. Previously established Service Life values for every installed snubber shall be reevaluated each fuel cycle for continued applicability.
    - (1) Reevaluation shall be based on information including examination, maintenance, performance, and operating service life history data associated with representative snubbers that have been in service.
    - (2) Based upon the reevaluation the estimated service life values may remain as previously established, reduced, or increased.

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### 5.13 Service Life Monitoring (continued)

- (3) The snubber listing is documented in CSD-EG-ONS-1618 and shall be updated as appropriate to reflect the reevaluation results.
- (4) The reevaluation methodology and basis for conclusions are to be clearly documented .
  - (a) 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.
  - (b) A 21 year minimum seal life is generically assumed for Lisega snubbers, with certain exceptions as noted in the listing due to actual experience under severe conditions. Adjustments may be made to account for time in storage versus time in service.
  - (c) A 25 year minimum seal life is generically assumed for Grinnell/Anvil snubbers, with certain exceptions as noted in the listing due to actual experience under severe conditions
  - (d) For mechanical snubbers, a generic service life of 40 years from the date of manufacture is 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/3018/024, Stroking Mechanical Snubbers. Data is insufficient to accurately predict an exact end of life. However, the entire population is hand stroked over a 2-cycle period and the results evaluated to validate suitability for the next 2-cycle period. Service life may be extended beyond the original design effective service life of 40 years provided the guidelines of AD-EG-ALL-1618, Snubber Program Plan. Certain snubbers in severe (high vibration) applications have previously been replaced with hydraulic snubbers, and this will continue to be the practice as applicable.

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### 5.13 Service Life Monitoring (continued)

- d. If the reevaluation indicates that the service life of any snubber or snubbers will be exceeded before the next scheduled system or plant outage, then 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.
- e. 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 typically documented in an outage summary report.

## 6.0 RECORDS

None

## 7.0 REFERENCES

### 7.1 Commitments

None

### 7.2 Procedures

1. [AD-DC-ALL-0201](#), Development and Maintenance of Controlled Procedure Manual Procedures
2. [AD-EG-ALL-1000](#), Conduct of Engineering
3. [AD-EG-ALL-1006](#), Conduct of Technical Program Engineering
4. [AD-EG-ALL-1600](#), Engineering Programs
5. [AD-EG-ALL-1618](#), Snubber Program Plan



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## 7.2 Procedures (continued)

6. [AD-IT-ALL-0002](#), Software Quality Assurance (SQA) Program Administration
7. [MP/0/A/3018/026](#), PSA, Mechanical, SSF Accessible Inspection
8. [MP/0/B/3018/012](#), Anvil/Grinnell, Hydraulic, Non-Safety Related Inspection
9. [MP/1/A/3018/010](#), Unit 1, Hydraulic, Inaccessible Inspection
10. [MP/1/A/3018/011](#), Unit 1, Hydraulic, Accessible Inspection
11. [MP/1/A/3018/019](#), Unit 1, Mechanical, Inaccessible Inspection
12. [MP/1/A/3018/020](#), Unit 1, Mechanical, Accessible Inspection
13. [MP/2/A/3018/010](#), Unit 2, Hydraulic, Inaccessible Inspection
14. [MP/2/A/3018/011](#), Unit 2, Hydraulic, Accessible Inspection
15. [MP/2/A/3018/019](#), Unit 2, Mechanical, Inaccessible Inspection
16. [MP/2/A/3018/020](#), Unit 2, Mechanical, Accessible Inspection
17. [MP/3/A/3018/010](#), Unit 3, Hydraulic, Inaccessible Inspection
18. [MP/3/A/3018/011](#), Unit 3, Hydraulic, Accessible Inspection
19. [MP/3/A/3018/019](#), Unit 3, Mechanical, Inaccessible Inspection
20. [MP/3/A/3018/020](#), Unit 3, Mechanical, Accessible Inspection
21. [MP/0/A/3018/002](#), Grinnell/Anvil, Figure 200/201, Removal and Replacement
22. [MP/0/A/3018/024](#), Stroking Mechanical Snubbers
23. [MP/0/A/3018/028](#), Grinnell, Hydraulic, Configuration "A" Upgrade
24. [MP/0/A/3018/058](#), PSA, Mechanical, Removal and Replacement
25. [MP/0/A/3018/060](#), ITT Grinnell, Mechanical and Hydraulic, Repair of Rod Eye Bearing
26. [MP/0/A/3018/062](#), Lisega, Hydraulic, Removal and Replacement
27. [MP/0/A/3018/063](#), Operation of Barker/Diacon S 2000 NM Snubber Test Machine

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## 7.2 Procedures (continued)

28. [MP/0/A/3018/064](#), Anvil Figure 3306/3307, Hydraulic, Removal and Replacement
29. [MP/0/A/3019/009](#), Hangers, Sway Struts, and Snubber Extension Pieces, Field Modifications
30. [MP/0/A/3018/029](#), ITT Grinnell Model 5434-3 Snubber Test Bench Calibration
31. [MP/0/A/3018/025](#), Operability Testing of Hydraulic Snubbers

## 7.3 Miscellaneous Documents

1. ASME OM: Operation and Maintenance of Nuclear Power Plants
2. Code of Federal Regulations: 10 CFR 50.55a, Codes and Standards<sup>7</sup>
3. [CSD-EG-ONS-1618](#), ONS Installed Snubber Listing
4. INPO EPG-07, Snubbers (historical document)
5. NUREG-1482, Guidelines for In-service Testing at Nuclear Power Plants
6. OM 244.0057.001, Operation & Maintenance Manual for Snubber Test Stand Model 524
7. OM 244.0058.001, ITT Grinnell Fig. 200/201 Hydraulic Snubber, All Models Prior to 11-74, I/M
8. OM 244.0060.001, ITT Grinnell Fig. 200/201 Hydraulic Snubber, Model PH-74R, 1-1/2" - 6", I/M
9. OM 244.0068.001, Lisega, Hydraulic Snubber Technical Manual
10. OM 244.0069.001, S2000 NM Snubber Test Machine Instruction, Operation, and Maintenance Manual
11. OM 244.0070.001, Anvil International Grinnell Fig. 200N & 201N Snubber Upgrade to Configuration A
12. OM 244.0074.001, Installation Guide for Anvil Figure 3306N/3307N Hydraulic Snubbers
13. OM 244.0074.002, Design Report Summary for Anvil Figure 3306N/3307N Hydraulic Snubbers
14. ONS Selected Licensee Commitment SLC 16.9.18

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### 7.3 Miscellaneous Documents (continued)

15. ONS Technical Specification Sections 3.0.8
16. ONS UFSAR Section 3.9.3.4.2.2
17. OS-0027.00-00-0001, Design Specification for Class A, B, C, D, and F Pipe Supports and Restraints
18. OS-0027.00-00-0003, Design, Fabrication, and Erection for Class E, G, and H Pipe Supports
19. OSS-0027.00-00-0002, Procedures, Supplemental Requirements and Tolerances for Fabrication and Erection of Pipe Supports and Restraints
20. [PD-EG-ALL-1618](#), Snubber Program Description
21. PSA DR-1219, Rev. 2, Standard Design Specification
22. PSA DR-2041, Activation versus Load Testing Summary Report
23. PSA DR-3020, Revs 1 & 2, Service Life Extension Program & Preventive Maintenance Recommendations
24. Regulatory Guide 1.192, Operation and Maintenance Code Case Applicability, ASME OM Code
25. Regulatory Guide 1.193, ASME Code Cases Not Approved for Use

<< ISTD 4252-1 Visual Examination Table >>

ASME OM Code, 2004 thru 2006 Addenda

**Table ISTD-4252-1 Visual Examination Table**

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

NOTES:

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

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### << Outage Summary Template >>

#### NOTE

This attachment is a general example of the content included in a typical outage summary document. This is an informational guidance document only and is not intended to be a prescriptive procedure.

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

- Total number of Anvil/Grinnell snubbers installed: \_\_\_\_\_
- Number of Safety Related Anvil/Grinnell snubbers installed: \_\_\_\_\_
- Total number of Lisega pipe snubbers installed: \_\_\_\_\_
- Number of Safety Related Lisega snubbers installed: \_\_\_\_\_
- Total number of PSA snubbers installed: \_\_\_\_\_
- Number of Safety Related PSA snubbers installed: \_\_\_\_\_
- Total number of snubbers installed: \_\_\_\_\_

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## << Outage Summary Template >>

### Functional Test Details

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

- 10% of Hydraulic Snubbers = \_\_\_\_ snubbers
- 10% of Mechanical Snubbers = \_\_\_\_ snubbers
- 10% of RCP Snubbers = \_\_\_\_ snubbers

The above numbers are compared to the sample snubbers listed as actually tested in Work Orders \_\_\_\_\_ and \_\_\_\_\_. A review of the SNUBBWORKS sample data details verifies that the selections are sufficiently representative of the sample population.

Testing pipe snubbers, WO # \_\_\_\_\_

- Number of Hydraulic snubbers tested: \_\_\_\_ Failures: \_\_\_\_
- Number of Mechanical snubbers tested: \_\_\_\_ Failures: \_\_\_\_
- Number of RCP snubbers tested: \_\_\_\_ Failures: \_\_\_\_

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### << Outage Summary Template >>

#### Visual Examination Details:

- Inaccessible Snubbers
  - ◇ Number of Inaccessible snubbers: \_\_\_\_\_
  - ◇ Latest Work Order # \_\_\_\_\_ Completed Date: \_\_\_\_\_
  - ◇ No. of visual failures in current interval: \_\_\_\_\_
  - ◇ Previous Interval: \_\_\_\_ cycles ( \_\_\_\_ months)
  - ◇ Column \_\_\_\_ of Table ISTD 4252-1 Visual Examination
  - ◇ Maximum # of unacceptable exams per table = \_\_\_\_\_
  - ◇ Per Table ISTD 4252-1 Visual Examination and previous examination results, interval to be:
    - ☐ ..... Reduced
    - ☐ ..... Repeated
    - ☐ ..... Extended
  - ◇ Next due Outage \_\_\_\_\_

#### Freedom of Motion Details

- 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) = \_\_\_\_\_

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### << Outage Summary Template >>

#### **Basis Comments (e.g., review of pertinent data, seal life):**

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 \_\_\_\_% where degraded or replaced as preventative maintenance. All results indicate that the population is acceptable for service through the next cycle.

#### **Service Life Acceptability**

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

Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

#### **General Comments**

#### **Specific Snubber Functional Test Notes**



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### << 10% Sample Plan Completion Criteria >>

10% Sample Plan is completed when the mathematical expressions below are satisfied, or all snubbers have been tested.

1. For each Defined Test Plan group (DTPG):

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

where:

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

2. For each Failure Mode Group (FMG):

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

where:

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

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**<< Model Work Orders >>**

<b>WO#</b>	<b>Work order description</b>
01465732	Inspect Non-Safety Related Hydraulic Snubbers
01626330	Functional Test of Snubbers in SSF Building
01461881	Visual Inspection of Accessible Snubbers in SSF Building
01465728	Unit 1 10% Functional Test of Hydraulic Snubbers
01467545	Unit 1 10% Functional Test of Mechanical Snubbers
01461807	Unit 1 Accessible Hydraulic Snubbers Inspection
01461883	Unit 1 Accessible Mechanical Snubber Inspection
02055952	Unit 1 Handstroke 'BS' Mechanical Snubbers, Every Even Outage (01774294 - Historical Info)
01773563	Unit 1 Handstroke 'FDW' and 'C' Mechanical Snubbers, Every Outage
01773729	Unit 1 Handstroke 'HPI' Mechanical Snubbers, Every Even Outage
01873636	Unit 1 Handstroke Mechanical Snubbers, Every Odd Outage
01465749	Unit 1 Inaccessible Hydraulic Snubber Inspection (Begin)
01465737	Unit 1 Inaccessible Hydraulic Snubber Inspection (End)
01465743	Unit 1 Inaccessible Mechanical Snubber Inspection (Begin)
01763823	Unit 1 Rebuild Hydraulic Snubbers
01774072	Unit 1 Handstroke '53A LPI' Mechanical Snubbers, Every Even Outage
02055963	Unit 1 Handstroke '53B LPI' Mechanical Snubbers, Innage
01466289	Unit 2 10% Functional Test of Hydraulic Snubbers
01467551	Unit 2 10% Functional Test of Mechanical Snubbers
01461809	Unit 2 Accessible Hydraulic Snubber Inspection
01461885	Unit 2 Accessible Mechanical Snubber Inspection
01785616	Unit 2 Handstroke 'FDW' and 'C' Mechanical Snubbers Every Outage
01989430	Unit 2 Handstroke 'LPI' (53B) Mechanical Snubber, Innage
01787951	Unit 2 Handstroke Mechanical Snubbers, Every Odd Outage
01873637	Unit 2 Handstroke Mechanical Snubbers, Every Even Outage
01466311	Unit 2 Inaccessible Hydraulic Snubber Inspection (Begin)
01466299	Unit 2 Inaccessible Hydraulic Snubber Inspection (End)
01466305	Unit 2 Inaccessible Mechanical Snubber Inspection (Begin)
01763824	Unit 2 Rebuild Hydraulic Snubbers
01466444	Unit 3 10% Functional Test of Hydraulic Snubbers
01467556	Unit 3 10% Functional Test of Mechanical Snubbers
01461811	Unit 3 Accessible Hydraulic Snubber Inspection
01461887	Unit 3 Accessible Mechanical Snubber Inspection

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**<< Model Work Orders >>**

01875336	Unit 3 Handstroke Mechanical Snubbers, Every Odd Outage
01839515	Unit 3 Handstroke Mechanical Snubbers, Every Even Outage
01759793	Unit 3 Handstroke Mechanical Snubbers Every Outage
02056100	Unit 3 Handstroke 'BS' & 'SF' Mechanical Snubbers Innage
02055968	Unit 3 Handstroke 'LPI' (53B) Mechanical Snubbers Innage
01466455	Unit 3 Inaccessible Hydraulic Snubber Inspection (Begin)
01466461	Unit 3 Inaccessible Hydraulic Snubber Inspection (End)
01466467	Unit 3 Inaccessible Mechanical Snubber Inspection (Begin)
01759785	Unit 3 Rebuild Hydraulic Snubbers
01913132	2-01A-1401A-H4160, Visually Inspect Snubber Quarterly