INDEPENDENT CORRECTIVE ACTION VERIFICATION PROGRAM

MILLSTONE UNIT 2

SYSTEM VERTICAL SLICE REVIEW

SVSR CHECKLISTS

MILLSTONE UNIT 2 SVSR CHECKLISTS

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DEVELOPMENT OF SYSTEM VERTICAL SLICE CHECKLISTS

Introduction

This instruction provides a generic framework based on checklist modules that can be used to develop a system specific checklist to support System Vertical Slice Reviews (SVSRs).

Exhibit 1 provides an overview of the generic SVSR checklist development process. System specific checklist development is based on the process outlined in Exhibit 1, system specific requirements, and the generic checklist modules in this instruction. The generic checklist modules are based on the requirements of the Confirmatory Order, the NRC Oversight Inspection Plan, and NRC Inspection Guidelines. Exhibit 2 and 3 provides matrices to cross reference of Confirmatory Order and NRC Oversight Plan requirements to the generic checklist modules included in this instruction.

All checklist modules contained in this instruction are generic and applicable to a variety of systems. After identification of SVSR systems by the USNRC, the generic modules are used as the framework to incorporate system specific considerations. The attachments at the end of this instruction provide examples of system specific considerations for mechanical systems (Attachment 1) and electrical systems (Attachment 2) that could be incorporated during system specific checklist preparation.

The SVSR checklist development process noted in Exhibit 1 is used to prepare a system specific checklist by defining system boundaries, identifying licensing and design requirements, and identifying configuration management considerations. Generic checklist modules guidance provided in this instruction that supports checklist development includes:

1. Define System Scope and Boundary
2. Identify Licensing and Design Requirements
3. Evaluate Configuration Management
    - Modifications
    - Corrective Action Plan
    - Testing
    - Procedures
    - Operations and Maintenance Practices
    - Physical Plant Verification

EXHIBIT 1
OVERVIEW OF SVSR CHECKLIST DEVELOPMENT

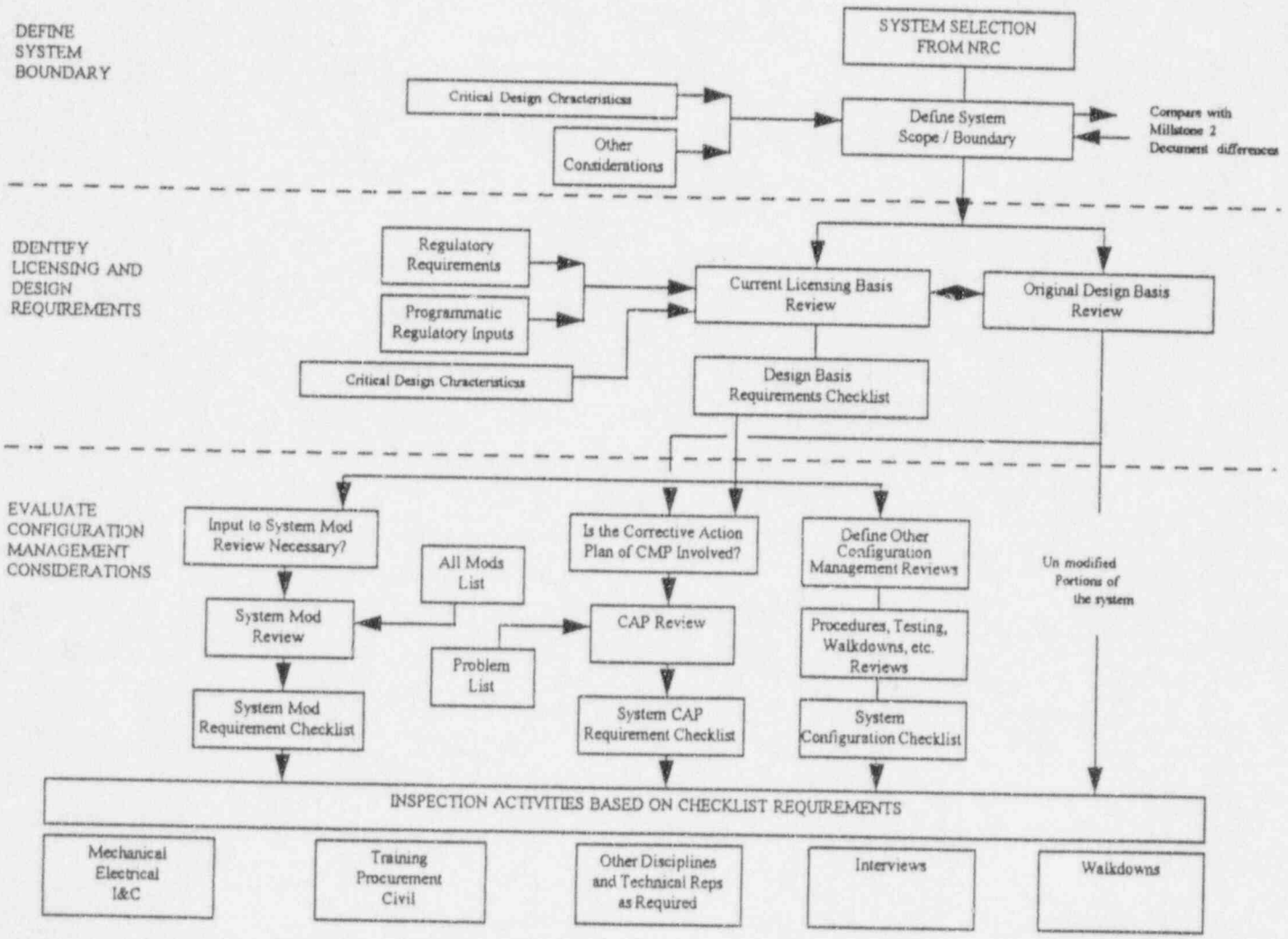

Exhibit 2
SVSR Checklist Requirements

Confirmatory Order Actions	AREA					
	License & Design Basis	Mods	CAP	Testing	Procedures	Walkdown
Licensee committed to the scope of the ICAVP review encompassing modifications to the selected systems since initial licensing, including :						
Review engineering design	X	X				
Review configuration control processes	X	X				X
Verify current as-modified plant conditions against design basis	X	X				X
Verify current as-modified plant conditions against licensing basis documentation	X	X				X
Verify that design requirements are translated into operating procedures					X	
Verify that design requirements are translated into maintenance procedures					X	
Verify that design requirements are translated into test procedures				X		
Verify that licensing bases is translated into operating procedures					X	
Verify that licensing bases are translated into maintenance procedures					X	
Verify that licensing bases is translated into test procedures				X		
Verify system performance through review of specific test records				X		
Verify system performance through observation of selected testing of particular systems				X		
Review proposed and implemented corrective actions for Licensee-identified design deficiencies			X			

Exhibit 3
SVSR Checklist Requirements

Oversight Inspection Plan Actions	AREA					
	Licensing & Design Bases	Mods	CAP	Testing	Procedures	Walkdown
Design modifications are adequate		X				
Control of the design has been maintained since issuance of the initial operating license		X				
Control of the design bases has been maintained since issuance of the initial operating license	X	X				
System's current configuration conforms to its licensing bases and will be capable of performing its intended function	X			X		X
System's original design that has not been modified conforms to its licensing bases and will be capable of performing its intended function	X			X		X
System modifications made since issuance of the initial operating license conform to its licensing bases and will be capable of performing its intended function		X		X		X
Verify that the licensee's design engineers had sufficient technical guidance to perform assigned engineering functions.	X	X				
Verify that the regulatory requirements are correctly implemented and the system can perform its specified functions	X	X				X
Verify that the licensing-bases are correctly implemented and the system can perform its specified functions	X	X				X
The updated Final Safety Analysis Report (FSAR) accurately reflects the current licensing bases.	X	X				
The updated Final Safety Analysis Report (FSAR) accurately reflects the current plant configuration	X	X				
The updated Final Safety Analysis Report (FSAR) accurately reflects the operational characteristics	X				X	X
The analyzed facility configuration in the design bases is consistent with the current plant configuration of the unit	X					X
The analyzed facility configuration in the design bases is consistent with the current plant operational characteristics of the unit	X				X	X

Oversight Inspection Plan Actions	AREA					
	Licensing & Design Bases	Mods	CAP	Testing	Procedures	Walkdown
The correct licensing-bases information has been reflected in the maintenance procedures					X	
The correct licensing-bases information has been reflected in the responsible engineering procedures	X					
The correct licensing-bases information has been reflected in the operations procedures					X	
System design changes have not invalidated preoperational testing.		X		X		
System design changes have not invalidated startup acceptance		X		X		
Design controls have been applied to temporary modifications design changes		X			X	
Design controls have been applied to design procedure changes					X	
Design controls have been applied to change the configuration of the facility.	X	X				
Design controls have been applied to change the operation of the facility.		X			X	
Verify the adequacy of the licensee's corrective actions as part of the CMP and in response to the ICAVP findings.		X	X			
Assess the adequacy of the licensee's effectiveness of implementation of the corrective actions developed as part of the CMP and in response to the ICAVP findings.			X		X	
Review of procedural controls for modifying or changing the facility operational characteristics.		X			X	
Verify the current configuration accurately reflects the licensing-bases, including the updated FSAR.	X					X
The calculations and analyses were performed using recognized and acceptable analytical methods.	X	X				
The assumptions made in calculations supporting the change are technically sound.	X	X				
The assumptions made in analysis supporting the change are technically sound.	X	X				

Oversight Inspection Plan Actions	AREA					
	Licensing & Design Bases	Mods	CAP	Testing	Procedures	Walkdown
The results of calculations supporting the unmodified portions of the original configuration and design changes are reasonable (based on engineering judgement) for the scope of the change.	X					
The results of analysis supporting the unmodified portions of the original configuration and design changes are reasonable (based on engineering judgement) for the scope of the change.	X					
The licensee considered the effect of a change on design margins.		X			X	
The appropriate level of engineering and management review existed during the design phase and prior to implementation.		X			X	
The licensee considered the effect of a change on pre-operational acceptance test results.		X		X		
The licensee considered the effect of a change to startup acceptance test results.		X		X		
The licensee considered the effect of a change to system baseline acceptance test results.		X		X		
Design changes were accomplished in accordance with the licensee's approved procedures.		X			X	
Design changes are accurately reflected in operating procedures.		X			X	
Design changes are accurately reflected in maintenance procedures.		X			X	
Design changes are accurately reflected in test procedures		X		X		
Design changes are accurately reflected in training materials.		X			X	
Proposed design changes, subsequently cancelled, were not replaced by procedural changes that imposed excessive burdens on plant operators.		X				
The walkdowns will be multi-disciplinary reviews including, as a minimum,						
Mechanical systems,						X
Mechanical components,						X
Electrical power,						X
Civil and structural design, and						X
Instrumentation and control.						X

Oversight Inspection Plan Actions	AREA					
	Licensing & Design Bases	Mods	CAP	Testing	Procedures	Walkdown
Walkdowns will verify adequate control of surveillance procedures						X
Walkdowns will verify adequate control of operating procedures,						X
Walkdowns will verify adequate control of maintenance procedures,						X
Walkdowns will verify adequate control of test procedures,						X
Walkdowns will verify adequate control of operator training,						X
Walkdowns will verify adequate control of plant simulator configuration.						X
Verify that the current configuration is consistent with the licensing bases at the level of detail contained in						
Piping and instrumentation diagrams (P&IDs)	X	X				X
Verify that the current configuration is consistent with the licensing bases at the level of detail contained in piping isometric drawings	X					X
Verify that the current configuration is consistent with the licensing bases at the level of detail contained in electrical single-line diagrams	X					X
Verify that the current configuration is consistent with the licensing bases at the level of detail contained in emergency, abnormal, and normal operating procedures.	X				X	X
Verify the licensing-bases information contained in the updated FSAR.	X					
Verify the licensing-bases information contained in docketed correspondence.	X					
Verify the analyzed configuration is consistent with the current plant configuration.	X					X
Verify equipment location and identification numbers are as indicated on the P&ID						X
Verify equipment name plate data is consistent with design specifications.						X
Verify equipment name plate data is consistent with analyses.						X

Oversight Inspection Plan Actions	AREA					
	Licensing & Design Bases	Mods	CAP	Testing	Procedures	Walkdown
Verify that the location of pipe supports, snubbers, and other pipe restraints are consistent with design specifications.						X
Verify that the location of pipe supports, snubbers, and other pipe restraints are consistent piping stress analyses.						X
Verify that divisional separation of safety-related systems, structures and components, seismic II/I, and other topics addressed by the licensee's hazards analyses are reflected in the current plant configuration.						X
Modifications that appear to have been completed recently will be screened to assure adequate documentation						X

1.0 Scope and Boundary Checklist

1.1 Purpose

Provide a process for systematically defining the selected system scope and boundary conditions through the use of system functions and critical design characteristics of the selected system.

The completion of this checklist shall be documented on the attached "System Scope and Boundary Checklist Form".

1.2 Prerequisites/Documents

- ICAVP Tier 2 Input, (Critical Design Characteristics Team).
- SER
- Technical Specifications
- FSAR
- P&ID
- System Elementary Drawings
- System logic diagrams
- System Specifications
- Manufacturers Performance Test Data

1.3 Action/Requirements

Interfaces with, and portions of, other systems may be included within the boundary of the selected system to the extent they are necessary to support the functional requirements of the selected system.

System boundaries may be defined at appropriate components that provide physical isolation, as long as the selected boundary does not split the component between systems.

All passive devices such as supports and restraints, within the system boundary are included within the scope of the SVSR

1.3.1 Determine System Functional Requirements

Determine the functional requirements for the system and each active component during normal, accident and abnormal conditions. Functional requirements must be determine for each mode of system operation

Identified System Functions must have the basis used for the determination identified. (System Functions and the appropriate basis document are to be noted on Exhibit 4.)

1.3.2 Obtain the Tier 2 list of Critical Design Characteristics for the system and add to Exhibit 4.

NOTE
Assessment of the selected system in the area of Critical Design Characteristics shall not be delayed pending receipt of a complete list. Action shall commence as soon as sufficient data is received to support the inspection effort. However, this checklist requires all Critical Design Characteristics to be evaluated in order to be complete.

1.3.3 Identify the supporting system interfaces.

1.3.4 Prepare a System Scope and Boundary Description using the system functions and the identified critical design characteristics. The description shall be in the format shown in Exhibit 4. Marked-up drawings supporting the narrative description are required.

1.3.5 Verify that the configuration of the system supports the Critical Design Characteristics.

1.3.6 Compare with Millstone Unit 2 System Boundary. Resolve differences prior to proceeding with the balance of Tier 1 activities.

Exhibit 4
System Scope and Boundary Description

System Name:

System Scope Description:

The following information is required to complete the System Scope and Boundary Checklist. Additional pages (in addition to the required marked up drawing (s) may be used if necessary. If additional pages are used, indicate below the total number of attached pages for each category of information

System Functions:

Critical Design Characteristics (Tier 2):

Supporting System Interfaces:

Prepared By: _____ Date: _____

2.0 Licensing and Design Basis Review Checklist

2.1 Purpose:

Provide a process for the systematic review and assessment of compliance with the Licensing and design bases of Millstone Unit 2. This checklist includes an assessment the maintenance of the Licensing and Design bases and the conformance of Millstone Unit 2 with the design and licensing basis information since initial operation to the present.

The review will follow the following general outline:

- Identification of Regulatory Requirements
- Identification of UFSAR Commitments
- Identification of Design Inputs and Requirements
- Evaluation of Design Inputs
- Calculation and Specific Measurements
- Other Configuration Management Measurements as appropriate

2.2 Definitions

Current Licensing Basis (CLB) is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73, 100 and appendices thereto; orders, license conditions; exemptions; and technical specifications. It also includes the plant specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensing correspondence

such as licensee responses to NRC Bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.[1]

Design Basis That information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted state-of-the-art practices for achieving functional goals or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals.[2]

2.3 Prerequisites/Documents

- Design Specifications
- Design Input Documents
- System Scope and Boundary Documentation
- Critical Design Characteristics Documentation
- Original Design Specifications
- ICAVP Regulatory Requirements/Commitments Documentation
- List of all system modifications since the issuance of the Operating License.
- List of architect engineer identified design deficiencies issued at initial startup
- Performance Calculations
- License amendments
- Technical Specifications, revisions, and SERs
- UFSAR

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[1] 10 CFR 54.3 (a)

[2] 10 CFR50.2

- Applicable Codes, Standards, and Regulatory Guides
- Accident Analysis Calculations
- Performance Calculations
- Equipment Specifications
- Instrument Setpoints
- Surveillance Tests and Procedures
- Technical Specifications
- Design Guides/Design Standards etc. prepared by or for NNECo.
- Design Basis Documentation as defined by NNECo

2.4 Action/Requirements

2.4.1 Identification of Regulatory Requirements

- Prepare a summary of the licensing basis for the system that were applicable at the time the operating license was issued.
- Prepare list of post-operating license commitments applicable to the system , including those in correspondence that modify the licensing basis.
- Prepare list of other changes since initial operating license such as license amendments and technical specifications that modify the licensing basis.

2.4.2 Identification of Commitments

- Review list of all system modifications since the issuance of the Operating License, establish order of implementation or inspection process.
- Have the architect engineer identified design deficiencies issued at initial startup been addressed and corrected?

- Review those portions of the system that have not been modified from initial operation to the present to verify:
    - conformance to the licensing basis.
    - that they are capable of performing their intended functions.
- Does the system design incorporate and meet the licensing basis commitments?

2.4.3 Identification of Design Inputs and Requirements

- Is there a Design Input for the system? If "YES" review against the Design Input Checklist for adequacy.
- Prepare a Design Input checklist based on ANSI N45.2.11 requirements.

2.4.4 Design Input Evaluation

- Are applicable Codes, Standards and Regulatory Guides referenced in the Design Input, Performance Calculations and Specifications?
- Verify that the calculations, specifications, and design specifications incorporate the original licensing basis (as modified).
- If the original design was based on any assumptions are these assumptions still valid.
- Does the UFSAR reflect the Current Licensing Basis
- Does the Design Basis Documentation, as defined by NNECo, identify design define the Design Basis ?
- Determine if the System design basis is in accordance with the licensing and regulatory requirements (licensing basis) for the system.
- Is the Design Basis Documentation adequately controlled and revised as required to reflect changes to the Design Basis.

2.4.5 Calculation and Specification Measurements

- Do the Calculations conform to the Design Inputs ?
- Are any assumptions used in the calculations technically sound ?
- Verify that the system design/performance calculation results envelope any performance requirements used or assumed in the Chapter 14 Accident Analysis. Where more than one flow path alignment is used for the system each alignment should be checked
- Are appropriate margins used for establishing the design basis of equipment.
- Were system calculations and analysis performed using recognized and acceptable methods?
- Are the results of the calculations reasonable and consistent with the design input ?
- Is data in the UFSAR consistent with the plant design calculations and analysis?
- Do the system calculations/analysis reflect the current plant configuration and operation?

2.4.6 Other Configuration Management Measurements

- Verify the seismic and safety classification of those components and portions of a system that perform a critical function.
- Verify that non-safety portions of the system are isolated by automatic valves meeting single failure criteria or that calculations are available demonstrating that any loss of flow to the non-safety branch will not effect the required operation.
- Verify that safety grade power and control signals are provided to the critical components.

- Review the control logic, interlocks, power supply, and manual controls associated with pumps and valves for required operation to support system design basis.
- For instrumentation that provides initiation or permissives for system operation verify the range, set point, and set point calculations are adequate.
- Does the system design incorporate and meet the licensing basis commitments?
- Does the data in the UFSAR reflect modifications or changes in the licensing basis?

3.0 Modifications Checklist

3.1 Purpose:

Provide a mechanism for the systematic review and assessment of all modifications for the subject system, determination of major or significant modifications requiring further review, and to validate the status of modifications made to the system configuration since original licensing.

3.2 Prerequisites/Documents

- List of Modifications
- Design Control Procedure
- Configuration Management Plan
- Configuration Management Procedures
- Copies of Modifications and all Attachments

3.3 Action/Requirements

Record the results of the System Modification Summary Review Form (Exhibit 5)

3.3.1 Modification Package Initial Screening

- Was the modification to correct a Performance Deficiency
- Was the modification to correct a Regulatory Requirement?
- Review the modification to determine if any unreviewed safety questions were introduced.
- Is a 10 CFR 50.59 Safety Evaluation required for the Modification?
- Has a 10 CFR 50.59 Safety Evaluation been performed for the Modification?
- Does the package indicate plant documents that will require revision as a result of the modification? (Documents would include: Calculations, Drawings, ASME Design Specifications, UFSAR, Plant Procedures.)
- Is a UFSAR change required as a result of the modification?
- Is the Design Input defined or referenced in the package?
- Does the package document the effect of the modification on other systems?

- Is there an Interface Reviews by other groups such as Operations, Training, Testing, Maintenance, etc.?

3.3.2 Detailed Modification Review

- Was the modification performed in accordance with an Approved Design Control Program?
- Does the program provide proper controls for verification and approvals (including Plant Operations)?
- Did the modification consider "Holds" or "Design Change notices" for plant documents to alert the design and operating staff to In-Process modifications.
- Does the design input incorporate the critical function requirements for the system?
- Are assumptions used in the design input technically sound?
- Does the modification meet the design input requirements?
- Does the design confirm the accuracy of any assumptions contained in the Design Input?
- Does the modification have the potential to change the design basis or licensing basis?
- If the modification has the potential to change either bases, does the as-modified system meets the design/licensing basis?
- If the modification has the potential to change either bases, was the as-modified design/licensing basis correctly revised as part of the modification process?
- Is the Safety Evaluation complete and adequate?.
- Has the modifications, if adding non safety equipment or modifications to structures, considered and evaluated seismic class 2-over-1 concerns?
- Are the cumulative effects of modifications on support systems, such as Cooling Water, HVAC, Electrical Power Supply etc. adequately addressed and reviewed as part of the modification process ?

- Verify the Seismic and Safety classification of those components and portions of a system that perform a critical function.
- Verify that non-safety portions of systems are isolated by automatic valves meeting single failure criteria, or that calculations are available demonstrating that a failure in the non-safety branch will not affect the system to perform its safety function.
- Verify that safety-grade 1E electrical power and control signals are provided to critical components.
- Review the modification and prepare a list of Configuration control documents and databases that could require revision as a result of the modification. The following is a list of typical documents to be considered:
    - P&ID Drawings
    - Operating Procedures
    - FSAR text, figures and tables
    - Surveillance Test Procedures
    - Elementary Diagrams
    - ASME Design Specifications
    - One Line Diagrams
    - Training and/or Simulator
    - Instrument Set Points
    - Fire Protection Evaluation Report (FPER)
    - Calculations
    - System Descriptions
    - Maintenance Procedures
    - Classification/EQ lists
- Did the modification correctly identify the documents requiring revision?
- Have the critical configuration-control documents and databases been correctly revised to incorporate the modification?

- For new or revised calculations that were performed for the modification did they use recognized analytical methods?
- For new or revised calculations that were performed for the modification all assumptions technically sound?
- Does Post-Modification testing demonstrate that the modified system meets the performance requirements?
- Does Post-Modification testing validate the Pre-Operational acceptance testing?
- Have modifications that may reduce the design margins for a system been adequately reviewed and approved.
- Did the modification contain any "temporary" changes? Were these changes analyzed and controlled?
- If a proposed modification was canceled did it result in procedural changes that could impose an excessive burden on the plant operators during normal or emergency operating conditions?
- What controls were used to accept and incorporate the design documents any differences between the as-built and as-designed configuration.
- Has the modification been installed in accordance with the Modification package design?
- Were any deviations between the as-designed and the as-built modification adequately resolved?
- Are the original design analysis, applicable to the unmodified portions of the system, conservative and reasonable for supporting the design basis of the modified system?
- Have the program requirements been followed for "temporary" modifications?

System Modification Screening
Summary Review Form

Exhibit 5

System: _____ **Modification Number:** _____

Brief description of Modification:

Modification Required for:
- ☐ Regulatory Requirement
- ☐ Performance Deficiency
- ☐ Other: _____

Safety Evaluation Required?
☐ yes ☐ no

UFSAR change required?
☐ yes ☐ no

Design Input defined or referenced?
☐ yes ☐ no

Plant Document changes identified?
☐ yes ☐ no

Interface reviews specified?
☐ yes ☐ no

Detailed Modification Review Required?
☐ yes ☐ no

Comments:

Engineer: _____ Date: _____

Team Leader: _____ Date: _____

4.0 Corrective Action Plan Review

4.1 Purpose:

Review the proposed and implemented corrective actions for design deficiencies identified by the NNECo during the implementation of the Configuration Management Corrective Action Program.

4.2 Prerequisites/Documents

- NRC Significant Action List
- Corrective actions identified by NEECo

4.3 Action/Requirements

- Is the problem clearly identified?
- Does the solution identify the root cause?
- Does the root cause identify any generic or programmatic issues?
- Have the corrective actions been adequately documented and any required configuration control document changes made?
- Is the corrective action technically and programmatically acceptable?

5.0 Testing Checklist

5.1 Purpose:

Provide a process for the systematic review and assessment of testing requirements for the selected system by evaluating:

- Test Acceptance Criteria and Basis
- Testing Conditions, and System Boundary Considerations
- Test Performance and Documentation
- Post Testing Review and Evaluation

The Testing Checklist is grouped into two types of tests:

- Pre-operational and Post Maintenance
- Surveillance and Periodic

5.2 Prerequisites/Documents

- Pre-Operation Test Procedures
- Pre-Operation Test Results
- Maintenance Tests
- Maintenance Test Results
- Surveillance Testing Procedures
- Surveillance Testing Results
- Calculations related to testing
- Completed Critical Function Checklist

5.3 Action/Requirements

5.3.1 Pre-operational and Post Maintenance

- Verify that the Pre-operational or post maintenance test acceptance criteria demonstrated that the System met the required critical performance/functional requirements. Verify the system alignment and test conditions demonstrate performance functional/requirements.

- Review calculations used to establish test results acceptance criteria for acceptable analytical approach and correct testing configuration.
- Verify that the Design Basis information was correctly incorporated into the pre-operational testing procedures with appropriate acceptance criteria.
- The reviewer should determine if the system has been adequately tested to demonstrate that it can perform the intended safety function. This review should include initial tests performed by the manufacturer, start-up testing and preoperational testing.
- Review the program for post maintenance testing of components prior to declaring them operable. The post modification testing should demonstrate that the system functional capability has been restored/maintained.
- Review the measuring and test equipment requirements to ensure the equipment can measure the parameter to the accuracy necessary to assure proper operation.
- Review the testing procedures to ensure that the method for measuring the parameter is appropriate for the physical condition of the plant.
- Review post test data reduction and analysis. Are the results of the analysis consistent with test conditions/assumptions and recognized analytical methods? Does the post test analysis satisfy test acceptance criteria?

5.3.2 Surveillance and Periodic

- Review the Technical Specification surveillance procedures and Inservice test procedures for technical accuracy and adequacy. Compare the testing alignment with the DBE alignment as part of the determination of adequacy.
- Verify that surveillance test procedures correctly incorporate performance criteria and response requirements contained in the licensing basis and DBE analysis.
- Verify that the surveillance test procedure acceptance criteria are adequate to demonstrate continued operability.

- Are the Technical Specification performance requirements correctly incorporated into the surveillance testing procedures?
- Have the Surveillance test procedures been revised to reflect modifications?
- Are Engineering and Technical Support personnel involved in the revision of test procedures and do they review test results?
- Have the effects of design changes and modifications been incorporated into the testing program including the need to examine the impact on the original pre-operational and acceptance test data?
- Use surveillance test data, instrument set point data, manufacturers test data, pre-operational test data or calculations to verify that the critical performance parameters can be met. Also note margins.
- Do the testing conditions correctly consider the actual plant conditions during system critical function operation?
- Do the Technical Specifications reflect the current plant configuration?
- Review the measuring and test equipment requirements to ensure the equipment can measure the parameter to the accuracy necessary to assure proper operation.
- Review the testing procedures to ensure that the method for measuring the parameter is appropriate for the physical condition of the plant.
- Review post test data reduction and analysis. Are the results of the analysis consistent with test conditions/assumptions and recognized analytical methods? Does the post test analysis satisfy test acceptance criteria?

6.0 Procedures Review Checklist

6.1 Purpose

Provide a process for the systematic review and assessment of the system related operation, maintenance and training procedures.

6.2 Prerequisites/Documents

- Operating Procedures
- Abnormal Operation Procedures
- Emergency Procedures
- Alarm Response Procedures
- Maintenance Procedures
- Surveillance Testing Procedures
- Pre-, Post-Operating Testing Procedures
- Training Procedures
- Op Critical Diagrams
- Functional/Logic Diagrams

6.3 Action/Requirements

6.3.1 Operations Procedures

- Does the operating procedure reflect the present plant configuration?
- Does the operating procedure reflect the Design Operating Alignment for the system?
- Review the adequacy and accuracy of the alarm response procedures and operating procedures for normal, abnormal and emergency system operation.
- Walk down the system operating procedure to ensure that the procedure can be performed using the Main Control Panel and alternate shutdown controls.

- Walk down the system operating procedure to ensure that equipment is accessible for operation.
- If any special equipment is required for operation under DBE conditions determine if it is available and in working order.
- Determine if the system operating procedures are consistent with the design and licensing basis.

6.3.2 Maintenance Procedures

- Does the maintenance procedure reflect the present plant equipment?
- Review the adequacy and accuracy of the procedure relative to the ensuring the critical characteristics of the component are not reduced due the maintenance procedure.
- Review the maintenance procedure for technical completeness.
- Ensure that the maintenance procedures incorporate applicable system modifications.
- Determine if the maintenance procedures compromise the design and licensing basis.
- Verify that Vendor manuals are the latest version and reflect what is in the field.
- Review maintenance procedures for technical adequacy and for conformance with Vendor manuals for the equipment.
- Does the procedure reflect the precautions and limits for the equipment per the vendor documents?
- Determine if maintenance personnel receive adequate training for the system and if the training is consistent with the level of detail in the maintenance procedures.

6.3.3 Training Procedures

- Do the training procedures reflect the present plant configuration?
- Do the training procedures reflect the current plant configurations and equipment of the system?

- Review the operator training procedure for the system for technical completeness. Ensure that the training procedures incorporate system modifications and that the operators are trained on the modifications.
- Determine if maintenance personnel receive adequate training for the system and if the training is consistent with the level of detail in the maintenance procedures.

7.0 Walkdowns Checklist

Walkdowns Checklist

7.1 Purpose.

Provide a process for the systematic identification of requirements for system walkdowns to verify the physical plant installation, Primary Drawing information, and the implementation of the configuration management program.

7.2 Prerequisites/Documents

- P&IDs
- One Line Diagrams
- Specifications
- Requirements/commitments list from other Primary checklists and discipline checklist requiring verification

7.3 Action/Requirements

1. Does the UFSAR reflect the system "as-built" configuration, including the current configuration and operational characteristics?
2. Is the current plant configuration consistent with the analyzed configuration?
3. Verify that equipment nameplate data is consistent with specifications and analysis.
4. Verify the location and type of pipe restraints installed against the piping analysis and Design Specifications.
5. Confirm Physical separation of systems
6. Confirm Electrical and Control channel separation of systems.
7. Note any Modifications that appear to be a recent activity for further screening per the Modification Checklist.

8. Verify that the current latest revision of P&IDs, One Line Diagrams, Elementary and other critical drawings are available for reference by plant operations.
9. Verify that critical control room drawings reflect partially installed modifications which are turned over to operations.
10. Verify that the current configuration of the system is in accordance with the design basis and licensing basis.
11. Review the system configuration as installed in the plant and determine if the drawings which reflect the as-built design are consistent with the current design and licensing basis, regulatory requirements and commitments for the plant.
12. Verify the capability to perform local operation of equipment and the availability of indication for local operation is in accordance with the operating procedures. Environmental conditions that will exist in the area under post accident conditions should be considered in determining the capability to perform local operation.
13. Perform a detailed verification to assure that the system as-built configuration agrees with the P&ID. The verification should include a review of the following characteristics of the system:
    - Access to system components requiring local operation and are components accurately labeled.
    - Are motor operated valves and check valves installed in the orientation required (or qualified as an active component) by the manufacturer.

Attachment 1

Mechanical Discipline Considerations

- Are the design pressure and temperature correctly selected in accordance with the applicable piping code?
- Are the system design conditions correctly stated in the ASME Design Specifications
- Have the code requirements for overpressure protection been correctly applied in the design.
- Review valves and orifices in the systems for operating conditions with excessive (flashing or cavitation) pressure drops
- Review the pipe size and flow in the system for Excessive fluid system velocities (erosion)
- Do Valve, Flanges and other piping system components have adequate pressure-temperature ratings
- Review the structure(s) housing the system for seismic design in the areas containing safety class system/components.
- Review the structural design for adequate load capacity of floor and roof designs to support piping and component loads (dead and live)
- Control valve operating conditions are bounded by procurement Specifications or valve vendors as-manufactured data
- Review piping and equipment support interfaces for adequate capacity for piping reaction loads.
- Check required (as-built) heat exchanger duty with design requirements.
- Check Surveillance testing procedures for testing to monitor heat exchanger fouling
- Review application of structural seismic response data to piping analysis and equipment seismic qualification.
- Review Seismic qualification data for operability of active components

- Has minimum flow protection been provided for pumps that are subject to operation at zero or reduced flow ?

- Is there adequate isolation valving provided in any cross connections between redundant fluid trains ?

- Are piping code/code class boundaries clearly identified and correctly applied to the system ?

- Does the design provide instrumentation for performance testing and monitoring ?

- Has the design considered the potential transient fluid loadings which may occur in the system ?

- Has adequate NPSH been provided for pumps under all operating conditions and alignments ?

- Have the effects of flooding and pipe rupture been considered in the design ?

Attachment 2

Electrical Requirements Considerations

- Are the AC and DC electrical systems design bases/inputs including applicable codes, standards, criteria and regulatory requirements identified?
- Are the AC and DC electrical systems design bases/inputs complete and adequate to define the design base?
- Are the AC, DC and EDG design base calculations and analyses identified?
- Were the electrical system design base calculations and analyses performed using organized and accepted methods?
- Are the assumptions used in the system calculations or analyses technically sound and do they consider all operational modes and conditions that the AC or DC systems or components or EDG will experience?
- Are the calculations or analyses results consistent with the design inputs?
- Do the design base electrical calculations identify available margins?
- Are the AC and DC one line diagrams consistent with the supporting analyses?
- Do the electrical calculations and analyses support the rating of major safety related equipment/components including but not limited to:
    - EDG's
    - medium voltage switchgear
    - low voltage switchgear
    - power center transformers
    - batteries and chargers
    - inverters
    - distribution panels
    - motor control centers
    - cables
    - electrical penetrations

- Do the AC and DC calculations and analyses represent the current plant configuration?
- Test the informaion system to determine if modification could impact a design base electrical calculation?
- Is there a process in place to evaluate the impacts of a modification to the design base electrical calculations and available margin prior to implementing the modification?
- Are the cumulative effects of modifications to design base electrical calculations effectively monitored and controlled?