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

James A. FitzPatrick Nuclear Power Plant
Renewed Facility Operating License No. NPF-59
NRC Docket No. 50-333

Subject: Submittal of the Snubber Program Plan for the Fifth 10-Year Interval

In accordance with the ASME OM Code-2004 Edition, attached for your information is a copy of the Snubber Program Plan for the James A. FitzPatrick Nuclear Power Plant (JAF), associated with the fifth ten-year IST interval. The new interval began on June 1, 2018 and concludes on September 30, 2027.

There are no regulatory commitments contained within this submittal.

If you have any questions or require additional information, please contact David Neff (267) 533-1132.

Sincerely,

David T. Gudger
Senior Manager - Licensing
Exelon Generation Company, LLC

Attachment: James A. FitzPatrick Nuclear Power Plant Snubber Program Plan for the Fifth 10-Year Interval, SEP-SNB-JAF, Revision 0

cc: Regional Administrator, Region I, USNRC
NRC Senior Resident Inspector - JAF
NRC Project Manager, NRR - JAF
A. L. Peterson, NYSERDA

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

SNUBBER PROGRAM PLAN

For the 5th Ten-Year IST interval, effective June 1, 2018 through September 30, 2027.

REVIEW AND CONCURRENCE SHEET

Program Section Title: Snubber Program

Prepared by: Charles A. Parker Date: 8-8-2018
Responsible Engineer/Signature

Checked by: J. Mansfield Date: 8-9-18
Name/Signature

Concurred by: Keith Schoales Date: 08/09/18
Responsible Supervisor/Signature

REVISION STATUS SHEET

PROGRAM SECTION REVISION SUMMARY	
Revision	**Description of Changes**
0	New issue, replacing ENN-SEP-SNB-010 Rev 3, supplementing ER-AA-330-004, ER-AA-011 and ER-AA-330-010.

TABLE OF CONTENTS

1.0 PURPOSE

This procedure establishes requirements for safety-related Snubbers, both non-ISI and ISI code related, at JAF. The code requirements have been formatted for this procedure and site requirements specified which includes the following:

- Receipt inspection and storage of snubbers
- Periodic examination and testing of snubbers
- The in-service examination and testing intervals, criteria, and data requirements
- Snubber service life monitoring
- Program administration and responsibilities

2.0 SCOPE

This procedure applies to all safety-related Snubbers, ISI and non-ISI.

3.0 REFERENCES

3.1 Performance References

3.1.1 MA-AA-716-040, Control of Portable Measurement and Test Equipment Program

3.1.2 MST-100.01, Snubber Functional Surveillance Test (ISI)*

3.1.3 MST-100.02, Snubber Visual Surveillance Test (ISI)*

3.1.4 MP-100.03, Removal and Installation of Snubbers (ISI)*

3.1.5 MP-102, Bergen-Paterson Hydraulic Snubbers*

3.1.6 [ITS] Technical Requirements Manual (TRM) 3.7.G

3.1.7 ASME OM Code-2004 subsection ISTD “Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Nuclear Power Plants”. Including ASME OMb Code 2006 “Addenda to ASME OM Code 2004, Code for Operation and Maintenance of Nuclear Power Plants”.

3.1.8 ASME Section XI Rules for Inservice Inspection of Nuclear Power Plant Components, 2007 Edition with 2008 Addenda

3.2 Developmental References

3.2.1 JPN-96-051, JAFNPP Docket 50-333, Proposed Changes to the Technical Specifications to Relocate Requirements for Snubbers to Plants Controlled Documents (JPTS-96-001 and JPTS-96-002), dated 11/26/96

3.2.2 JMD-94-347, Snubber Seal Life Evaluation (ACTS #10545, 10549), from A. Halliday to D. Lindsey dated 10/04/94

3.2.3 NRC Generic Letter 90-09, Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions, dated 12/11/90

3.2.4 JPN-92-013, Proposed Change to the Technical Specifications Snubber Visual Inspection Schedule (JPTS-91-011), Revision 1 to Reflect Guidance on Generic Letter 90-09, from NYPA to NRC, dated 3/11/92

3.2.5 Letter from R. Fandetti, Lisega to "All LUG (Lisega Users Group) Members Plants", dated 8/1/01, for Lisega seal life

3.2.6 JMD-97-369, Clarification of ASME Section XI-1989, OMa-1988 Part 4, Snubber Requirements, dated 11/25/97

3.2.7 JAFP-98-0135, Relocation of Operability and Surveillance Requirements from the Technical Specifications to Authority Controlled Procedures per Proposed Amendments (JPTS-96-001 and 96-002)

3.2.8 Docket No. 50-333, James A. Fitzpatrick Nuclear Power Plant Amended Facility Operating License, Appendix C

3.2.9 ER-JAF-06-24089, Evaluate the acceptability of using WYLE Report 17163-01 as justification for PM frequency change

3.2.10 Condition Report CR-JAF-2002-01032 ISI Snubber Functional Testing Failure was not tracked with ASME Repair/Replacement Planner

3.2.11 ASME Code Case OMN-13, Performance based requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants

3.2.12 Regulatory Guide 1.192, Operation and Maintenance Code Case Acceptability, ASME OM Code

3.2.13 EC-62220 and EC-61084 addressing Snubber Service Life on BP Hydraulic Snubbers

4.0 DEFINITIONS

4.1 **Examination** - The performance of visual observation to detect impaired functional ability due to physical damage, leakage, corrosion or degradation from environmental or operating conditions. The act of performing a second check of component status separately from the initial verification, the independent verifier shall not be involved with and shall not witness the installation. Independent verification shall be conducted in a manner such that each check constitutes an actual identification of the component and determination of both the required and actual position. To be independent, the interaction between personnel performing the first and

second check does not occur. Physical separation of personnel is not required, but should be maintained.

4.2 **Examination Group** - A composition of snubbers which have been selected to be examined.

4.3 **Group-Snubber** - Two snubber groups are defined, accessible or inaccessible.

4.4 **Defined Test Plan Group (DTPG)** - A population of snubbers selected for testing in accordance with the 10% testing sample plan.

4.5 **Kip** - The force unit frequently used in describing snubber sizes. 1 kip = 1000 pounds force.

4.6 **Load Rating** - The design load of the snubber as established by the manufacturer.

4.7 **Lockup (or Activation) Rate** - The shaft velocity or acceleration at which the snubber effectively becomes a restraint for dynamic load.

4.8 **Maintenance** - Action taken to repair deficiencies in the function of a snubber.

4.9 **Maintenance, Repair, Installation Induced Failures** - Failures which result from damage during maintenance, repair, or installation activities, the nature of which lends to other snubbers to be suspect.

4.10 **Repair** - Action taken to correct deficiencies in the function of a snubber.

4.11 **Type-Snubber** - Two snubber types are defined, mechanical or hydraulic.

4.12 **Test Temperature** - The temperature of the snubber at the time of the test.

4.13 **Unexplained Failure** - A failure that cannot be categorized as design/manufacturing, maintenance/repair/installation, and application induced, or isolated. This includes all failures for which the cause of failure cannot be determined.

5.0 RESPONSIBILITIES

5.1 Operations Department (OPS)

5.1.1 Establish proper plant conditions to facilitate periodic inspection of snubbers.

5.1.2 Take action as required per the Snubber Operability and Time Requirements for Evaluation section (listed below) to declare a system inoperable when notified in the event a safety-related snubber fails while in service or during surveillance testing (TRM 3.7.G).

5.2 Maintenance Department

5.2.1 Provide a suitable facility for snubber maintenance and testing.

5.2.2 Perform inspections, testing, and preventive and corrective maintenance on plant snubbers.

5.2.3 Review and update, as necessary, maintenance procedures for snubber examination, testing, and maintenance.

5.2.4 Review and approve vendor procedures for functional testing of snubbers to ensure the intent of the snubber program is not violated.

5.2.5 Initiate an IR when a safety-related snubber fails a requirement

5.2.6 Perform visual examinations of non-ISI Snubbers per MST-100.02.

5.3 Training Department

5.3.1 Assist the Maintenance Department in developing and providing snubber training.

5.4 Radiation Protection Department (RP)

5.4.1 Support the Maintenance Department during job planning so exposures will be minimized.

5.4.2 Identify problem areas resulting in unnecessary exposure and implementing corrective actions.

5.5 Design and Programs Engineering Departments

5.5.1 Designate a snubber program engineer.

5.5.2 Assist the snubber program engineer with the evaluation to demonstrate operability of equipment associated with failed snubbers including cause investigations in accordance with the time limits of this procedure.

5.6 NDE

5.6.1 Perform VT-3 exam for ISI snubber replacements in accordance with MP-100.03 and applicable NDE Procedure.

5.6.2 Perform visual examinations (VT-3 exam) of ISI snubbers per MST-100.02 and applicable NDE Procedure.

5.7 Snubber Program Engineer

5.7.1 Perform, or request Design & Programs Engineering Department, or, contract an evaluation to demonstrate operability of equipment associated with failed snubbers including causal investigations within the time limits of this procedure.

5.7.2 Review the program results and evaluate the program effectiveness to improve snubber performance and reliability.

5.7.3 Develop snubber history summaries.

5.7.4 Ensure that snubbers added, deleted, or changed by modifications are reflected in the snubber program.

5.7.5 Ensure adequate spare snubbers are ready for service to support in-service examination and operability testing.

5.7.6 Ensure that the ISI Engineer is provided with information regarding functional test failures.

5.8 Maintenance Administrative Specialist

5.8.1 Update snubber inspection history records in work orders as directed by the snubber program engineer.

5.9 Maintenance Planner

5.9.1 Plan snubber work so radiation exposure will be minimized.

5.9.2 Ensure adequate supply of spare parts to support snubber maintenance and generally assist the snubber program engineer with directing the implementation and operation of the snubber program.

5.10 Maintenance Calibration Coordinator

5.10.1 Plan and schedule calibration of testing equipment.

5.11 ISI Engineering

5.11.1 Review and forward snubber failure information from the Snubber Program Engineer to the Owner's Activity Report.

6.0 ADMINISTRATIVE CONTROLS

6.1 Interpretation Contact

The Manager, Program Engineering, is the focal point for implementation, control, and interpretations of this program.

7.0 PROGRAM DESCRIPTION

7.1 Program Overview

7.1.1 Receipt of New Snubbers

The snubber engineer shall assign a JAF number to each new snubber and provide for the snubber to be so marked when the snubber enters the snubber program

7.1.2 Storage of Snubbers

Snubbers shall be protected from exposure to rain, dirt and other airborne contaminants. The requirements of ANSI Standard N45.2.2, Level C shall be invoked as applicable.

7.2 General Program Requirements

ER-AA-330-010 Snubber Functional Testing
ER-AA-330-004 Visual Examination of Snubber
ER-AA-330-011 Snubber Service Life Monitoring

7.3 Plant Operational Requirements (Pre-service)

7.3.1 Pre-service Examination Requirements

Pre-service examination shall be made on all safety-related snubbers after installation. Inspections are performed per MP-100.03 or MST-100.02; additionally applicable NDE procedures shall be used for ISI Snubbers. QA personnel shall perform PSI VT-3 exam for ISI Snubbers. The initial examination shall, as a minimum, verify that:

NOTE: Examination boundaries shall include the snubber assembly from pin to pin, inclusive.

a. There are no visible signs of damage or impaired operability as a result of storage, handling, or installation.

b. The snubber load rating, location, orientation, position setting, and configuration (attachments, extensions, etc.) are in accordance with design drawings and specifications. Installation records (based on physical inspections) verifying the snubbers were installed according to design drawings and specifications shall be acceptable in meeting this requirement.

c. Adequate swing clearance is provided to allow snubber movement.

d. If applicable, fluid is at the recommended level and fluid is not leaking from the snubber system.

e. Structural connections such as pins, bearings, studs, fasteners, and other connecting hardware such as lock nuts, tabs, wire, and cotter pins are installed correctly.

f. If the period between the pre-service examination and initial system preoperational tests exceeds 6 months, reexamination shall be performed.

7.3.2 Pre-service Examination Corrective Action

a. Snubbers which are installed incorrectly or otherwise fail to meet the Pre-service Examination requirements shall be installed correctly, adjusted, repaired, replaced, or evaluated by engineering to be acceptable.

b. The corrected, adjusted, repaired, or replacement snubber shall be examined in accordance with the Pre-service Examination and shall meet the requirements therein. Additionally, replacement snubbers shall meet the requirements of Pre-service Operational Testing requirements.

7.3.3 Pre-service Thermal Movement Examination Requirements

a. Pre-service thermal movement examination is only required for new snubber installations (i.e. completely new support) or extensively modified snubbers (i.e. relocation of base plate, snubber configuration change, etc.).

b. During initial system heat up and cool down, snubber thermal movement for systems whose design operating temperature exceeds 250°F (121°C) shall be verified as follows:

1. Record the thermal movement during initial system heat up and cool down at specified temperature plateaus.

2. Verify that snubber movement during the thermal movement examination is within the design specified range.

3. Any discrepancies or inconsistencies shall be evaluated to determine the movement acceptability prior to proceeding to the next specified plateau.

4. The total thermal movement from cold to hot at full operating temperature shall be recorded. This value may be measured directly if maximum operating temperature was attained, or extrapolated from lower temperature readings. The cold or hot position setting shall be evaluated and adjusted if necessary to ensure adequate snubber clearance from fully extended or retracted positions.

5. Verify there is swing clearance at specified heat up and cool down plateaus.

7.4 Snubber Categorization

7.4.1 Snubber Categorization - For the purposes of examination, snubbers are categorized as accessible and inaccessible and shall be treated independently. The Snubber Program Engineer will maintain a list of all accessible and inaccessible snubbers.

7.4.2 For in-service operability testing, snubbers are categorized as:

- Small Bore Bergen-Paterson hydraulic snubbers
- Medium Bore Bergen-Paterson hydraulic snubbers
- Large Bore Bergen-Paterson hydraulic snubbers
- Lisega hydraulic snubbers
- Pacific Scientific mechanical snubbers

7.4.3 Number of Safety-related snubbers installed:

- Small Bore Bergen-Paterson hydraulic snubbers – 119
- Medium Bore Bergen-Paterson hydraulic snubbers – 55
- Large Bore Bergen-Paterson hydraulic snubbers – 38
- Pacific Scientific snubbers – 15
- Lisega hydraulic snubbers – 4

7.5 Snubber and Location Identifiers

7.5.1 A list of individual snubbers and related systems with detailed information of the installed location and snubber design characteristics is provided in SnubbWorks®. Detailed unique identifiers have been assigned to both snubbers (component number) and location (exam number).

7.6 Visual Examination Program

7.6.1 Examination Requirements (Visual Inspection) - Visual examination for operational readiness is required of snubbers, with the number of snubbers and the frequency of reexamination being determined by the number of unacceptable snubbers within a group.

7.6.2 In-service Examinations Requirements

a. In-service Examination for safety-related snubbers shall be a visual examination for impaired functional ability due to physical damage, leakage, corrosion, or degradation from environmental exposure or operating conditions. The visual examination is performed in accordance with MST-100.02; additionally applicable NDE procedures shall be used for ISI Snubbers. NDE personnel shall perform PSI VT-3 exam for ISI Snubbers. The in-service examination of accessible and inaccessible snubbers is performed per work orders, additionally for ISI Snubbers for the ISI program applies.

b. The snubber installation must meet all of the following requirements:

NOTE: Parallel and multiple installations shall be identified and counted individually.

1. Snubbers shall be installed so they are capable of restraining movement when activated. Visual observation of loose fasteners, deformed members, or detection of disconnected components requires identification. Snubbers evaluated to be incapable of restraining movement shall be classified unacceptable.

2. Snubbers shall be installed in such condition that they do not restrict the thermal movement to the extent that unacceptable overstressing could develop in the pipe or other equipment. The installation is designed to protect or restrain. **IF** no indication of binding, misalignment, or deformation is observed, **THEN** the provisions of this requirement are considered to have been satisfied.

3. Design-specific characteristics required for the actuation of the snubber shall be visually verified.

4. Fluid supply or content for hydraulic snubbers shall be observed.

5. Observation that the fluid level is equal to or greater than the minimum amount which is sufficient for actuation at its operating extension is considered to satisfy the provisions of this requirement for hydraulic snubbers.

6. If the fluid is less than the minimum amount, the installation is to be identified as unacceptable; unless a test is performed establishing that performance of the snubber is within specified limits.

7. Tests on snubbers with low fluid levels shall be performed in accordance with MST-100.01. The initial test shall start with the piston at the as-found setting and be performed in the extension (tension) direction.

8. Visual examination discrepancies which indicate potential impaired operability of the snubber(s) may be resolved in accordance with the requirements of Pre-service Examination and Operational Testing Evaluations.

9. If a snubber is scheduled for visual examination and removal for any reason (in-service testing, seal life, repairs, etc.) is required, then visual examination shall be performed before the snubber is removed.

10. Attachment 2 lists items which should be included in the examination.

7.6.3 In-service Examination Frequency

a. Examination Frequency is based on the number of inoperable snubbers from the previous inspection, and on the length of the previous interval (I). The basic interval shall be the normal fuel cycle up to 24 months. When evaluations in accordance with In-service Operational Testing Failure Evaluation reveal the existence of inoperable snubber(s),

refer to Attachment 1 to determine future interval. ASME Code Case OMN-13 extends this interval to 10 years.

b. This examination interval may vary in time by plus or minus 25 percent to coincide with planned outages, and the new interval shall be based on the new examination results.

c. Examinations may be performed at an interval less than 75 percent of the stated interval and shall be used as a new reference point to determine the next inspection. However, those examination results shall not be used to permit a longer interval than that which applied before the examination was performed.

d. Any examination whose results require a shorter examination interval will override the previous interval.

e. The examination interval applies separately to each examination group (accessible or inaccessible).

f. The examination interval shall be controlled under the provisions of Preventive Maintenance Process in Passport.

7.6.4 In-service Examination Sample Size

a. The in-service examination sample size shall be all (100 percent) safety-related Snubbers, non-ISI and ISI, in a particular group (accessible or inaccessible).

NOTE: Fractional sample sizes shall be rounded up to the next integer.

7.6.5 In-service Examination Failure Evaluation

a. Snubbers which do not meet the examination acceptance criteria shall be evaluated to determine the cause of the unacceptable condition and documented through the Corrective Action Program.

b. Functional Test Evaluation - The snubber(s) that is found to be unacceptable as a result of in-service examination may be tested in accordance with the requirements of In-service Operational Testing Failure Evaluation provided that testing can resolve the unacceptable condition. Results which satisfy the operability test criteria may be used to disposition the snubber(s) as acceptable.

7.6.6 Visual In-service Examination Failure Mode Groups (FMGs)

Unacceptable snubbers shall be categorized into examination failure mode groups.

a. An examination failure mode group shall include all unacceptable snubbers which have a given failure and all other snubbers subject to the same failure, except as permitted to be considered separately per Snubber Categorization.

b. The examination failure mode groups shall be distinct for examination purposes from any testing failure mode groups.

c. The following examination failure mode groups shall be used:

- design/manufacturing
- application induced
- maintenance/repair/installation
- isolated
- unexplained
- transient dynamic event

7.6.7 Examination Failure Mode Group Boundaries

Once an examination failure mode group has been established, any snubber(s) in that group will not be part of the examination group(s) from which the snubber originated unless an evaluation shows more than one failure mode. The new examination failure mode group will remain as defined until

a. The examination failure mode group has reached the maximum time interval allowed; or

b. Replacement/modification action provides an examination failure mode group with all acceptable snubbers.

7.6.8 Snubbers in More Than One Failure Group

a. In the event a snubber(s) is included in more than one examination failure mode group, it shall be counted in each of those FMGs and shall be included in a corrective action for each of those FMGs.

b. Unacceptable Snubbers in More Than One Failure Group

Any snubber(s) which is included as unacceptable in more than one failure mode group shall be counted for scheduling purposes in each of these failure mode groups.

7.6.9 In-service Examination Corrective Action and Impact on Examination Frequency

a. Snubbers which have been found unacceptable by the visual acceptance criteria and have been failure evaluated shall be subject to the failure mode corrective action(s) including impact on subsequent examination schedule.

b. Design/Manufacturing, Maintenance/Repair/Installation, or Application Induced Failure Mode Group Corrective Action

1. All snubbers in the examination failure mode group shall be replaced/modified. The replacement/modified snubber shall be reclassified as acceptable. A Pre-Service examination shall be completed; OR

2. All unacceptable snubbers in the examination failure mode group shall be replaced or repaired to the original qualified condition and shall determine the examination schedule for this examination failure mode group in accordance with In-service Examination ISI Frequency; OR

3. All unacceptable snubbers in the APPLICATION INDUCED FAILURE MODE GROUP shall be replaced/repaired. All snubbers in this group shall be re-categorized as acceptable for examination frequency purposes, provided the environment or applications are compatible with the design parameters of the examination failure mode group snubber(s).

7.6.10 Isolated Failure Mode Corrective Action

All unacceptable snubbers in this examination failure mode group shall be replaced or repaired to an acceptable condition and re-categorized as acceptable for examination frequency purposes.

7.6.11 Unexplained Failure Mode Corrective Action

All unacceptable snubbers in this examination failure mode group shall be replaced/repaired to an acceptable condition and shall determine the examination schedule for this examination failure mode group.

7.6.12 Deletions of Unacceptable Snubbers

Snubbers may be deleted based on analysis of the affected piping system. When unacceptable snubbers are deleted, the remaining snubbers in the examination failure mode group shall be subject to corrective action, and the number of unacceptable deleted snubbers shall also be used in determining the next examination interval.

7.6.13 Supported Component(s)/System Evaluation

System(s) of which an unacceptable snubber is part shall be considered inoperable if the snubber is not returned to an acceptable condition within the time frame specified by Snubber Operability and Time Requirement for Evaluation section. An evaluation shall be performed for possible damage to the supported system or component.

7.7 Operational Readiness Testing Program

Functional Testing Requirements - Operability tests are required to be performed on representative samples of snubbers at specific intervals. For each snubber determined to be unacceptable from the operability testing, an additional sample lot of snubbers shall be tested.

NOTE: Snubber testing may begin no earlier than 60 days before a scheduled refueling outage.

7.7.1 Pre-service Operability Testing

Pre-service operability testing shall be performed on all safety-related snubbers per MST-100.01 or approved vendor procedures. Testing may be at the manufacturer or another approved vendor facilities, provided the test procedure is reviewed and approved by the Snubber Program Engineer. The testing shall verify that:

a. The force that will initiate motion (breakaway force) and the force that will maintain low velocity displacement (drag force), are within specified limits in tension and compression for mechanical and hydraulic snubbers.

b. Activation is within the specified range of velocity or acceleration in tension and compression.

c. Release rate, where applicable, is within the specified range in tension and compression. For units specifically required not to displace under continuous load, the ability of the snubber to withstand load without displacement shall be demonstrated

d. Operability Testing Loads - Snubbers shall be tested at a load sufficient to verify the operating parameters. Testing at less than rated load must be correlated to operability parameters at rated load.

NOTE: Differences may exist between installed operating conditions and conditions under which snubber is tested. In such cases, correction factors shall be established and test results shall be correlated to operating conditions, as appropriate.

e. Pre-service Operability Testing Failures -Snubbers that fail the preservice operability test shall be evaluated for the cause(s) of failure(s). If a design deficiency in the snubber is found, it shall be corrected. Modified, repaired, or replacement snubbers shall be tested per Pre-service Operability Testing requirements.

7.7.2 In-service Operability Testing

In-service operability tests of safety-related snubbers shall be performed in accordance with MST-100.01 or per vendor procedure approved by the Snubber Program Engineer. Operability testing of snubbers shall be performed to verify the following:

a. The force that will initiate motion (breakaway force), and the force that will maintain low velocity displacement (drag force), is within specified limits in tension and compression.

b. Activation is within the specified range of velocity or acceleration in tension and compression (for mechanical and hydraulic snubbers).

c. Release rate, where applicable, is within the specified range in tension and compression. For units specifically required not to displace under continuous load, the ability of the snubber to withstand load without displacement shall be demonstrated.

d. Operability Testing Loads -Snubbers shall be tested at a load sufficient to verify the operating parameters. Testing at less than rated load must be correlated to operability parameters at rated load.

NOTE: Differences may exist between installed operating conditions and conditions under which a snubber is tested. In such cases, correction factors shall be established and test results shall be correlated to operating conditions, as appropriate.

e. In-service Operability Testing Frequency - Testing of safety-related Snubbers, ISI and non-ISI, shall take place at least every refueling outage using a sample of snubbers in the facility.

7.7.3 In-service Operability Testing Sample Plans

a. The in-service testing sample shall be selected using the 10% sample plan.

b. The testing samples for a given test interval shall be based on the following criteria: Initial Sample Test Lots - Representative/Random Sampling for the first sample lot tested, 10% of the safety-related snubbers in the general population shall be selected. As far as practical, this sample selected for testing shall include the various designs, configurations, operating environments, range of sizes, and capacity of snubbers, etc. The first sample lots tested shall be a composite based on the ratio of each particular category (manufacturer type) to the total number of snubbers installed in the plant. Sample lot selection from the representative categories of snubbers shall be random.

For example: 10% of each snubber type is to be tested.

- 12 Small Bergen-Paterson hydraulic snubbers
- 6 Medium Bergen-Paterson hydraulic snubbers
- 4 Large Bergen-Paterson hydraulic snubbers
- 2 Pacific Scientific mechanical snubbers
- 1 Lisega hydraulic snubber

NOTE: Selection of Snubbers for 10% functional testing is based on location, not on snubber serial number.

c. Additional test(s) Lots - Results of Unacceptable Snubbers in the Same Test Interval

For any snubber(s) determined to be unacceptable after an engineering evaluation has been completed as a result of testing discrepancies, an additional sample of at least one-half the size of the initial sample lot for that type of snubber shall be tested until the mathematical expressions below are satisfied, or all snubbers in the Defined Test Plan Group (DTPG) or Failure Mode Group (FMG) have been tested.

For each DTPG,

$N > 0.1n + C(0.1n / 2)$

where

N = total number of snubbers tested that were selected from the DTPG

n = number of snubbers in DTPG

C = total number of unacceptable snubbers found in the DTPG (excluding those counted for FMG tests)

For each FMG,

$NF > CF (0.1n / 2)$

where

NF = all snubbers selected and tested from the FMG after FMG was established from the DTPG

CF = 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 DTPG

d. Additional Test Lots Composition in the Same Test Interval. When an unacceptable snubber has not been assigned to an FMG, the additional sample shall be taken from the DTPG.

e. As far as practical, the additional samples shall include:

- Snubbers of the same manufacturer's design
- Snubbers immediately adjacent to those found unacceptable
- Snubbers from the same piping system
- From other piping systems, snubbers that have similar operating conditions such as temperature, humidity, vibration, and radiation.
- Snubbers which are previously untested

f. Subsequent Test Intervals - Sample Selection Criteria - For subsequent in-service testing intervals, each representative sample shall be selected from previously untested snubbers.

When all snubbers have been selected for testing, then any additional required sampling lots shall be selected in accordance with above listed paragraph.

g. In-service Operability Testing Failure Evaluation

Failure Evaluation Requirements - Snubbers that do not meet the operability testing acceptance criteria shall be evaluated to determine the cause of failure. A Condition Report shall be initiated to document the unacceptable condition.

7.7.4 Operational Readiness Testing Failure Mode Groups (FMGs)

Unacceptable snubbers shall be categorized into failure mode groups.

a. A test failure mode group shall include all unacceptable snubbers which have a given failure and all other snubbers subject to the same failure, except as permitted to be considered separately per Snubber Categorization.

b. The test failure mode groups shall be distinct for examination purposes from any testing failure mode groups.

c. The following test failure mode groups shall be used:

- design/manufacturing
- application induced
- maintenance/repair/installation
- isolated
- unexplained
- transient dynamic event

7.7.5 Test Failure Mode Group Boundaries

Once an examination failure mode group has been established, any snubber(s) in that group will not be part of the test group(s) from which the snubber originated unless an evaluation shows more than one failure mode. The new test failure mode group will remain as defined until:

a. The test failure mode group has reached the maximum time interval allowed; or

b. Replacement/modification action provides a test failure mode group with all acceptable snubbers.

7.7.6 Snubbers in More than One Failure Group

a. In the event a snubber(s) is included in more than one test failure mode group, it shall be counted in each of those FMGs and shall be included in a corrective action for each of those FMGs.

b. Unacceptable Snubbers in More than One Failure Group

Any snubber(s) which is included as unacceptable in more than one failure mode group shall be counted for scheduling purposes in each of these failure mode groups.

7.7.7 Operational Readiness Testing Corrective Action and Impact on Continued Testing

a. Snubbers which have been found unacceptable by the test acceptance criteria and have been failure evaluated shall be subject to the failure mode corrective action(s) with its indicated impact on continued testing.

b. The 10% Testing Sample Plan Corrective Action from Design/Manufacturing, Maintenance/Repair/Installation, or Application Induced Failure Mode Groups:

1. All snubbers in the test failure mode group shall be replaced/modified. The replacement/modified snubber shall be reclassified as acceptable. A Pre-service examination shall be completed; OR

2. All unacceptable snubbers in the test failure mode group shall be replaced or repaired to the original qualified condition and the number of unacceptable snubber(s) shall determine the additional testing lots previously defined.; OR

3. All unacceptable snubbers in the APPLICATION INDUCED FAILURE MODE GROUP shall be replaced/repaired. Provided the environment or application and the design parameters of the test failure mode group snubber(s) are made compatible, all snubbers in this group shall be re-categorized as acceptable and the repaired/replacement snubbers are not counted for the purpose of determining the number of additional sample lots.

7.7.8 Isolated Failure Mode Corrective Action

All unacceptable snubbers in this test failure mode group shall be replaced/repaired to an acceptable condition and dispositioned as acceptable, and replacement/repaired snubbers are not counted for the purpose of determining the number of additional sample lots.

7.7.9 Unexplained Failure Mode Corrective Action

All unacceptable snubbers in this test failure mode group shall be replaced/repaired to an acceptable condition. The number of unacceptable snubber(s) shall determine the additional testing lots.

7.7.10 Deletions of Unacceptable Snubbers

Snubbers may be deleted based on analysis of the affected piping system. When unacceptable snubbers are deleted, the remaining snubbers in the test failure mode group shall be subject to corrective action, and the number of unacceptable deleted snubbers shall also be used in determining the next examination interval.

7.7.11 Supported Component(s)/System Evaluation

System(s) of which an unacceptable snubber is part shall be considered inoperable if the snubber is not returned to an acceptable condition within the time frame specified by Snubber Operability and Time Requirement for Evaluation, (section 7.8). An evaluation shall be performed for possible damage to the supported system or component.

7.7.12 In-service Operability Testing Methods

a. Testing shall be performed on the snubbers in their as-found condition to the fullest extent practical regarding the features to be tested.

b. Test methods employed must not alter the condition of the snubber to the extent the results are not representative of the parameters prior to the test.

c. In-service operability testing may be accomplished with the snubber installed in its permanent location by using approved test methods and equipment.

d. Snubbers may be removed and bench tested in accordance with approved test procedures. After reinstallation, the snubber shall meet the requirements of Per-service Examination Requirements.

e. Where the physical size of the snubber, test equipment limitations, or inaccessibility of location prevent the use of methods in steps C and D above, the snubber subcomponents shall be examined and tested in accordance with approved procedures. Reassembly of individual components must be in accordance with approved procedures.

f. Testing methods may be used which measure parameters indirectly or parameters other than those specified if those results can be correlated to specified parameters through established methods.

7.8 Snubber Operability and Time Requirements for Evaluations

7.8.1 During all modes of operation except cold shutdown and refueling, all snubbers that are required to protect the primary containment coolant system or any other safety related system or component shall be operable. During Cold Shutdown or Refueling mode of operation, only those snubbers shall be operable which are on systems that are required to be operable in these modes.

7.8.2 With one or more snubbers inoperable, within 72 hours during normal operation, or within 7 days during Cold Shutdown or Refueling mode of operation for systems which are required to be operable in these modes, complete one of the following:

a. Replace or restore the inoperable snubber(s) to operable status, OR

b. Declare the supported system inoperable and follow the appropriate limiting condition for operation statement for that system, OR

c. Perform an engineering evaluation to show the inoperable snubber is unnecessary to assure operability of the system or to meet the design criteria of the system, and remove the snubber from the system.

d. With one or more snubbers found inoperable, within 72 hours perform a visual inspection of the supported component(s) associated with the inoperable snubber(s) and document the results.

7.8.3 For all modes of operation, except Cold Shutdown and Refueling, within 14 days complete an engineering evaluation to ensure the inoperable snubber(s) has not adversely affected the supported component(s). For Cold Shutdown or Refueling mode, this evaluation shall be completed within 30 days.

7.9 Snubber Service Life Monitoring / Replacement Program

NOTE: The records are uncontrolled documents. Initial Snubber service life shall be predicted based on manufacturer's recommendation or design review.

7.9.1 A record of the service life of each snubber, whose failure could adversely affect the primary coolant or other safety-related system, including the date at which the designated service life commences, and the installation and maintenance records on which the designated service life is based shall be maintained.

7.9.2 The designated service life for Bergen-Paterson hydraulic snubbers is 16.9 years from the date of the rebuilding of a snubber in accordance with MP-102. For "new snubbers", snubbers new from the Warehouse or "DTO" from the manufacturer, the service life is 16.9 years from the date of the new functional test at FitzPatrick. The functional test constitutes the end of shelf life and the beginning of service life.

EC-62220 documented the Bergen-Paterson service life evaluation done by Lake Engineering and EC-61084 concluded that extending the service life for 10 and 20KIP snubbers to 17 years is acceptable. Service life intervals for other Bergen-Paterson snubbers remain at 16.9 years.

7.9.3 The designated service life for Lisega hydraulic snubbers is 21 years.

7.9.4 The designated service life for mechanical snubbers is 40 years from the date of installation.

7.9.5 At least once per operating cycle (increased or decreased, if warranted), the installation and maintenance records for each installed snubber whose failure could adversely affect the primary coolant or other safety-related system, shall be reviewed to verify the designated service life has not been exceeded or will not be exceeded prior to the next scheduled snubber service life review. Spare snubbers, usually located in the snubber cage, shall also be reviewed to ensure they are not installed in the plant with inadequate service life remaining. This review shall be documented by a work request issued for this purpose and completed prior to startup from each refueling outage.

7.9.6 **IF** the indicated service life of a snubber installed in the plant will be exceeded prior to the next scheduled snubber service life review, **THEN** the snubber service life shall be re-evaluated or the snubber shall be replaced or refurbished, in accordance with section 7.10.3, to extend its service life beyond the date of the next scheduled service life review. This re-evaluation, refurbishment or replacement shall be indicated in the maintenance history records.

7.9.7 Periodically the snubber engineer shall re-evaluate or contract a re-evaluation of the groups and types of snubbers according to their respective environments. The re-evaluation may shorten or lengthen the service life for group(s) and/or type(s) of snubbers.

7.9.8 If testing is conducted specifically for service life monitoring purposes, the results of such testing do not require testing of additional snubbers, but shall be evaluated for appropriate corrective actions.

7.9.9 Root causes for any examination or testing failures shall be determined and considered in establishing or re-establishing service life.

7.10 Maintenance

7.10.1 Overhaul and Refurbishment

a. Overhaul and refurbishment of Bergen-Paterson hydraulic snubbers to determine cause of failure or for service life considerations shall be performed in accordance with MP-102, CEP-RR-001 and CEP-RR-002.

b. Overhaul and refurbishment of mechanical snubbers to determine cause of failure shall be performed by vendor in accordance with the manufacturer's instructions.

c. Overhaul and refurbishment of Lisega hydraulic snubbers to determine cause of failure or for service life considerations shall be performed by vendor in accordance with manufacturer's instructions.

d. Disassembly of Mechanical or Lisega Hydraulic snubbers to determine the cause of failure shall be performed in accordance with the manufacturer's instructions.

7.10.2 Snubber Maintenance or Repair:

a. Maintenance or repair activities which can alter the snubbers intended function shall be evaluated by considering the effects of the maintenance or repair on the snubber's ability to meet the examination criteria specified in the In-service and Operational Testing sections previously listed.

b. Maintenance or repair activities that affect the ability of the snubber to satisfy its intended function shall be completed in accordance with CEP-RR-001 and CEP-RR-002, for ISI snubbers.

c. Snubber removal and installation is performed in accordance with MP-100.03, additionally CEP-RR-001 and CEP-RR-002 applies to ISI snubbers.

7.10.3 Snubber modification and replacement:

a. Replacement/modified snubbers shall have a proven suitability for its application and environment.

b. Replacement or modified snubbers shall be examined and tested in accordance with written procedures. The applicable requirements of Pre-service, In-service and Operational testing sections previously listed shall be included in these procedures. Additionally CEP-RR-001 and CEP-RR-002 applies to ISI snubbers.

c. The examination and test requirements selected shall meet the Pre-service, In-service and Operational testing performance limits.

d. Snubber removal and installation is performed in accordance with MP-100.03, additionally, CEP-RR-001 and CEP-RR-002 applies to ISI snubbers.

8.0 EQUIPMENT & PERSONNEL REQUIREMENTS

8.1 Instrumentation and Test Equipment Calibration

a. Instruments and test equipment used in performing the examination and testing program shall be calibrated and controlled in accordance with MA-AA-716-040 or a vendor's program found acceptable by Exelon's QA program.

b. Instrumentation and test equipment used to verify the performance of the snubber shall have the range and accuracy necessary to demonstrate conformance to specific examination or test requirements.

8.2 Training and Personnel Qualifications

a. Personnel who are required to witness or perform examinations, or evaluate examination results shall be qualified in accordance with ASME Section XI 2007 Edition including 2008 Addenda, Article IWF-5000.

b. Other personnel performing visual examinations on safety-related non-ISI snubbers shall meet the requirements described in CEP-NDE-0100 for snubber visual inspections and testing.

9.0 DATABASE MANAGEMENT

9.1 A list of individual snubbers and related systems with detailed information of the installed location and snubber design characteristics is provided in SnubbWorks®. Detailed unique identifiers have been assigned to both snubbers (component number) and location (exam number).

NOTE: The documents listed below are uncontrolled.

9.2 Electronic databases may be used exist for snubber records and are maintained by the Snubber Engineer. SnubbWorks® is the controlled location of installed serialized snubber locations. The electronic database may contain the following suggested information:

- Snubber location by Asset Suite Component ID
- Current assigned Snubber S/N
- Installation Work Order and reason for installation (Test, Seal Life, etc.)
- Seal Life Expiration date
- Miscellaneous data, Size, Manufacturer, Rebuild / Test Work Order

9.3 Functional test results are kept as part of the Work Order history, in SnubbWorks®, and as part of the electronic database.

ATTACHMENTS

1. Attachment 1 - SNUBBER VISUAL EXAMINATION TABLE
2. Attachment 2 - EXAMINATION CHECKLIST ITEMS
3. Attachment 3 - FLOWCHART FOR 10% SNUBBER TESTING PLAN (ASME OM CODE 2001 NON-MANDATORY APPENDIX E)
4. Attachment 4 - Defined Test Plan Group (DTPG)

ATTACHMENT 1

VISUAL EXAMINATION TABLE (*taken from Table ISTD 4252-1*) Page 1 of 1

Number of Unacceptable Snubbers

Population or Category [Note (1)]	Column A for Extended Interval [Notes (2),(3),(7)]	Column B for Interval Same as Previous [Notes (2),(4),(5)]	Column C for Interval Reduction to 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 + 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.

(7)Code Case OMN-13 allows extension of the inspection interval to 10 years.

ATTACHMENT 2

EXAMINATION CHECKLIST ITEMS Page 1 of 1

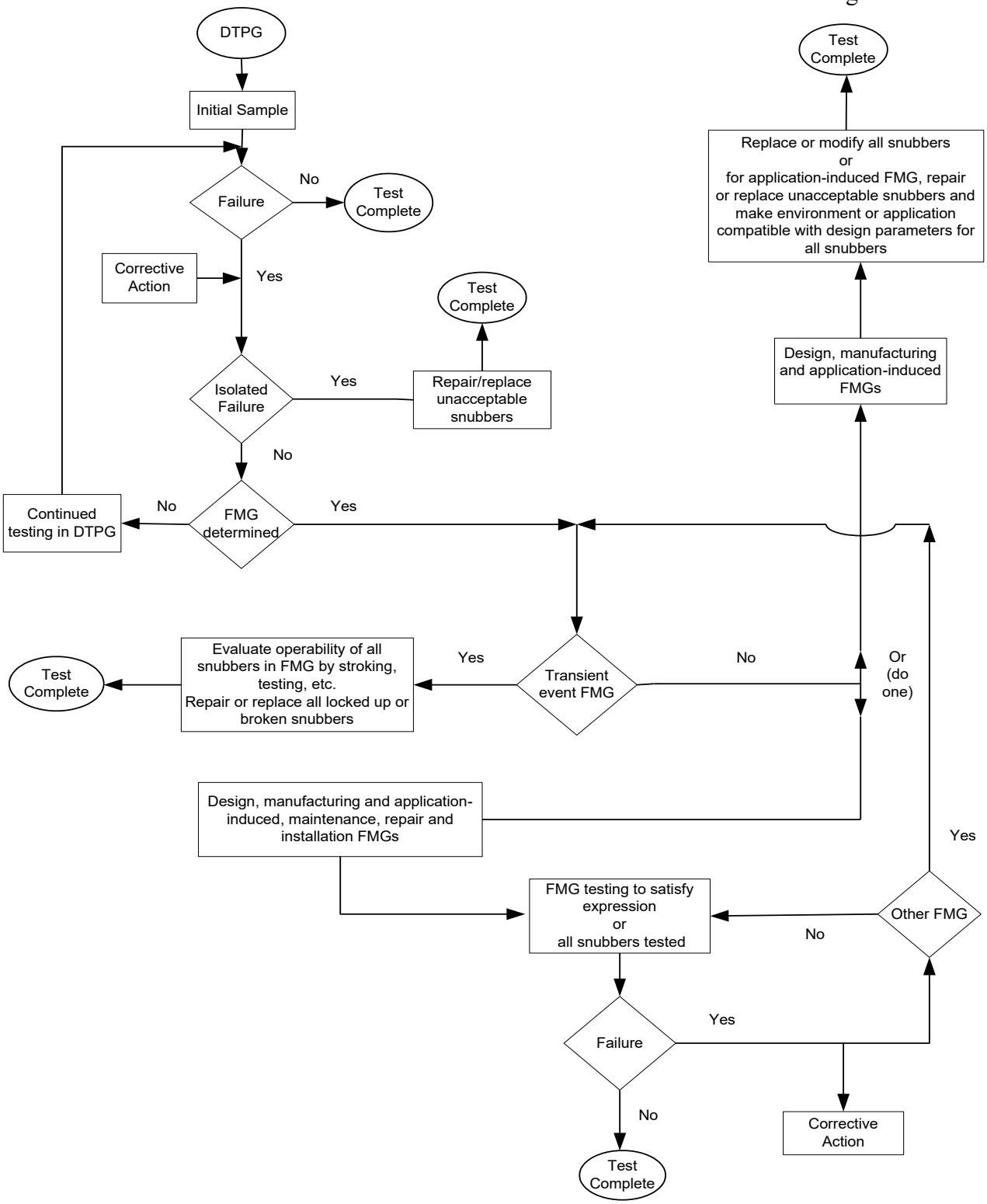
Listed below are examples of items normally included in a checklist (depending on snubber type) to verify pre-service and/or in-service inspection requirements:

1. Rotated reservoirs (hydraulic fluid could not reach valve blocks)
2. Piston shaft painted, which could cause a frozen condition
3. Unit installed upside down.
4. Sight glass broken.
5. Installed with preset locking screws for shipment (screws must be removed before service).
6. Hydraulic fluid lines for snubber remote reservoir placed too close to hot pipe causing the lines to burst.
7. Snubber placed in wrong location.
8. Clevis pins not attached to anchor.
9. Snubber not installed at correct piston position.
10. Bent or scored piston rod.
11. Welding arc strikes.
12. Lubrication of pivot points.
13. Abnormal spherical bearing position.
14. Protective coverings or plugs removed (after shipping or maintenance).
15. Fluid level indicators and/or rod position indicators accessible for visual inspection.
16. No visible corrosion or mechanical defects or working parts and surfaces

ATTACHMENT 3

FLOWCHART

Page 1



ATTACHMENT 4

DTPG	Description	Population	**Initial Sample (10%)**	Initial Sample Tested	Initial Sample Failed
1	BP Small Hydraulic	119	12		
2	BP Medium Hydraulic	55	6		
3	BP Large Hydraulic	38	4		
4	PSA 3, 10	15	2		
5	Lisega (30) 44.9KIP	4	1		
Totals		231	25		

DTPG	Description	Expanded Sample Tested	**Expanded Sample Failed**	SLM Info Tested	SLM Info Failed
1	BP Small Hydraulic				
2	BP Medium Hydraulic				
3	BP Large Hydraulic				
4	PSA 3, 10				
5	Lisega (30) 44.9KIP				
Totals					

Testing Period or Outage _____

Testing Start Date _____ Testing End Date _____

DEFINED TEST PLAN GROUP (DTPG)
SERVICE LIFE MONITORING (SLM), INFORMATIONAL TEST (Info)

COMMENTS: _____

_____

_____

_____

DTPG – 1

SIZE DESCRIPTION: BP Small Bore 3 KIP & 10 KIP

03-NE-HS-10	3 KIP
03-NE-HS-11	3 KIP
03-NW-HS-14	3 KIP
03-NW-HS-15	3 KIP
03-SE-HS-8	3 KIP
03-SE-HS-9	3 KIP
03-SW-HS-12	3 KIP
03-SW-HS-13	3 KIP
10-30A-HS-1000	3 KIP
10-30B-HS-1002	3 KIP
10-30B-HS-1003	3 KIP
10-10B-HS-17	3 KIP
10-10B-HS-18	3 KIP
10-39-HS-166A	3 KIP
10-10B-HS-20	3 KIP
12-1-HS-18	3 KIP
10-12A-HS-116	3 KIP
10-12B-HS-141	3 KIP
10-13A-HS-105	3 KIP
12-1-HS-19	3 KIP
12-1-HS-20	3 KIP
12-1-HS-20A	3 KIP
12-1-HS-22	3 KIP
14-9B-HS-34	3 KIP
23-19A-HS-2	3 KIP
23-19-HS-10	3 KIP
23-19-HS-13	3 KIP
23-29-HS-101A	3 KIP
23-34-HS-7	3 KIP
29-R1L-HS-171A	3 KIP
10-39-HS-166	3 KIP
10-9A-HS-39	3 KIP
10-9B-HS-287	3 KIP
10-9B-HS-288	3 KIP
10-9B-HS-5	3 KIP
12-1-HS-23	3 KIP
14-5A-HS-23	3 KIP
14-5A-HS-24	3 KIP
14-5A-HS-25	3 KIP
14-9A-HS-14	3 KIP
14-9B-HS-35	3 KIP
23-19A-HS-4	3 KIP
23-19-HS-15	3 KIP
23-19-HS-17	3 KIP
23-29-HS-101B	3 KIP
29-R1L-HS-171B	3 KIP
10-10A-HS-45	10 KIP
10-10B-HS-19	10 KIP
10-11B-HS-89	10 KIP
10-14B-HS-245A	10 KIP
10-15A-HS-103	10 KIP
10-15A-HS-306	10 KIP
10-15B-HS-119B	10 KIP
10-15B-HS-294	10 KIP
10-17-HS-57	10 KIP
10-2B-HS-161	10 KIP
10-2B-HS-162	10 KIP
10-2C-HS-186A	10 KIP
10-2C-HS-186B	10 KIP
10-2C-HS-187	10 KIP
10-32B-HS-277	10 KIP
10-32B-HS-278	10 KIP
10-3B-HS-153	10 KIP
10-8A-HS-32	10 KIP
10-8A-HS-33	10 KIP
10-8A-HS-35A	10 KIP
10-8B-HS-10	10 KIP
10-9A-HS-38	10 KIP
10-9B-HS-4	10 KIP
10-9B-HS-7	10 KIP
10-9B-HS-8	10 KIP
14-5B-HS-43	10 KIP
14-9A-HS-15	10 KIP
23-19A-HS-3	10 KIP
23-1-HS-92	10 KIP
27-18A-HS-1	10 KIP
29-R1A-HS-161B	10 KIP
29-R1D-HS-114A	10 KIP
29-R1F-HS-123B	10 KIP
29-R1G-HS-131	10 KIP
29-R1H-HS-150	10 KIP
29-R1H-HS-151A	10 KIP
29-R1J-HS-140	10 KIP
29-R1J-HS-142	10 KIP
29-R1J-HS-148B	10 KIP
29-R1K-HS-180A	10 KIP
29-R1K-HS-180B	10 KIP
29-R1K-HS-181	10 KIP
29-R1L-HS-173	10 KIP
29-R1L-HS-174	10 KIP
29-R1L-HS-175A	10 KIP
10-10A-HS-42	10 KIP
10-10A-HS-43	10 KIP
10-14A-HS-240A	10 KIP
10-14B-HS-247	10 KIP
10-15B-HS-293	10 KIP
10-30A-HS-1001	10 KIP
10-8B-HS-9	10 KIP
10-9A-HS-251	10 KIP
10-9A-HS-252	10 KIP
10-9A-HS-40	10 KIP
10-9B-HS-6	10 KIP
14-5B-HS-44	10 KIP
14-5B-HS-45	10 KIP
23-1-HS-91	10 KIP
27-19-HS-2	10 KIP
29-R1A-HS-160	10 KIP
29-R1A-HS-161A	10 KIP
29-R1B-HS-101	10 KIP
29-R1B-HS-105	10 KIP
29-R1D-HS-114B	10 KIP
29-R1F-HS-123A	10 KIP
29-R1G-HS-132A	10 KIP
29-R1G-HS-132B	10 KIP
29-R1H-HS-151B	10 KIP
29-R1J-HS-146	10 KIP
29-R1J-HS-148A	10 KIP
29-R1K-HS-182	10 KIP
29-R1L-HS-175B	10 KIP

DTPG – 2 SIZE DESCRIPTION: BP Medium Bore 20 KIP & 30 KIP

02-2-1A-HS-12	20 KIP
02-2-1A-HS-13	20 KIP
02-2-1A-HS-18	20 KIP
02-2-1B-HS-13	20 KIP
02-2-1B-HS-18	20 KIP
10-11A-HS-85	20 KIP
10-13A-HS-109A	20 KIP
10-13A-HS-109B	20 KIP
10-15A-HS-102	20 KIP
10-15A-HS-84	20 KIP
10-15B-HS-295	20 KIP
10-15B-HS-296	20 KIP
10-17-HS-55	20 KIP
10-1-HS-207	20 KIP
10-1-HS-208	20 KIP
10-1-HS-208A	20 KIP
10-1-HS-209	20 KIP
10-3A-HS-197	20 KIP
10-3B-HS-154	20 KIP

10-8B-HS-12	20 KIP
23-17-HS-87	20 KIP
23-17-HS-88	20 KIP
27-19-HS-3	20 KIP
29-R1B-HS-100	20 KIP
29-R1B-HS-102	20 KIP
29-R1B-HS-103	20 KIP
29-R1B-HS-104	20 KIP
29-R1D-HS-113	20 KIP
29-R1F-HS-120	20 KIP
29-R1F-HS-121	20 KIP
29-R1F-HS-122	20 KIP
29-R1J-HS-141	20 KIP
29-R1J-HS-143	20 KIP
29-R1J-HS-145A	20 KIP
29-R1J-HS-145B	20 KIP
29-R1L-HS-172	20 KIP
02-2-1A-HS-19	30 KIP
02-2-1B-HS-12	30 KIP

02-2-1B-HS-19	30 KIP
10-11B-HS-89A	30 KIP
10-12A-HS-117	30 KIP
10-12B-HS-142	30 KIP
10-14A-HS-240B	30 KIP
10-15B-HS-122	30 KIP
10-15B-HS-291	30 KIP
10-3A-HS-198	30 KIP
23-25-HS-81	30 KIP
34-4A-HS-16	30 KIP
34-4A-HS-17	30 KIP
34-4B-HS-35	30 KIP
34-4B-HS-36	30 KIP
34-5C-HS-6	30 KIP
34-5C-HS-7	30 KIP
34-5D-HS-26	30 KIP
34-5D-HS-27	30 KIP

DTPG – 3 SIZE DESCRIPTION: BP Large Bore 50 KIP & 70 KIP

02-2-1A-HS-15	50 KIP
02-2-1A-HS-16	50 KIP
02-2-1A-HS-17	50 KIP
02-2-1A-HS-20	50 KIP
02-2-1B-HS-15	50 KIP
02-2-1B-HS-16	50 KIP
02-2-1B-HS-17	50 KIP
02-2-1B-HS-20	50 KIP
02-2-2A-HS-8	50 KIP
02-2-2B-HS-8	50 KIP
10-15B-HS-121	50 KIP
10-15B-HS-292	50 KIP
13-22-HS-13	50 KIP

13-22-HS-13A	50 KIP
29-1A-HS-2	50 KIP
29-1A-HS-3	50 KIP
29-1A-HS-6A	50 KIP
29-1A-HS-6B	50 KIP
29-1A-HS-8A	50 KIP
29-1B-HS-11	50 KIP
29-1B-HS-12	50 KIP
29-1B-HS-13A	50 KIP
29-1B-HS-15	50 KIP
29-1B-HS-16	50 KIP
29-1B-HS-17	50 KIP
29-1C-HS-21	50 KIP

29-1C-HS-22	50 KIP
29-1C-HS-23B	50 KIP
29-1C-HS-24	50 KIP
29-1C-HS-25	50 KIP
29-1C-HS-26	50 KIP
29-1D-HS-34	50 KIP
29-1D-HS-35	50 KIP
29-1D-HS-39	50 KIP
29-1D-HS-40	50 KIP
29-1D-HS-41	50 KIP
29-1A-HS-4	70 KIP
29-1D-HS-36	70 KIP

DTPG – 4 **SIZE DESCRIPTION: PSA Mechanical (3, 10) 6 KIP &15 KIP**

10-15A-MS-307	6 KIP
10-15A-MS-308	6 KIP
10-15B-MS-119A	6 KIP
10-15B-MS-124	6 KIP
10-15B-MS-124B	6 KIP
10-15B-MS-125	6 KIP
10-15B-MS-125B	6 KIP
10-35-MS-221A	6 KIP

10-7B-MS-3	6 KIP
10-9A-MS-254	6 KIP
10-9A-MS-40A	6 KIP
10-9B-MS-286	6 KIP
10-13A-MS-112	15 KIP
10-15A-MS-303	15 KIP
10-15A-MS-304	15 KIP

DTPG – 5 **SIZE DESCRIPTION: Lisega (30) 44.9 KIP**

02-2-2A-HS-4	44.9 KIP
02-2-2A-HS-3	44.9 KIP
02-2-2B-HS-3	44.9 KIP
02-2-2B-HS-4	44.9 KIP