Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-01, Rev. 0

System Reference List

Prepared by:	A.A. NERI		4-7-97
	Name	Signature	Date
Approved by:	D.K. Schopfer		4-25-97
	Name	Signature	Date

IMPLEMENTATION

System	
Prepared by: SRG/CRG/ORG	
Concurrence by:	

Sheet 1 of ___

System Reference List

Instructions

This checklist supplements PI-MP3-02 and shall be used to document system references. The checklist shall be completed in accordance with the following instructions:

a. Pages 3 and 4 provide an outline for the System Reference List.

b. The System Reference List will be prepared in electronic format.

c. The Preparer shall provide input by completing Page 5 as follows:

- Enter Document Type Section No. from Pages 3 and 4
- Enter Document Type from Pages 3 and 4
- Enter Document No. and Revision Level or Date
- Sign and Date Page 5

For documents which are categorized as "other," the Preparer shall provide input by completing Page 6 of this checklist. Page 6 is identical to Page 5 with the exception that a document title is required.

d. The Lead Verifier from the SRG, ORG and CRG shall ensure input from their respective Group is accurately entered into electronic version of checklist and shall sign and date the coversheet. The SRG Lead shall indicate his concurrence that the checklist has been properly completed by signing and dating the coversheet.

e. The system name shall be entered on all sheets of the checklists. The sheet numbers shall be sequentially numbered (i.e. 1,2,3, etc.). It is acceptable to add insert pages (i.e., 1A, 1B, 1C, etc.) if needed.

System Reference List

Outline

Document Type	Document No.	Rev./Date

A. System Specific Documents
   1. Calculations
      a. Mechanical
      b. Electrical
      c. I&C
      d. Structural
      e. Piping Analysis
      f. Other

   2. Electrical Equipment Qualification Reports

   3. Equipment Seismic Qualification Reports

   4. System Descriptions/Design Basis Documents

   5. Equipment Specifications

   6. Drawings
      a. P&ID's
      b. Logic Diagrams
      c. Electrical Schematics
      d. Piping Drawings
      e. Electrical One-Line Drawings
      f. Wiring Drawings
      g. Electrical Physicals
      h. Pipe Support Drawings
      i. Structural Mounting Details
      j. General Arrangements/ Equipment Location Drawings

System Reference List

Outline (continued)

Document Type	Document No.	Rev./Date

k. Instrument Location Drawings
l. Vendor Drawings
m. Other

7. Procedures
   a. Operating Procedures
   b. Maintenance Procedures
   c. Surveillance Test Procedures
   d. Vendor Manuals
   e. System Training Procedures
   f. Other

8. List/Databases

B. Licensing Documents
   1. FSAR Sections
   2. SER Sections
   3. NRC Committments
   4. Technical Specifications
   5. Regulatory Documents

System Reference List

DATA ENTRY FORM

Document Type Section No.: _____

Document Type: _____

Document No.	Rev./Date	Document No.	Rev./Date

Prepared by: _____/_____
Name Date

System Reference List

DATA ENTRY FORM

Document Type Section No.: _____

Document Type: _____

Document No.	Rev./Date	Title

Prepared by: _____/_____
Name Date

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-02, Rev. 0

System Requirements List

Prepared by: A. A. NEKI _____ _____ 4-24-97
Name Signature Date

Approved by: D. K. Schopfer _____ 4-25-97
Name Signature Date

IMPLEMENTATION

System		
	Preparation	Disposition
SRG Verifier:		
ORG Verifier:		
SRG Concurrence:		
ORG Concurrence:		

System Requirements List

Instructions

These instructions supplement PI-MP3-02 and shall be used for the development of the system reference list. Application of this checklist shall be as follows:

1. System requirements identified during the review of the FSAR, SAR, Technical Specifications, MP3 Commitments and Position Papers (if applicable), etc., shall be entered individually on the System Requirements List as follows:

   a. Enter detailed description of requirement under the appropriate category.
   b. Enter source document, section, etc.
   c. Enter your initials.
   d. Requirements identified under each category shall be sequentially numbered beginning with 0001.
   e. A DR number shall be entered in the initials column for any conflicting requirements.

   Note: The system requirements list will be developed electronically. The form on page 4 is a sample of the final list. The final list will be sorted by the six categories; Design, Functional, Performance, Operational, Maintenance and Testing Requirements.

2. The independent verifier shall indicate his concurrence with a specific entry by initialing the entry adjacent to the preparer's initials.

3. Disposition of system requirements shall be entered as follows:

   a. Enter documents reviewed against system requirement. Use description for references from System Reference List (CK-MP3-02-1) for consistency.
   b. Enter whether document reviewed conforms with system requirement identified in checklist (SAT or USAT).
   c. Enter DR No. for USAT documents in USAT column.
   d. Enter initials and date.

4. Deviations identified during the preparation or disposition phase shall be processed per PI-MP3-11.

5. The SRG and ORG verifiers shall sign and date the coversheet after both the requirements identification phase and the disposition phase. The SRG verifier shall be responsible for assembly of the completed checklist and for completing the titleblock on each page of the checklist including the identification of system and sheet numbering. Sheet numbering shall be numerical.

6. The ORG and SRG Lead shall indicate their concurrence that the checklist has been applied correctly by signing and dating the cover sheet after each phase.

7. Changes made after ORG and SRG Lead signatures shall be processed as a formal revision to the checklist. New SRG & ORG Verifier and Lead Signatures shall be required.

Modification Review Administrative Checklist

REQUIREMENTS				DISPOSITION			
No.	*Description*	*Reference*	*Initials (Prep./Rev.)*	*Documents Reviewed*	*SAT*	*USAT*	*Initials*
	A. Design Requirements						
	B. Functional Requirements						
	C. Performance Requirements						
	D. Operational Requirements						
	E. Maintenance Requirements						
	F. Testing Requirements						

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-03, Rev. 0

Design Process Document Review Checklist

Prepared by:	A.A. NERI		4-7-97
	Name	Signature	Date
Approved by:	D.K. Schopfer	D.K. Schopfer	4-25-97
	Name	Signature	Date

IMPLEMENTATION

System		
Verified by:		Date:
Concurrence by:		Date:

Design Process Document Review Checklist

Instructions

This checklist supplements the design process document review process described in PI-MP3-02. Use of this checklist shall be as follows:

1. The Lead Verifier shall enter the system on the checklist cover sheet.

2. The Lead Verifier or Discipline Verifiers shall review attached pages 4 through 11 to define applicable Design Process Documents for the system being reviewed.

   a. If a Design Process Document type is applicable, check applicable and enter Design Process Document Number(s).

   b. If not applicable, check not applicable.

   c. If applicable and no Design Process Document exists, process DR per PI-MP3-11 and enter DR Number under Design Process Document Number.

   d. If other Design Process Documents exist which are not covered by the generic Design Process Document types, list these Design Process Documents under "Other."

   e. Sign and date when identification of applicable Design Process Documents has been completed.

   f. The form on Page 12 can be used to list additional Design Process Documents for each Design Process Document Type, if needed.

3. For each Design Process Document identified above, the Lead Verifier or Discipline Verifier, as applicable, shall prepare a Design Process Document review and comment sheet (Forms on Pages 13 and 14) as follows:

   a. Enter design process document number.

   b. Review the design process document for each attribute on Page 13 of the checklist.

b.1 If the review determines the attribute is satisfied, check satisfactory.

b.2 If the review determines the attribute is not satisfied, check unsatisfactory, enter a sequential comment number and enter the comment on Page 14 of the checklist.

c. Once the review is complete, sign the review and comment form (Pages 13 and 14).

4. When the identification and review of design process documents for the system has been completed, the Lead Verifier shall compile a complete checklist as follows:

a. Assemble all checklists in a logical order.

b. Enter the system designator in the title block.

c. Number the pages sequentially. Note, it is acceptable to add insert pages such as 2A, 2B, 4A, 4B, 4C, etc. if needed for subsequent changes.

d. Sign and date the coversheet.

5. The SRG Lead shall indicate his concurrence that the checklist has been applied properly by signing and dating the coversheet.

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
1. Mechanical			
a. Piping minimum wall thickness			
b. Pump net positive suction			
c. Pump total system head			
d. Valve pressure drops (Cv)			
e. Heat transfer (sizing of heat exchangers, condensers, heaters, etc)			
f. Pump/system performance			
g. Pressure/vacuum relief valve sizing			
h. Sump capacity			
i. Cooling water flow rates			
j. Equipment performance design process document			
k. Corrosion/erosion allowances			
l. Tanks (volume, wall thickness, etc)			
m. Pipe sizing/flow			
n. System design/operating pressures and temperatures			
o. Pump brake-horsepower requirements			
p. Valve actuation times and check valve closure valve closure			
q. Heating and cooling loads			
r. Duct sizing and pressure drop			
s. Equipment performance/design requirements (fans, chillers, coils, filters, dampers)			
t. System performance (supply, return, and exhaust airflow requirements)			
u. Refrigerant line sizing			
v. Refrigerant specialties sizing/performance			
w. Refrigerant vent line sizing			
x. Allowable duct and filter housing leakage (for nuclear air cleaning systems)			

Design Process Document Review Checklist

y. Residence time for charcoal filter units	_____	_____	_____
z. Allowable damper leakage	_____	_____	_____
aa. Allowable damper leakage	_____	_____	_____
ab. Damper closure time requirements	_____	_____	_____
ac. Duct weight & hanger loading	_____	_____	_____
ad. Allowable boundary leakage	_____	_____	_____
ae. Space sound levels (noise calc)	_____	_____	_____
af. Other	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

_____ _____

Prepared by **Date**

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
2. Instrumentation and Controls			
a. Instrument setpoint design basis document			
b. Instrument setpoint uncertainty calculation			
c. Instrument loop uncertainty calculation			
d. Control loop response time design process document			
e. Instrument scaling document			
f. Other (list below)			

_____ _____
Prepared by **Date**

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
3. Electrical			
a. Diesel generator sizing			
b. Safety-related power cable sizing			
c. Safety-related system voltage			
d. Safety-related system short circuit analysis			
e. Diesel generator performance			
f. Safety-related bus transfer analysis			
g. 480V and higher MCC and switchgear			
h. Protection and coordination			
i. Class 1E battery sizing			
j. Uninterruptible power supply sizing			
k. Low voltage and DC cable sizing			
l. Low voltage AC system protection and coordination			
m. DC system protection and coordination			

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
n. Electrical separation analysis			
o. Raceway fill and loading			
p. Control circuit voltage analysis			
q. Maximum cable lengths (voltage and power)			
r. other (list below)			

_____ _____
Prepared by Date

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
4. Civil			
a. Piping rupture restraints			
b. Bolt anchorage in Category I			
c. Seismic analysis of electrical conduit			
d Category I supports (pipe, duct conduit, tray and instrumentation, and NSSS supports)			
e. Other (list below)			

Prepared by **Date**

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
5. Piping (Use CK-MP3-03-16 in conjunction with this checklist.)			
a. ASME Class 1 piping analysis			
b. ASME Class 2 & 3 piping analysis			
c. Non-ASME piping analysis			
d Simplified small bore and tubing analysis			
e. Other (list below)			

_____ _____
Prepared by **Date**

Design Process Document Review Checklist

Design Process Document Type	Applicable	Not Applicable	Document No.
6. Equipment Qualification (Use CK-MP3-03-10 and 11 in conjunction with this checklist.)			
a. Seismic qualification			
b. Environmental qualification			
c. Other (list below)			

Prepared by _____ Date _____

Design Process Document Review Checklist

Design Process Document Type	Rev.	Design Process Document No.	Rev.

Note: This page is to be used if there are multiple design process documents for a specific design process document type.

Design Process Document Review Checklist

Review Attributes

Design Process Document No./Rev.: _____

Attributes	Sat	Unsat	Comment
A. Numerical Accuracy			
1. Numerical aspects and mathematical operation are error free.	_____	_____	_____
2. Significant digits are consistent with input data, assumptions and methodology.	_____	_____	_____
3. Transposed or transferred numbers are correct.	_____	_____	_____
B. Modeling Accuracy			
1. Analytical models are consistent with input data, assumptions and methodology.	_____	_____	_____
C. Assumptions and Engineering Judgment			
1. Assumptions and engineering judgment is consistent with design approach and methodology.	_____	_____	_____
D. Design Inputs			
1. Design inputs are consistent with latest controlled documents.	_____	_____	_____
2. Design inputs have been properly transposed.	_____	_____	_____
E. Methodology			
1. The methodology is consistent with the purpose and scope of the design process document.	_____	_____	_____

_____ _____

Prepared by **Date**

Design Process Document Review Checklist

Comment Sheet

Design Process Document No./Rev. _____

Comment No.	Comment

_____ _____
Prepared by **Date**

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-4.1, Rev. 0

P&ID Review Checklist

Prepared by:	A.A. NERI		4-7-97
	Name	Signature	Date
Approved by:	D.K. Schopfer		4-25-97
	Name	Signature	Date

IMPLEMENTATION

System	
P&ID No./Rev.	
Verified by:	
Concurrence by:	

P&ID Review Checklist

Instructions

This checklist supplements PI-MP3-02 and is used to document the review of P&ID's. A single checklist will be used for all P&ID's associated with a given system. The checklist shall be completed in accordance with the following instructions.

a. The Verifier shall review the P&ID's against each attribute listed on Page 3 of the checklist.

b. The Verifier shall indicate for each attribute, whether the P&ID is satisfactory or unsatisfactory.

c. The Verifier shall assign a sequential comment number to each response indicated on Page 3 and shall use the Page 4 comment sheet to provide justification for the responses on Page 3. Multiple Page 4's may be used. The justification shall list documents reviewed versus each attribute to ensure P&ID consistency and correctness.

d. When completed, the Verifier shall sign and date the checklist cover sheet.

e. The Lead Verifier shall indicate his concurrence on the cover sheet that the P&ID review has been adequately completed.

f. The system name shall be entered on all sheets of the checklists. The sheet numbers shall be sequentially numbered (i.e. 1,2,3, etc.). It is acceptable to add insert pages (i.e., 1A, 1B, 1C, etc.) if needed.

P&ID Review Checklist

P&ID No.(s): _____ _____ _____ _____ _____

Revision: _____ _____ _____ _____ _____

Attributes	Satisfactory	Unsatisfactory	Comment
a. If System is within NSSS scope, the P&ID conforms to the NSSS P&ID.	_____	_____	_____
b. Pipeline sizes shown on the P&ID agree with line sizing calculations.	_____	_____	_____
c. Pipeline class breaks shown on P&ID are consistent with classification requirements identified on system requirements list (CK-MP3-02--01)	_____	_____	_____
d. Pipe wall thickness from referenced piping design table is consistent with design pressure and temperature calculations.	_____	_____	_____
e. Valve and other in line component data shown on P&ID is consistent with applicable list or database.	_____	_____	_____
f. System functional configuration shown on P&ID allow system to perform functional requirements identified on System Requirements List (Checklist CK-MP3-02-01).	_____	_____	_____

P&ID Review Checklist

Attributes	Satisfactory	Unsatisfactory	Comment
g. Controls and Interlocks shown on P&ID will allow sytem to perform functional requirements identified on CK-MP3-02-01.			
h. System redundancy requirements if applicable from CK-MP3-02-01 are satisfied.			
i. Airflows shown on P&ID agree with system requirement calculations and duct work layout drawings.			
j. Water flows shown on P&ID agree with system requirement calculations.			
k. Dampers, coils, filters, and other duct mounted component data shown on P&ID is consistent with applicable list or database.			

P&ID Review Checklist

Comment Sheet

P&ID No.(s): _____ _____ _____ _____ _____

Revision: _____ _____ _____ _____ _____

Comment No.	Comment

Northeast Utilities
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System Review Checklist

CK-MP3-02-4.2, Rev. 0

Logic Diagram Review Checklist

Prepared by:	J.W. DeMarco	J.W. DeMarco	4-7-97
	Name	Signature	Date
Approved by:	A.A. NER.	A.A. Ner.	4-10-97
	Name	Signature	Date

IMPLEMENTATION

System		
Document No. / Rev.		
Verified by:		Date:
Concurrence by:		Date:

Logic Diagram Review Checklist

Instructions

This checklist supplements PI-MP3-02 and is used to document the review of Logic Diagrams. A single checklist shall be used for all Logic Diagrams associated with a given system. The checklist shall be completed in accordance with the following instructions:

a. The Verifier shall review the Logic Diagrams against each attribute listed on Page 3 of the checklist.

b. The Verifier shall indicate for each attribute whether the Logic Diagram is satisfactory or unsatisfactory. If the attribute is not applicable, the Verifier shall indicate NA in both columns.

c. The Verifier shall assign a sequential comment number to each response indicated on Pages 3 and 4 and shall use the Page 5 comment sheet to provide justification for the responses on Pages 3 and 4. Multiple Page 5's may be used. The justification shall list documents reviewed versus each Logic Diagram to ensure Logic Diagram consistency and correctness.

d. Discrepancies shall be processed in accordance with PI-MP3-11.

e. When completed, the Verifier shall sign and date the checklist cover sheet.

f. The Lead Verifier shall indicate the Verifier's concurrence on the cover sheet that the Logic Diagram review has been adequately completed.

g. The Lead Verifier shall compile the individual checklists and enter the system name on each sheet, number the sheets sequentially and sign the cover sheet. The sheet numbers shall be sequentially numbered (i.e., 1, 2, 3, etc.). It is acceptable to add insert pages (i.e., 1A, 1B, 1C, etc.) if needed.

h. The cover sheet and all applicable checklists and comment forms shall be included in the final project file copy.

Logic Diagram Review Checklist

Logic Diagram No.(s): _____ _____ _____ _____ _____

Revision: _____ _____ _____ _____ _____

	Attributes	Satisfactory	Unsatisfactory	Comment
a.	If System is within NSSS scope, the Logic Diagram conforms to the NSSS drawing format and symbols.	_____	_____	_____
b.	If System is not within NSSS scope, the Logic Diagram conforms to the Station or other acceptable drawing format and symbols.	_____	_____	_____
c.	If System is within NSSS scope, the Logic Diagram conforms with the NSSS Design Criteria.	_____	_____	_____
d.	If System is not within NSSS scope, the Logic Diagram conforms with the Station Design Criteria.	_____	_____	_____
e.	If System is within NSSS scope, the Logic Diagram conforms with the NSSS System Description.	_____	_____	_____
f.	If System is not within NSSS scope, the Logic Diagram conforms with the Station System Description.	_____	_____	_____
g.	The Logic Diagram conforms with the controls and interlocks identified in the System P&ID.	_____	_____	_____
h.	The Logic Diagram conforms with the controls and interlocks identified in the FSAR.	_____	_____	_____
i.	The Logic Diagram conforms with the controls and interlocks identified in the Technical Specification.	_____	_____	_____

Logic Diagram Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
j.	The Logic Diagram shows the basic control and interlocking functions for the following:			
	1) Control from the main control room.	_____	_____	_____
	2) Control from the local control station, as appropriate.	_____	_____	_____
	3) Interlocking from system process variables, as appropriate.	_____	_____	_____
	4) Interlocking electrical functions, such as circuit breaker trip, loss of power, low voltage, and/or others as appropriate.	_____	_____	_____
	5) Interlocking from complex protective circuits, such as Boiler-Turbine-Generator Trip, Reactor Protection System, and or others as appropriate.	_____	_____	_____
	6) Interlocking with other devices which originate on the diagrams and cross-referencing to other devices or diagrams as appropriate.	_____	_____	_____
	7) Annunciation and/or computer functions, ESF Status Indication, and/or others as appropriate.	_____	_____	_____
	8) Time delay functions.	_____	_____	_____
k.	Logic Diagram is suitably identified by System or equipment description, Station, date of issuance, page number, revision, and nuclear safety-related classification.	_____	_____	_____
l.	Other attributes			
	1)	_____	_____	_____
	2)	_____	_____	_____
	3)	_____	_____	_____

Prepared by _____ Signature _____ Date _____

Logic Diagram Review Checklist

Logic Diagram Review Comment Form

Comment No.	Comment

Prepared by _____ Signature _____ Date _____

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-04.3, Rev. 0

Schematic Review Checklist

	DAVID A. SCHROEDER		4/10/97
Prepared by:	IAN WARNER	Ian Warner	4/7/97
	Name	Signature	Date
Approved by:	A.A. NERI		4/10/97
	Name	Signature	Date

IMPLEMENTATION

System	
Schematic Drawing No./Rev.	
Verified by:	
Concurrence by:	

Schematic Review Checklist

Instructions

This checklist supplements PI-MP3-02 and is used to document the review of schematics. A single checklist will be used for all schematics associated with a given system. The checklist shall be completed in accordance with the following instructions.

a. The Verifier shall review the schematics against each attribute listed in the checklist.

b. The Verifier shall indicate, for each attribute, whether the schematic is satisfactory or unsatisfactory.

c. The Verifier shall assign a sequential comment number to each response and shall use the comment sheet to provide justification for the responses. Multiple comment sheets may be used. The justification shall list documents reviewed versus each schematic to ensure schematic consistency and correctness.

d. When completed, the Verifier shall sign and date the checklist cover sheet.

e. The Lead Verifier shall indicate his concurrence on the cover sheet that the schematic review has been adequately completed.

f. The system name shall be entered on all sheets of the checklists. The sheet numbers shall be sequentially numbered (i.e. 1, 2, 3, etc.). It is acceptable to add insert pages (i.e., 1A, 1B, 1C, etc.) if needed.

Schematic Review Checklist

Schematic Drawing No.(s): _____ _____ _____ _____

Revision: _____ _____ _____ _____

	Attributes	Satisfactory	Unsatisfactory	Comment
1.0	**PHASING DIAGRAMS**			
1.1	Is there a summary of system phasers shown for all voltage levels involved?			
1.2	Is the "North" geographic arrow and equipment shown on this drawing positioned to agree with the arrow and equipment as shown on the General Arrangement Drawings?			
1.3	Are system and nameplate phasers shown for each power transformer?			
1.4	Are all terminals identified and located physically at the generators and transformers?			
1.5	Do the phase connections at all terminals agree with the system phase requirements?			
1.6	Are bus runs geographically correct for all phases?			
1.7	Are phase transposition points shown?			
1.8	Are cable runs and bus runs differentiated?			
1.9	Are switchgear fronts indicated?			
1.10	Are switchgear buses identified by phases front to rear, top to bottom, or left to right?			
1.11	Other checks, explain.			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
2.0	**SINGLE LINE DIAGRAMS OR ONE LINE DIAGRAMS**			
2.1	Are all phasers for generators, power transformers and potential transformers shown with displacement and orientation the same as on the Phasing Diagram?			
2.2	Is the generator excitation system shown in accordance with the appropriate vendor information?			
2.3	Are generator and power transformer ratings complete in all respects and according to the vendor's nameplate drawing and in sequence as shown?			
2.4	Are quantities and rating of instrument transformers (current and potential) and auxiliary transformers in accordance with design input?			
2.5	Are current transformer connections correct, wye or delta?			
2.6	Do all current transformer circuits show the actual sequence of relays and instruments as they are physically connected?			
2.7	Is the ground for the power transformer neutral overcurrent relay current transformer secondary shown physically nearest to the power transformer winding?			
2.8	Is each circuit breaker shown with a correct device or component number?			
2.9	Are the buses identified correctly?			
2.10	Are all bus current and voltage ratings indicated?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
2.11	Are all breakers and starters and/or contractors shown, including unassigned, blank and future spaces for future additions?			
2.12	Are all cubicles and compartments identified with cubicle and compartment numbers respectively?			
2.13	Do main and reserve power source references include reference to other appropriate diagrams?			
2.14	Have all potential and current transformers within the switchgear been shown in their correct locations with ratings and quantities designated and with any remote continuation properly identified?			
2.15	Is the information table for services, etc., complete?			
2.16	Is reference made to any special forms covering breaker and starter rating limitations?			
2.17	Are adequate notes and reference drawings shown on drawings? Have services requiring "Power-Lock-Out" been identified and is it noted on the drawings that power restoration is specifically permitted only when allowed by Plant Operating Procedures or Technical Specifications?			
2.18	Are applicable segregation identification reference codes shown on the drawing?			
2.19	Other checks, explain.			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
3.0	**RELAYING & METERING DIAGRAMS**			
3.1	Are the equipment/cable safety classifications and segregation codes consistent with the associated components?			
3.2	Does the drawing layout follow the Single Line Diagram as closely as possible?			
3.3	Are equipment types, locations and device numbers according to the Single Line Diagram?			
3.4	Are all phasers shown positioned identically to the Phasing Diagram and/or Single Line Diagram phasers?			
3.5	Are polarity marks and terminal numbers shown for all power transformers, current transformers and potential transformers according to appropriate vendor drawings?			
3.6	Do current transformer and potential transformer connections and ratios agree with those on the Single Line Diagram?			
3.7	Does the sequence of current transformer circuit connections agree with the Single Line Diagram?			
3.8	Are all test switches shown properly connected and distinctly identified (e.g., current enters test switch on jack side)?			
3.9	Are all current and potential circuits grounded correctly and with the location of the ground connections identified?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
3.10	Are current transformer connections for differential relays correct?			
3.11	Do current and potential phase connections to all equipment terminals [illegible] with appropriate [illegible] and/or catalog information?			
3.12	For devices requiring directional operation, (e.g., directional relays, wattmeters, varmeters, power factor meters, etc.) are the current and/or potential terminals properly identified with a plus (+) sign, denoting positive polarity.			
3.13	Are all computer input points identified at corresponding transducers?			
3.14	Are the ammeter and voltmeter switch developments correctly shown?			
3.15	Are all device terminals identified according to appropriate vendor information?			
3.16	Are all fuses, fuse ratings and other disconnect devices shown?			
3.17	Are wire codes or similar identification means used where external cable connections are required?			
3.18	Are terminal block connection points identified?			
3.19	Are associated instrument numbers shown with the device designations?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
3.20	Have instrument and equipment numbers been referenced in the applicable instrument or equipment lists?			
3.21	Are the appropriate potential phase continuations shown?			
3.22	Do switchgear potential circuits show or refer to additional circuit burdens as shown on the Key Diagrams (e.g., bus auxiliary loads requiring watthour meters, run time meters, etc.)?			
3.23	Are transformer internal winding circuits configured consistent with system phasing requirements?			
3.24	Other checks, explain.			
4.0	**SYNCHRONIZING DIAGRAMS**			
4.1	Are the equipment/cable safety classifications and segregation codes consistent?			
4.2	Does the drawing layout follow the Single Line Diagram as closely as possible?			
4.3	Are all phasors shown positioned identically to the Phasing Diagram and/or Single Line Diagram phasors?			
4.4	Is the synchronizing potential on the phasor shown to distinguish it from the other phasor leg(s)?			
4.5	Are phasors and ratings shown for all auxiliary potential transformers?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
4.6	Are "incoming" and "running" potential continuations referenced to the proper phase on the applicable Relaying and Metering Diagram?			
4.7	Are the synchronizing switch developments correctly shown?			
4.8	Are instrument numbers shown for the synchronizing switches and other synchronizing devices?			
4.9	Are all device terminals identified according to appropriate vendor information?			
4.10	Are the wire codes (if required) shown identical to the wire codes shown on the Relay and Metering Diagrams?			
4.11	Do the synchronizing switch and/or synchroverifier relay developments reference contacts to the applicable DC breaker control schematics?			
4.12	Other checks, explain.			
5.0	**SCHEMATIC DIAGRAMS**			
5.1	Are the equipment/cable safety classifications and segregation codes consistent with the associated components and system assignments?			
5.2	Are all device terminals identified according to appropriate vendor information?			
5.3	Is the operating mode defined for all level, temperature, pressure or vacuum switches?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
5.4	Is the operating mode defined for all time delay relay coils and their contacts?	_____	_____	_____
5.5	Has the schematic been developed utilizing the appropriate number of wires to minimize the ac or dc control circuit conductor lengths in accordance with the maximum length guidelines?	_____	_____	_____
5.6	Are all control or instrument circuits properly shown as grounded or ungrounded circuits?	_____	_____	_____
5.7	Are all test switches shown properly connected and distinctly identified?	_____	_____	_____
5.8	Are all fuses, fuse ratings and other disconnect devices shown?	_____	_____	_____
5.9	Are terminal block connection points (i.e., terminal numbers) identified and consistent with associated wiring drawings?	_____	_____	_____
5.10	Are wire codes (if required) used when external cable connections are required?	_____	_____	_____
5.11	Are contacts cross-referenced to the Schematic Diagrams on which the initiating device (relay coil, etc.) is located?	_____	_____	_____
5.12	Does the drawing show correct developments for control switches, limit switches, relays, timers, etc., with contacts cross-referenced to other Schematic Diagrams where applicable?	_____	_____	_____

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
5.13	Have any contacts been changed since the initial order with the manufacturer for relays requiring seismic qualification? If yes, does the following statement appear on the wiring drawing? "To retain the relays' seismic qualification, changes made in the field to the arrangement of relay contacts (for example, NO to NC or vice versa) shall be done in strict accordance with the relay manufacturers instructions." This is to ensure that any required critical relay adjustments, i.e., coil pick-up, contact gap or wipe, are done properly?	_____	_____	_____
5.14	In the case of reproduced Schematic Diagrams of vendor "package" systems (water treating, ash handling, etc.), are the cross-references, vendor's unique symbols and notes, interlocks and interfaces with other system Schematic Diagram Circuits identified correctly?	_____	_____	_____
5.15	If the schematic diagram is a reproduction, redraw, or revision of a design by others (e.g., NSSS vendor), and considering that all designers do not necessarily use common drafting nomenclature/convention, have the device contacts been correctly shown (e.g., NC vs. NO)?	_____	_____	_____

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
5.16	If this drawing is reproduced or redrawn from a vendor drawing, is reference to the vendor drawing indicated above the title block?			
5.17	Is cross-reference to the associated Wiring Diagrams included?			
5.18	Are adequate notes and reference drawings shown on drawings? In particular, have services requiring "Power-Lock-Out" been identified and is it noted on the drawings that power restoration is specifically permitted only when allowed by Plant Operating Procedures or Technical Specifications?			
5.19	Have instrument, equipment or valve numbers been documented on the drawings and the schematic drawing number referenced in the appropriate column on instrument, equipment or valve lists?			
5.20	Are applicable segregation identification reference codes shown on the drawing?			
5.21	Does the schematic diagram accurately reflect the design information shown on P&IDs, data sheets, logic diagrams/functional descriptions and Vendor/Manufacturer's drawings.			
5.22	For modifications do the breaker control circuits correctly operate when interacting with the breaker's anti-pumping feature.			
5.23	Do breaker control circuits correct operate when interacting with the breaker's anti-pumping feature?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
5.24	Does the control system described by the schematic diagram function correctly under all conditions (e.g., starting, stopping, etc.)?			
5.25	Are control devices (e.g., pressure switch, level switch, etc.), being applied within their published rating (voltage rating, continuous current rating, current interrupting rating)?			
5.26	Does the schematic diagram indicate the interlocking required for proper operation of the equipment?			
5.27	Does the schematic diagram indicate controls at the required locations (e.g., local, remote, control room)?			
5.28	Does the schematic diagram indicate the required alarms?			
5.29	Are all control circuits fused properly (in accordance with project specific criteria) and is the control power source adequate?			
5.30	Is the control power source correct (e.g. ac vs dc, interruptible vs. non-interruptible, etc.)?			
5.31	Does the schematic diagram indicate the required monitoring features e.g., indicating lamps, voltmeter, ammeter, etch?			
5.32	Does the schematic diagram indicate the required test functions?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
5.33	If the schematic diagram includes design data derived from calculations (e.g. time delay relay setting) do these calculations support the data?			
5.34	Are the control circuit conductor lengths within the maximum length guidelines or approved project guidelines?			
5.35	Are the equipment/cable safety classifications and segregation codes consistent with the associated system design?			
5.36	Other checks, explain.			
6.0	**THREE LINE DIAGRAMS**			
6.1	Does the drawing layout follow the single line diagram as closely as possible?			
6.2	Do the three-phase power connections agree with the phasing diagram?			
6.3	Do the three-phase power terminals and transformer internal winding circuits agree with vendor nameplate drawings and are internal winding circuits consistent with system phasing requirements?			
6.4	Are all current transformers, disconnecting devices, tap-offs, potential transformers and other connections on the three-phase power circuits located and shown in correct sequence according to the single line diagram and vendor drawings?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
6.5	Have power transformer taps and current transformer ratio tables been correctly shown on this diagram?			
6.6	Are all phasors shown positioned identical to the phasing diagram and single line phasors?			
6.7	Are polarity marks and terminal numbers shown for all power transformers, current transformers and potential transformers according to appropriate vendor drawings?			
6.8	Are wire designations and color codes (if required) shown on both ends of cables?			
6.9	Are terminal blocks located and wired to meet segregation and separation requirements?			
6.10	Is the segregation code, Class 1E Division, etc., for each cable shown, applicable?			
6.11	Is there a reference on the drawing to the respective schematic for determination and redundancy and separation requirements?			
6.12	Is the correct wiring diagram drawing number shown for the other end of the cable (if wiring diagram has been completed)?			
6.13	Are power, control and instrumentation cable shields shown correctly?			
6.14	Does each device have a cross-reference to its Schematic Diagram?			
6.15	Other checks, explain.			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
7.0	**LOOP SCHEMATICS**			
7.1	Have the latest vendor drawings for the instruments on the loop schematic been reviewed and processed? Have all required components including junction boxes, electrical penetrations, etc., been shown and are they in the correct loop arrangement?			
7.2	Have all components been correctly numbered and titled?			
7.3	Have all instrument components been correctly located with location or equipment numbers shown?			
7.4	Do the loop components match with regard to input/output signal voltage, current and scaling factors?			
7.5	Have switch developments been shown for all loop selector switches?			
7.6	Have the instrument loops been properly fused?			
7.7	If isolation devices are required, have they been included?			
7.8	Are instrument loop burdens acceptable for the power supply and loop components capabilities?			
7.9	Have required grounds been shown for all loop components?			
7.10	Have required external power requirements been shown?			
7.11	Have contact or cutoff outputs been shown and correctly referenced to other drawings as required?			

Schematic Review Checklist

	Attributes	Satisfactory	Unsatisfactory	Comment
7.12	Are fail safe output modes required and have they been implemented correctly?			
7.13	If shielded cables are required, have they been used and have the shields been grounded at the correct location and only at that location?			
7.14	Have all required terminations (including plug connections) been shown with correct terminal designations indicated and is the polarity correct for loop operation?			
7.15	Have terminations in high humidity areas been eliminated or minimized?			
7.16	Have cable numbers been indicated, if required?			
7.17	Are wire codes (if required) used when external cable connections are required?			
7.18	Are contacts cross-referenced to the Schematic Diagrams on which the initiating device (relay coil, etc.) is located?			
7.19	Other checks, explain.			

Schematic Review Checklist

Comment Sheet

Schematic Drawing No.(s): __________ __________ __________ __________

Revision: __________ __________ __________ __________

Comment No.	Comment

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02 - 5.1, Rev. 0

Mechanical Component Review Checklist

Prepared by:	A A NEK		4-10-97
	Name	Signature	Date
Approved by:	D.K. Schopfer	D.K. Schopfer	4-11-97
	Name	Signature	Date

IMPLEMENTATION

System	
Verified By:	
Concurrence By:	

Mechanical Component Review Checklist

Instructions

This checklist supplements PI-MP3-02 and shall be used for the Mechanical Component Review process described in the PI. The application and use of this checklist shall be as follows:

1. The Lead Verifier shall identify all mechanical components included in the scope of the review and shall list the component ID and description on the form included as page 3 of this checklist. The Lead Verifier shall sign and date the form when this step is completed.

2. The Lead Verifier and/or Verifiers shall then complete an individual component checklist for each system component using the applicable component specific checklists included here in. The Lead Verifier and/or Verifiers shall sign and date the individual checklists when completed. For each component specific checklists, the Lead Verifier and/or Verifier shall:

   a) Enter the component ID

   b) Enter, for each attribute on the checklist, the requirement or data listed in the licensing documents, specifications, calculation, vendor or design drawings and lists or database. Enter NA if not applicable.

   c) Enter Yes/No/NA as applicable in the "Acceptable" column.

   d) For each "No" response, assign a comment number and use the form on page 4 to explain the No response. Discrepancies shall then be processed for PI-MP3-11.

3. Once the review has been completed, the Lead Verifier shall compile the individual component checklists, enter the system name on each sheet, number the sheets sequentially and sign the cover sheet. Only applicable component specific checklists shall be included in the final packages. Checklists for component types not applicable to the system being reviewed shall be omitted.

4. The SRG Lead shall indicate his concurrence that the mechanical component review process has been completed by signing the cover sheet.

5. If needed due to subsequent revisions, insert pages can be as 1A, 1B, 2A, 2B, etc.

System ______________________________
Sheet ______ of ______

Mechanical Component Review Checklist

Mechanical Equipment List

Equipment ID	Description

Prepared by: ______________________________ / ______________
Name Date

Mechanical Component Review Checklist

Mechanical Component Review Comment Form

Comment No.	Comment

_________________________ Prepared by

_________________________ Signature

_____________ Date

Mechanical Component Review Checklist

PUMPS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type/Stages							
3.	Material							
4.	Pressure Rating							
5.	Driver Characteristics							
6.	Connection - Size							
7.	Connection - Weld/Flange End							
8.	Seal Type							
9.	Lubrication System							
10.	Bearing Type							
11.	Manufacturer/Model							
12.	Service/Fluid							
13.	Operating Modes							
14.	Controls/Interlocks/Trips							
15.	Seismic Classification							
16.	ASME Code Class							
17.	Design Pressure							
18.	Design Temperature							
19.	Design Flow							
20.	Minimum (Recirc.) Flow							

Mechanical Component Review Checklist

PUMPS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21.	Maximum (Runout) Flow							
22.	Design Discharge Head							
23.	Design Suction Head							
24.	Design Total Developed Head							
25.	Maximum Shutoff Head							
26.	NPSH Available							
27.	NPSH Required							
28.	Electrical Class							
29.	EQ Requirement							
30.	SQ Requirement							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

TANKS & VESSELS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type-Vertical/Horizontal							
3.	Pressure Rating							
4.	Materials							
5.	Connections - Number/Size/Orientation							
6.	Connections-Weld/Flange Ends							
7.	Insulation							
8.	Mounting Details							
9.	Overall Dimensions							
10.	Heaters/Heat Tracing							
11.	Diaphragms							
12.	Coatings/Liners							
13.	Service/Fluid							
14.	Operating Modes							
15.	Seismic Classification							
16.	Controls/Interlocks/Trips							
17.	Radiation Monitoring							
18.	Temperature Control							
19.	ASME Code Class							
20.	Capacity							

Mechanical Component Review Checklist

TANKS & VESSELS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21.	Design Pressure							
22.	Design Temperature							
23.	Normal Flows							
24.	Surge Flows							
25.	Overpressure Protection							
26.	Vacuum							
27.	Fluid Properties							
28.	Venting/Overflow							
29.	Environmental Qualification							
30.	Seismic Qualification							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

CONTAINMENT ISOLATION VALVES

Component ID. _____

Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1. Tag No./Identification							
2. Body Type							
3. Material							
4. Pressure Rating							
5. Connection - Size							
6. Connection - Weld/Flange Ends							
7. Normal Position							
8. Type of Operator							
9. Loss of Air/Elec.-Failed Position							
10. Seismic Classification							
11. Required Motor Torque							
12. Stroking Time							
13. ASME Code Class							
14. Design Pressure							
15. Design Temperature							
16. Fluid Design Flow							
17. Differential Pressure							
18. Seismic Qualification Required							
19. Environmental Qualification Required							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

GENERAL APPLICATION VALVES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Body Type							
3.	Material							
4.	Pressure Rating							
5.	Connection - Size							
6.	Connection - Weld/Flange Ends							
7.	Modulating or On-Off							
8.	Normal Position							
9.	Type of Operator							
10.	Loss of Air/Elec. - Failed							
11.	Seismic Classification							
12.	Normal Position							
13.	Type of Operator							
14.	Loss of Air/Elec. - Failed							
15.	Seismic Classification							
16.	Required Motor Torque							
17.	Stroking Time							
18.	Limit Switches							
19.	Solenoid Valves							
20.	ASME Code Class							

Mechanical Component Review Checklist

GENERAL APPLICATION VALVES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21.	Design Pressure							
22.	Design Temperature							
23.	Fluid Design Flow							
24.	Differential Pressure							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

CHECK VALVES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Body Type							
3.	Material							
4.	Pressure Rating							
5.	Connection - Size							
6.	Connection - Weld/Flange Ends							
7.	Seismic Classification							
8.	Leakage rating							
9.	Type							
10.	Water hammer considerations							
11.	ASME Code Class							
12.	Design Pressure							
13.	Design Temperature							
14.	Fluid Design Flow							
15.	Differential Pressure							
16.	Seismic Qualification Required							
17.	Equipment Qualification Required							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HEAT EXCHANGE EQUIPMENT

Component ID. _____ __

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Materials/Thickness							
	- Tube							
	- Shell							
4.	Outside Diameter							
	- Tube							
	- Shell							
5.	Number of Passes							
	- Tube Side							
	- Shell Side							
6.	Main Nozzle Sizes							
	- Tube Inlet							
	- Tube Outlet							
	- Shell Inlet							
	- Shell Outlet							
7.	Weight							
	- Empty							
	- Full							
8.	Control/Interlocks/Trips							

Mechanical Component Review Checklist

HEAT EXCHANGE EQUIPMENT

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
9.	Fluid Description - Tube Side - Shell Side							
10.	Operating Modes							
11.	Service Requirements							
12.	Tube/Shell Leakage Requirements							
13.	ASME Code Class							
14.	Sizing Codes and Standards							
15.	Heat Transfer Area							
16.	Heat Transfer Load							
17.	Design Operating Pressures - Tube Inlet - Tube Outlet - Shell Inlet - Shell Outlet							
18.	Design Operating Temperatures - Tube Inlet - Tube Outlet - Shell Inlet - Shell Outlet							

Mechanical Component Review Checklist

HEAT EXCHANGE EQUIPMENT

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
19.	Design Operating Flow - Tube Side - Max. ΔP - Shell Side - Max. ΔP							
20.	Number/Size of Vents - Tube Side - Shell Side							
21.	Number/Size of Drains - Tube Side - Shell Side							
22.	Overpressure Protection							
23.	Equipment Qualification Required							
24.	Seismic Qualification Required							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

PIPING INLINE COMPONENTS

Component ID. _____

Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1. Tag No./Identification							
2. Material							
3. Pressure Rating							
4. Overpressure Protection							
5. Size							
6. Weld/Flange Ends							
7. Attachments/Accessories							
8. Gasketing/Seals							
9. Weight							
10. Service/Fluid							
11. Operating Modes							
12. Seismic Classification							
13. Codes and Standards							
14. Design Flow							
15. Design Pressure							
16. Design Temperature							
17. Size							
18. Pressure Drop							
19. Equipment Qualification Required							
20. Seismic Qualification Required							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

PRESSURE RELIEF DEVICES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Manufacturer/Model							
4.	Pressure Rating							
5.	Material							
6.	Exhaust Path							
7.	Accessories							
	1. Backpressure Bellows							
	2. Pilot Relief Valve							
	3. Lifting Lever							
	4. Silencer							
8.	Connection-Size							
9.	Connection-Weld/Flange End							
10.	Limit Switches							
11.	Operator							
12.	Solenoid Valves							
13.	Service/Fluid							
14.	Operating Mode							
15.	Seismic Classification							
16.	Controls/Interlocks/Setpoint							
17.	ASME Code Class							

Mechanical Component Review Checklist

PRESSURE RELIEF DEVICES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
18.	Design Flow							
19.	Design Pressure							
20.	Design Temperature							
21.	Max. Differential Pressure							
22.	Fluid Properties							
23.	Accumulation/Blowdown							
24.	Back Pressure							
25.	Setpoint/Relief Pressure							
26.	Equipment Qualification Required							
27.	Seismic Qualification Required							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

CONTROL VALVES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Body Type							
3.	Material							
4.	Pressure Rating							
5.	Valve/Operator Manufacturer							
6.	Connection - Size							
7.	Connection - Weld/Flange Ends							
8.	Steam Leak Off Requirements							
9.	Flow Direction Thru Valve							
10.	Modulating or On-Off							
11.	Normal Position							
12.	Type of Operator							
13.	Loss of Air/Elec. - Failed Position							
14.	Seismic Classification							
15.	Required Motor Torque							
16.	Stroking Time							
17.	Limit Switches							
18.	Trim Design							
19.	Performance Characteristics - (Linear, Fast-opening, etc.)							
20.	ASME Code Class							

Mechanical Component Review Checklist

CONTROL VALVES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21.	Design Pressure							
22.	Design Temperature							
23.	Fluid Design Flow							
24.	Differential Pressure							
25.	CV							
26.	Equipment Qualification Required							
27.	Seismic Qualification Required							
28.	Design/Flow Range							
29.	1. Min. Flow							
30.	2. Normal Flow							
31.	3. Max. Flow							
32.	Leakage Rating/Tight Shutoff Requirements							
33.	Maximum P Valve must open or close against							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC DUCTS AND PLENUMS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Procurement Spec							
3.	Mfg./Fabricator							
4.	Pressure rating							
5.	Leakage rating							
6.	Material							
7.	Stiffener spacing							
8.	Hanger spacing							
9.	Weight							
10.	Codes and standards							
11.	Seismic class							
12.	Safety class							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC DUCT ACCESSORIES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement Spec.							
4.	Mfg.							
5.	Model No.							
6.	Size							
7.	Airflow							
8.	Pressure drop							
9.	Pressure rating							
10.	Leakage rating							
11.	Codes and standards							
12.	Weight							
13.	Safety classification							
14.	Seismic classification							
15.	EQ requirement							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC DAMPERS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type (control, isolation, fire, smoke, balancing)							
3.	Procurement spec							
4.	Mfg.							
5.	Model No.							
6.	Size							
7.	Airflow							
8.	Pressure drop							
9.	Pressure rating							
10.	Leakage rating							
11.	Safety classification							
12.	Seismic classification							
13.	Actuator type							
14.	Closing time							
15.	Maximum air velocity							
16.	EQ requirement							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC FANS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement Spec							
4.	Mfg.							
5.	Model No.							
6.	Airflow							
7.	Fan total pressure							
8.	Fan speed							
9.	Fan bhp required							
10.	Motor hp							
11.	Motor speed							
12.	Motor voltage/phase/frequency							
13.	Codes and standards							
14.	Safety classification							
15.	Seismic classification							
16.	EQ requirement							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC FILTERS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement Spec							
4.	Mfg.							
5.	Model No.							
6.	Efficiency							
7.	Airflow							
8.	Pressure drop							
9.	Size							
10.	Codes and standards							
11.	Bypass leakage							
12.	Housing leakage							
13.	Housing pressure rating							
14.	Drains							
15.	Fire Protection							
16.	Safety classification							
17.	Seismic classification							

_____ _____ _____
Prepared by Date

Mechanical Component Review Checklist

HVAC - LOUVERS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement spec							
4.	Mfg.							
5.	Model No.							
6.	Size							
7.	Airflow							
8.	Pressure drop							
9.	Pressure rating							
10.	Leakage rating							
11.	Safety classification							
12.	Seismic classification							
13.	Actuator type							
14.	Closing time							
15.	Maximum air velocity							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

REFRIGERATION UNITS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement Spec							
4.	Mfg.							
5.	Model No.							
6.	Capacity at rating conditions							
7.	Design load on unit							
8.	Minimum load on unit							
9.	Refrigerant number							
10.	Refrigerant suction temperature/pressure							
11.	Refrigerant condensing temperature/pressure							
12.	Condenser							
	Type (air/water cooled)							
	Tube material/configuration							
	Fin material/configuration							
	Number of passes/circuits							
	Air/water flow (max/min)							
	Air/water entering temperature (max/min)							
	Air/water leaving temperature							
	Pressure rating							
	Temperature rating							

Mechanical Component Review Checklist

Design fouling factor
Pressure drop

13. Evaporator
    - Type (direct expansion/chilled water)
    - Tube material/configuration
    - Fin material/configuration
    - Number of passes/circuits
    - Air/water flow (max/min)
    - Air/water entering temperature (max/min)
    - Air/water leaving temperature
    - Pressure rating
    - Temperature rating
    - Design fouling factor
    - Pressure drop
14. Capacity control
15. Interlocks and internal safeties
16. Pressure relief devices
17. Compressor type
18. Compressor motor kW
19. Compressor motor voltage/phase/frequency
20. Codes and standards
21. Safety classification
22. Seismic classification

_____ _____
Prepared by Date

Mechanical Component Review Checklist

ELECTRIC HEATING COILS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement spec.							
4.	Mfg.							
5.	Model No.							
6.	Capacity, kW							
7.	No. of stages							
8.	Airflow							
9.	Pressure drop							
10.	Size							
11.	Minimum velocity							
12.	Capacity control and safeties							
13.	Voltage/phase/frequency							
14.	Inlet configuration							
15.	Safety classification							
16.	Seismic classification							

_____ _____
Prepared by Date

Mechanical Component Review Checklist

COOLING COILS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Type							
3.	Procurement spec.							
4.	Mfg.							
5.	Model							
6.	Fluid							
7.	Tube material							
8.	Tube diameter							
9.	Tube wall thickness							
10.	Fin material							
11.	Fin pitch							
12.	Fin thickness							
13.	Number of tube rows							
14.	Number of tubes per row							
15.	Coil serpentine (passes/row)							
16.	Air flow							
17.	Face area							
18.	Air velocity							
19.	Entering air temperature							
20.	Leaving air temperatuare							
21.	Entering water temperature							
22.	Leaving water temperature							

Mechanical Component Review Checklist

23. Water flow
24. Water velocity
25. Fouling factor
26. Codes and standards
27. Safety classification
28. Seismic classification

_____ _____
Prepared by Date

Mechanical Component Review Checklist

PIPELINES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Material							
2.	Pressure Rating/sch							
3.	Size							
4.	Code Class.							
5.	Seismic Class							
6.	Design Pressure							
7.	Design Temperature							
8.	Operating Pressure							
9.	Operating Temperature							
10.	Insulation Thickness							

_____ _____
Prepared by Date

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02 -05.2, Rev. 0

Electrical Component Review Checklist

	DAVID A SCHROEDER	David A Schroeder	4/7/97
Prepared by:	IAN WARNER	Ian Warner	4/7/97
	Name	Signature	Date
Approved by:	A A. NEN	A A Nen	4/7/97
	Name	Signature	Date

IMPLEMENTATION

System	
Verified By:	
Concurrence By:	

Electrical Component Review Checklist

Instructions

This checklist supplements PI-MP3-02 and shall be used for the Electrical Component Review process described in the PI. The application and use of this checklist shall be as follows:

1. The Lead Verifier shall identify all electrical components included in the scope of the review and shall list the component ID and description on the form included as page 3 of this checklist. The Lead Verifier shall sign and date the form when this step is completed.

2. The Lead Verifier and/or Verifiers shall then complete an individual component checklist for each system component using the applicable component specific checklists included here in. The Lead Verifier and/or Verifiers shall sign and date the individual checklists when completed. For each component specific checklists, the Lead Verifier and/or Verifier shall:

   a) Enter the component ID

   b) Enter, for each attribute on the checklist, the requirement or data listed in the licensing documents, specifications, calculation, vendor or design drawings and lists or database. Enter NA if not applicable.

   c) Enter Yes/No/NA as applicable in the "Acceptable" column.

   d) For each "No" response, assign a comment number and use the form on page 4 to explain the No response. Discrepancies shall then be processed for PI-MP3-11.

3. Once the review has been completed, the Lead Verifier shall compile the individual component checklists, enter the system name on each sheet, number the sheets sequentially and sign the cover sheet. Only applicable component specific checklists shall be included in the final packages. Checklists for component types not applicable to the system being reviewed shall be omitted.

4. The SRG Lead shall indicate his concurrence that the electrical component review process has been completed by signing the cover sheet.

5. If needed due to subsequent revisions, insert pages can be as 1A, 1B, 2A, 2B, etc.

Electrical Component Review Checklist

Electrical Equipment List

Equipment ID	Description

Prepared by: _____ / _____
Name Date

Electrical Component Review Checklist

Electrical Component Review Comment Form

Comment No.	Comment

_____ _____ _____
Prepared by Signature Date

Electrical Component Review Checklist

CABLE

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Tag No./Identification							
2.	Ampacity							
3.	Size							
4.	Bending & Training Radius							
5.	Cables near Hot Equipment							
6.	Construction							
7.	Pulling Tension							
8.	Segregation							
9.	Separation							
10.	Short Circuit							
11.	Support e.g. Kellums Grip							
12.	Termination & Splicing							
13.	Voltage Drop							
14.	Type/Application							
15.	Radiation							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

CABLE COATINGS AND WRAPS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Ampacity Derating Factor							
2.	Application							
3.	Construction							
4.	Fire Rating							
5.	Material							
6.	Compatibility							
7.	Weight							
8.	Radiation							

Prepared by _____ Date _____

Electrical Component Review Checklist

CABLE TRAYS AND RISERS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Cable Bending Radius							
2.	Cable Fill							
3.	Cable Support							
4.	Cable Weight Loading							
5.	Covers							
6.	Material & Gauge							
7.	Routing							
8.	Seals and Wraps							
9.	Segregation							
10.	Separation							
11.	Tolerances							
12.	Type/Size							

_____ _____
Prepared by Date

Electrical Component Review Checklist

CONDUITS AND JUNCTION BOXES

Component ID. _____

Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1. Cable Bending Radius							
2. Cable Fill							
3. Cable Pulling							
4. Cable Support							
5. Design Tolerances							
6. Material							
7. Mounting							
8. Seals							
9. Segregation							
10. Drainage							
11. Separation							
12. Size/Arrangement & Fittings							
13. Grounding							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

ELECTRICAL DUCT RUNS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Cable Bending Radius							
2.	Cable Fill							
3.	Cable Pulling							
4.	Manhole/Handhole Cable Support							
5.	Manhole/Handhole Location and Size							
6.	Material							
7.	Seals							
8.	Segregation							
9.	Separation							
10.	Size/Arrangement/Cross Section & Fittings							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

BATTERIES

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Nominal Voltage							
2.	Nominal Amp-Hours							
3.	Duty Cycle							
4.	Number of Cells							
5.	Aging Factor							
6.	Ambient Temperature							
7.	Design Margin							
8.	Allowable Voltage Variation							
9.	Enclosure							
10.	Mounting							
11.	Available Fault Current							
12.	Recharge Time							
13.	Equalize Voltage							
14.	Float Voltage							
15.	Separation							
16.	Ventilation							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

ELECTRICAL PENETRATIONS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Codes & Design Standards							
2.	Configuration							
3.	Continuous Current							
4.	Grounding							
5.	Insulation Class & Type							
6.	Materials							
7.	Momentary Current							
8.	Withstand Current							
9.	Nominal voltage							
10.	Overcurrent Protective Devices							
11.	Pressure Rating							
12.	Separation							
13.	Size/Application							
14.	Temperature Rise							
15.	Time/Current							

_____ _____
Prepared by Date

Electrical Component Review Checklist

INVERTERS & CHARGERS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Allowable Input Frequency Variation							
2.	Allowable Input Voltage Variation							
3.	Allowable Output Frequency Variation							
4.	Allowable Output Voltage Variation							
5.	Compatibility with Downstream Loads							
6.	Cooling Requirements							
7.	Efficiency							
8.	Enclosure							
9	Grounding							
10.	Input/Output Current Limits							
11.	Input/Output Voltage Limits							
12.	Insulation Class & Type							
13.	Load/Battery Characteristics							
14.	Mounting							
15.	Noise Levels							
16.	Nominal Voltage							
17.	Power Factor							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

INVERTERS & CHARGERS

Component ID. _____

Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
18. Recharge Time							
19. Ripple							
20. Separation							
21. Service							
22. Short Circuit Capabilities							
23. Transfer Switch							
24. Temperature Rise							
25. Heat Loss							
26. Voltage Regulation							
27. Bypass Switch							

_____ _____
Prepared by Date

Electrical Component Review Checklist

DISTRIBUTION PANELS & CONTROL BOARDS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Circuit Breaker/Fuse Type							
2.	Configuration							
3.	Continuous Current							
4.	Control							
5.	Cooling Requirements							
6.	Temperature Rise							
7.	Heat Loss							
8.	Ambrent Temperature							
9.	Insulation Class & Type							
10.	Loads							
11.	Momentary Current							
12.	Mounting							
13.	Nominal Voltage							
14.	Protective Device types, Ratings, Ranges & Settings							
15.	Separation							
16.	Service							
17.	Source							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

SWITCHGEAR & MCCs

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Allowable Voltage Variation							
2.	Circuit Breaker/Fuse Type							
3.	Configuration							
4.	Grounding							
5.	Controls							
6.	Continuous Current							
7.	Interrupting Current							
8.	Withstand Current							
9.	Momentary Current							
10.	Cooling Requirements							
11.	Ambrent Temperature							
12.	Heat Loss							
13.	Insulation Class & Type							
14.	Surge Suppression							
15.	Materials							
16.	Mounting							
17.	Nominal Voltage							
18.	Protective Device Types, e.g. heaters, relays/ ratings, ranges, and settings							
19.	Separation							
20.	Service							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

SWITCHGEAR & MCCs

Component ID. _____

Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21. Source							
22. Temperature Rise							
23. Segregation							

_____ Prepared by

_____ Date

Electrical Component Review Checklist

TRANSFORMERS

Component ID. _____

	Attributes/Winding	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Nominal Voltage							
2.	Insulation Class, Type & BIL							
3.	Impedance & Tolerance							
4.	kVA Rating/Loads							
5.	Cooling Requirements							
6.	Configuration							
7.	Temperature Rise							
8.	Materials							
9.	Mounting							
10.	Type							
11.	Losses							
12.	Noise Level							
13.	Surge Suppression							
14.	Heat Load							
15.	Separation							
16.	Fire Protection							
17.	Winding Ratio and Taps							
18.	Grounding							

_____ _____
Prepared by Date

Electrical Component Review Checklist

FIRE STOPS AND SEALS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Ampacity Derating Factor							
2.	Application							
3.	Arrangement							
4	Configuration							
5.	Construction							
6.	Design Life							
7.	Fire Rating							
8.	Leakage Acceptance Criteria							
9.	Material Compatibility							
10.	Materials							
11.	Moisture							
12.	Penetration & Resealing							
13.	Radiation Levels							
14.	Thickness							
15.	Density & Weight							
16.	Tolerances							
17.	Water/Steam/Air/Pressure							

_____ _____
Prepared by Date

Electrical Component Review Checklist

MOTORS

Component ID. _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1.	Nameplate Horsepower							
2.	Driven Equipment Reqmts							
3.	Full Load Current							
4.	Locked Rotor Current							
5.	Duty							
6.	Accelerating Time							
7.	Frequency Variation							
8.	Voltage Variation							
9.	Configuration							
10.	Insulation Class							
11.	Mounting							
12.	Bearing type/lubrication							
13.	Power Factor							
14.	Rated Voltage							
15.	Service							
16.	Temperature Rise							
17.	Time/C urrent Characteristic							
18.	Minimum Starting Voltage							
19.	Radiation							
20.	Service Factor							

_____ Prepared by

_____ Date

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02-5.3, Rev. 0

I&C Component Review Checklist

Prepared by:	J. W. DeMarco	J W DeMarco	4-7-97
	Name	Signature	Date
Approved by:	A A NERI		4-10-97
	Name	Signature	Date

IMPLEMENTATION

System		
Verified by:		Date:
Concurrence by:		Date:

I&C Component Review Checklist

Instructions

This checklist supplements PI-MP3-02 and shall be used for the I&C Component Review process described in the PI. The application and use of this checklist shall be as follows:

1. The Lead Verifier shall identify all I&C components included in the scope of the review and shall list the component ID and description on the form included as Page 3 of this checklist. The Lead Verifier shall sign and date the form when this step is completed. Multiple Page 3's may be used.

2. The Lead Verifier and /or Verifiers shall then complete an individual component checklist for each system component using the applicable component checklists included herein. The Lead Verifier and /or Verifiers shall sign and date the individual checklists when completed. For each component specific checklist, the Lead Verifier and /or Verifiers shall:

   a) Enter the Component ID

   b) Enter, for each attribute on the checklist, the requirement or data listed in the licensing documents, specifications, calculations, vendor or design drawings and lists or database. Enter NA if not applicable.

   c) Enter Yes/No/NA as applicable in the "Acceptable" column.

   d) For each "No" response, assign a comment number and use the form on Page 4 to explain the "No" response. Discrepancies shall then be processed per PI-MP3-11.

3. Once the review has been completed, the Lead Verifier shall compile the individual checklists and enter the system name on each sheet, number the sheets sequentially and sign the cover sheet. Multiple Page 5's may be used. Only applicable component specific checklists shall be included in the final packages. Checklists for component types not applicable to the System being reviewed shall be omitted.

4. The SRG Lead shall indicate concurrence that the I&C component review process has been completed by signing the cover sheet.

5. If needed due to subsequent revisions, insert pages, numbered as 1A, 1B, 2A, 2B, etc., may be added.

6. The cover sheet and all applicable checklists and comment forms shall be included in the final project file copy.

I&C Component Review Checklist

I&C Component List

Component ID	Description

Prepared by _____ Signature _____ Date _____

I&C Component Review Checklist

I&C Component Review Comment Form

Comment No.	Comment

Prepared by _____ Signature _____ Date _____

I&C Component Review Checklist

INDICATORS

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1	Service							
2	Function							
3	Indicator Type							
4	Manufacturer							
5	Model Number							
6	Safety Classification							
7	Input Signal							
8	Range and Units							
9	Scale Range and Units							
10	Size							
11	Graduations							
12	Coil Rating							
13	Burden/Resistance							
14	Mounting Type							
15	Mounting Detail							
16	Accuracy							
17	Installation Location							
18	Environment							
19	Seismic Classification							
20	Separation Requirement							

I&C Component Review Checklist

INDICATORS (Continued)

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21	RG 1.97 Requirement							
22	Flood							
23	Access/Maintenance							
24	Isolation							
25	Connection Details							
26	Scale Banding							
27	Contract/Specification							
28	Codes and Standards							
29	Installation Specification							
30	Human Factors Interface							
31	Instrument Loop Interface							
32	Redundant To							
33								
34								
35								

Prepared by _____ Signature _____ Date _____

I&C Component Review Checklist

DETECTORS

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1	Service							
2	Function							
3	Detector Type							
4	Manufacturer							
5	Model Number							
6	Safety Classification							
7	Input Signal							
8	Range and Units							
9	Accessories							
10	Mounting Type							
11	Measurement Range and Units							
12	Background Radiation							
13	Energy Range							
14	Accuracy							
15	Setpoint							
16	Output Signal							
17	Instrument Loop Interface							
18	Connection Details							
19	Flow Rating							
20	Pressure Rating							

I&C Component Review Checklist

DETECTORS (Continued)

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21	Installation Location							
22	Environment							
23	Seismic Classification							
24	Separation Requirement							
25	RG 1.97 Requirement							
26	Flood							
27	Access/Maintenance							
28	Isolation							
29	Codes and Standards							
30	Installation Specification							
31	Redundant To							
32								
33								
34								
35								

Prepared by _____ Signature _____ Date _____

I&C Component Review Checklist

TRANSMITTERS

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1	Service							
2	Function							
3	Indicator Type							
4	Manufacturer							
5	Model Number							
6	Safety Classification							
7	Body Material/Rating							
8	Output Signal							
9	Maximum Fluid Pressure							
10	Maximum Fluid Temperature							
11	Flow Range							
12	Specific Gravity of Fluid							
13	Calibrated Range							
14	Mounting Type							
15	Accuracy							
16	Power Supply							
17	Instrument Loop Interface							
18	Installation Details							
19	Connection Details							
20	Time Response							

I&C Component Review Checklist

TRANSMITTERS (Continued)

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21	Loss of Power Failure Mode							
22	Building/Elevation							
23	Rack Number							
24	Environmental Qualification							
25	Seismic Classification							
26	Separation Requirement							
27	RG 1.97 Requirement							
28	Flood							
29	Access/Maintenance							
30	Isolation							
31	Contract/Specification							
32	Codes and Standards							
33	Installation Specification							
34	Installation Requirements							
35	Redundant To							
36								
37								
38								
39								
40								

Prepared by _____ Signature _____ Date _____

I&C Component Review Checklist

SIGNAL CONDITIONER/SWITCH

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
1	Service							
2	Function							
3	Type							
4	Manufacturer							
5	Model Number							
6	Safety Classification							
7	Input Signal Type							
8	Range and Units							
9	Output Signal Type							
10	Range and Units							
11	Setpoint							
12	Accuracy							
13	Reset/Deadband							
14	Contact Type							
15	Contact Rating							
16	Mounting Type							
17	Installation Location							
18	Environmental Qualification							
19	Seismic Classification							
20	Separation Requirement							

I&C Component Review Checklist

SIGNAL CONDITIONER/SWITCH (Continued)

Component ID: _____

	Attributes	Licensing Requirement	Specification Requirement	Calculation Requirement	Vnd/Design Drawing	List/ Database	Acceptable Y/N/NA	Comment
21	RG 1.97 Requirement							
22	Flood							
23	Access/Maintenance							
24	Isolation							
25	Connection Details							
26	Contract/Specification							
27	Codes and Standards							
28	Installation Specification							
29	Instrument Loop Interface							
30	Redundant To							
31								
32								
33								
34								
35								

Prepared by _____ Signature _____ Date _____

Northeast Utilities
Millstone - Unit 3

Independent Corrective Action Verification Program
(ICAVP)

System Review Checklist

CK-MP3-02 - 06, Rev. 0

Topical Area Review Checklist

Prepared by:	A.A. Nerl		4-24-97
	Name	Signature	Date
Approved by:	D.K. Schopfer	D.K. Schopfer	4-25-97
	Name	Signature	Date

IMPLEMENTATION

System	
Lead Verifier	
SRG Lead	

Topical Area Review Checklist

INSTRUCTIONS

This checklist supplements project instruction PI-MP3-02 and shall be used for performing the review of topical areas for the selected systems. Application and use of this checklist shall be as follows:

1. The checklists consists of five parts; A-Pipe Whip/Jet impingement, B-Missiles, C-Internal Fooding, D-Station Blackout and E-Appendix R Safe Shutdown Analysis.
2. The Lead Verifier shall assign verifier(s) to review each of the 5 topics addressed in the checklist.
3. The assigned verifier shall complete the applicable part, sign and date the applicable part and return it to the Lead Verifier.
4. The Lead Verifier shall review each part for proper implementation and for completeness. The Lead Verifier shall assemble the completed checklist, number the pages sequentially, identify the system in the applicable blocks and shall sign and date the cover sheet.
5. The SRG Lead shall indicate his concurrence the checklist has been completed by signing and dating the cover sheet.

Topical Area Review Checklist

A-Pipe Whip/Jet Impingement

	Yes	No	Comment
1. Is the system under review a high energy piping system as defined in section 3.6.1.1.2 of the USAR. If no, the review is complete. If yes, complete the remainder of section A of the checklist.	___	___	_____
2. Have the effects of pipe whip and jet impingement been evaluated in the 3.6-X series tables of the USAR. If no, initiate DR. If yes, list tables in the comment section.	___	___	_____
3. Are the breaks identified in the USAR 3.6 series tables consistent with the piping analysis. Identify calculations reviewed in comment section.	___	___	_____
4. Where pipe rupture restraints were used to prevent the pipe from whipping, have the whip restraints been designed adequately. Justify response in comment section. Identify applicable break numbers, pipe rupture restraints, and calculations reviewed. Calculations to be reviewed include analysis which determines pipe rupture loads and analysis qualifying the pipe rupture restraint.	___	___	_____
5. Where the pipe is allowed to whip, walkdowns and/or drawing reviews have verified all targets are addressed in the USAR tables and supporting calculations. Provide justification for response in comment section.	___	___	_____
6. Where the pipe is allowed to whip, safety related targets have either been demonstrated by analysis to be capable of withstanding impact or are protected by energy absorbing pipe rupture restraints. Provide basis for yes response in comment section. Basis should identify analysis reviewed (including qualification of target or qualification of restraint).	___	___	_____

Topical Area Review Checklist

A-Pipe Whip/Jet Impingement

		Yes	No	Comment
7.	For each postulated break, walkdown and/or drawing reviews have verified that all safety related jet impingement targets have been addressed in USAR Tables and supporting analysis. Provide justification for response in comment section.	____	____	_____
8.	For each postulated break, the distance from the break to the safety related jet impingement targets contained in the USAR and supporting analysis has either been field verified or verified by drawing review. Provide basis for response in comment section.	____	____	_____
9.	Jet intensity and jet load calculations for each target have been reviewed and are correct. Justify response in comment section.	____	____	_____
10.	Safety related jet impingement targets have been demonstrated to be capable of withstanding the jet impingement forces or has been adequately shielded. Justify response in comment section.	____	____	_____

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Pipe Whip/Jet Impingement Comment Sheet

Comment No.	Comment

Topical Area Review Checklist

B-Missiles

	Yes	No	Comment
1. Is system under review considered a high energy piping system as defined in section 3.6.1.1.2 of the USAR. If yes, respond to questions a thru c. If not proceed to question 2.	____	____	_____
a. Have all potential pressurized missile sources been evaluated in the internally generated missile evaluation. Justify response in comment sheet.	____	____	_____
b. For missiles determined to be not credible, was adequate justification provided for concluding generation of missile is not credible. Justify response in comment sheet.	____	____	_____
c. For missiles determined to be credible, were the effects of the missile evaluated and if required, were protection features adequate. Justify response in comment section.	____	____	_____
2. Does the system under review contain high speed rotating machinery. If yes, answer questions a, b and c below:	____	____	_____
a. Were all potential missiles from rotating equipment addressed in the missile analysis. Justify response in comment sheet.	____	____	_____
b. Where the evaluation concluded that missile generation was not credible, was this conclusion substantiated. Justify response in comment sheet.	____	____	_____
c. For credible missiles, were the effects of missiles properly evaluated, and if required, were the protection features adequate. Justify response in comment section.	____	____	_____

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Topical Area Review Checklist

B-Missiles Comment Sheet

Comment No.	Comment

Topical Area Review Checklist

C-Internal Flooding

For each environmental zone containing piping for the system under review, verify that the internal flooding evaluation has considered the effects of failure of such piping on the areas flood level. Describe below, the calculations reviewed (applicable flooding analysis) and whether the selected systems piping was properly addressed. (Use the continuation page as needed).

The effects of postulated pipe failures in the selected systems have been properly assessed in the flooding analysis.

____ ____ ____
Yes No NA

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Topical Area Review Checklist

C-Internal Flooding (Continuation Page)

Topical Area Review Checklist

D-Station Blackout

If components for the selected system are credited for coping with a station blackout, described below which equipment is applicable and the functional requirements assumed for the equipment in the station blackout report (SP-EE-363). Also describe whether the applicable equipment is capable of performing these functions and the basis for this assessment. (Use continuation page as needed).

Equipment of the selected system required for coping with a station blackout can perform the required functions.

____ ____ ____
Yes No NA

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Topical Area Review Checklist

D-Station Blackout (Continuation Page)

Topical Area Review Checklist

E. Appendix R Safe Shutdown Analysis

		Yes	No
1.	Is the system under review credited as a safe shutdown system in section 6.2 of the FPER or as a support system in section 7.0 of the FPER. If no, no further review is required. If yes, complete the remaining questions.	____	____
2.	From table 6.1 of the FPER, identify the fire areas for which the system under review is credited as available to support safe shutdown. List fire areas in the space below.	____	____
3.	For the fire areas identified in response to question 2 verify that no components of the system including cables supporting system function and associated cables are located in the fire area or, if they are, that adequate justification for safe shutdown is provided. Justify the response below. Identify calculations, drawings, reports and lists that were reviewed to arrive at the conclusion.	____	____

Topical Area Review Checklist

E-Appendix R Safe Shutdown Analysis (Continuation Page)

The selected system components credited for Appendix R safe shutdown have been verified to be capable of performing the required funcitons.

Yes	No	NA
____	____	____

_____ _____
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