

SOUTH CAROLINA ELECTRIC AND GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

NUCLEAR OPERATIONS

**NON CONTROLLED
COPY**

GENERAL TEST PROCEDURE

GTP-304

INSERVICE INSPECTION SYSTEM PRESSURE TESTING

REVISION 0

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SAFETY RELATED

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<u>PAGE</u>	<u>REVISION</u>
1	0
ii	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
<u>ATTACHMENTS</u>	
Attachment 7.1	0
Attachment 7.2	0
Attachment 7.3	0
Attachment 7.4	0
Attachment 7.5	0
Attachment 7.6	0
Attachment 7.7	0
Attachment 7.8	0

TABLE OF CONTENTS

	<u>PAGE</u>
1.0 <u>PURPOSE</u>	1
2.0 <u>REFERENCES AND GLOSSARY</u>	1
3.0 <u>RESPONSIBILITIES</u>	3
4.0 <u>INSERVICE INSPECTION TESTING AND EXAMINATION</u>	4
5.0 <u>DOCUMENTATION</u>	12
6.0 <u>RESULTS</u>	13
7.0 <u>ATTACHMENTS</u>	13

ATTACHMENTS

- Attachment 7.1 - Code Class 1, 2, and 3 Component Inspection Program
- Attachment 7.2 - Test and Examination Schedule
- Attachment 7.3 - ISI Hydro And/Or Pneumatic Testing Index
- Attachment 7.4 - Code Class 1, 2, and 3 System Leak Testing
- Attachment 7.5 - Code Class 1, 2, and 3 Relief Request Identification
- Attachment 7.6 - Appendix J Testing
- Attachment 7.7 - System Open/Reclose Leak Test Record
- Attachment 7.8 - System Open/Reclose Leak Test Acceptance Criteria

1.0 PURPOSE

- 1.1 This procedure provides the necessary controls for system pressure tests including leakage tests, hydrostatic tests, and, if applicable, pneumatic tests for ASME Section III code class 1, 2, and 3 pressure retaining components.

2.0 REFERENCES AND GLOSSARY

2.1 References

- 2.1.1 ASME Boiler and Pressure Vessel Code Section III, 1971 Edition through the summer 1973 addenda.
- 2.1.2 ASME Boiler and Pressure Vessel Code Section V, 1977 Edition Through the summer 1978 addenda.
- 2.1.3 ASME Boiler and Pressure Code Section XI, Section 1977 Edition through the summer 1978 addenda.
- 2.1.4 SAP-139, Procedure Development, Review, Approval and Control.
- 2.1.5 SAP-146, Non-Conformance Control Program
- 2.1.6 SAP-141, Control and Calibration of Measuring and Test Equipment.
- 2.1.7 SAP-145, Inservice Inspection.
- 2.1.8 10 CFR 50.55a.
- 2.1.9 SAP-108, Guidelines for Controlling Station Work Activities.
- 2.1.10 Applicable Surveillance Test Procedures
- 2.1.11 10 CFR 50.55 Appendix J

2.2 Glossary

- 2.2.1 Authorized Nuclear Inservice Inspector (ANII) - An inspector employed by an insurance company authorized to write boiler and pressure vessel insurance and having qualified in accordance with the requirements of ANSI/ASME N626.1 - 1975.
- 2.2.2 ASME Code (Code) - An approved ANSI document published by the American Society of Mechanical Engineers including, but not limited to, specific construction requirements, pre-service inspection requirements and inservice inspection requirements for certain classified pressure systems, components and their supports.
- 2.2.3 Code Class - A classification of items and components based upon the Section III construction code subsection used to fabricate and/or install such items.
- A. Class 1 - Subsection NB
 - B. Class 2 - Subsection NC
 - C. Class 3 - Subsection ND
 - D. Class MC - Subsection NE
 - E. Component Supports - Subsection NF
- 2.2.4 Inservice Inspection (ISI) - Those scheduled inspection activities performed during the plant lifetime as outlined in ASME Code Section XI.
- 2.2.5 Inservice Inspection Coordinator (ISI Coordinator)-That individual designated by the Manager, V. C. Summer Nuclear Station, who is responsible for development and implementation of the ISI Program.
- 2.2.6 Inservice Inspection Program - Those planned and systematic actions performed to: categorize the area subject to inspection and responsibilities, provide for accessibility, apply examination methods and procedures, qualify personnel, establish frequency of inspection, establish and maintain record keeping and reporting requirements, evaluation of inspection results and, if necessary subsequent disposition and corrective action of such results, and document a repair program.

- 2.2.7 Inspection Interval - That amount of time approximately equal to 1/4 of expected plant life. (10 years) See Attachment 7.1.
- 2.2.8 Inspection Period - That amount of time in calendar years and/or months approximately equal to 1/3 of an inspection interval. (3 to 4 years) See Attachment 7.1.
- 2.2.9 Regulatory Authority - A Federal Government Agency such as the USNRC.
- 2.2.10 Replacement - A spare component(s), parts of such component(s), or subsystem(s) as defined by IWA-7110 of Reference 2.1.3 but not the addition of new systems.
- 2.2.11 Repair - Welding activities, including initial and surface finishing processes, required to return an item to a condition acceptable to the Code.
- 2.2.12 Rework - Replacement and/or other non-welding activities required to return an item to a condition acceptable to the Code.
- 2.2.13 Associate Manager, Regulatory Compliance - That individual designated by the Manager, V. C. Summer Nuclear Station, to act as liason for SCE&G/NO with the USNRC.
- 2.2.14 Abbreviations.
- A. SCE&G/NO - South Carolina Electric and Gas Company, Nuclear Operations.
 - B. USNRC - United States Nuclear Regulatory Commission.

3.0 RESPONSIBILITIES

- 3.1 Procedure SAP-145 establishes, describes and delineates the responsibilities associated with the System Pressure Testing Program.

4.0 INSERVICE INSPECTION TESTING AND EXAMINATION

4.1 Inservice Inspection.

- 4.1.1 The required pressure tests and concurrent visual examinations (VT-2) shall be identified and scheduled in accordance with the requirements of attachment 7.2 unless specific relief has been granted by the Regulatory Authority. The required system pressure tests are indexed in attachments 7.3 and 7.4.
- 4.1.2 Pressure tests and examinations shall be performed in accordance with written approved procedures.
- 4.1.3 Personnel performing the required visual examinations during the pressure test shall be qualified in accordance with ASME Code Section XI and the appropriate procedures.
- 4.1.4 Type A, B and C testing per 10 CFR 50 Appendix J shall be in accordance with Surveillance Test Program (206 and 115 Series) in accordance with Attachment 7.6. Appendix J testing may be substituted for the required ASME Section XI Testing, when a relief request has been submitted and/or approved by the NRC.

4.2 Pressure Test and Examination Scheduling

- 4.2.1 In addition to the requirements of 4.1.2 class 1 inservice pressure tests and examinations shall be performed during plant outages; class 2 and 3 tests and examinations may be performed, as appropriate, either during plant outages or during systems operations.
- 4.2.2 The pressure tests and examinations shall be performed and completed during each period and/or interval, as applicable, during the service lifetime of the plant except as otherwise noted in paragraph 4.2.3.

- 4.2.3 Each inspection interval may be decreased or extended (but not cumulatively) by as much as 1 year. If the plant is out of service continuously for 6 months or more, the inspection interval during which the outage occurred may be extended for a period of time equivalent to the outage.
- 4.2.4 The inspection interval and period is determined by the number of calendar years following placement of the plant into commercial service. Attachment 7.1, Inspection Program B, tabulates 4 consecutive intervals.
- 4.2.5 Inspection intervals for repaired items, component replacements, additions, and alterations shall coincide with the remaining intervals as originally scheduled prior to such repairs, replacements, additions or alterations.
- 4.2.6 Repaired items, replacements, additions, alterations and items which have been opened and reclosed shall be pressure tested and visually examined (VT2) in accordance with the applicable code and procedure after such activities have been completed prior to or at the time the applicable component is placed back into service.
- 4.2.7 System and/or component pressure tests and concurrent examinations may be performed in conjunction with one or more of the following operations.
- A. Leakage test after pressurization to nominal operating pressure.
 - B. Leakage test performed concurrently with the system functional test.
 - C. Leakage test performed concurrently with a hydrostatic test.
 - D. Hydrostatic test or other required system pressure tests for repairs, alterations, replacements and additions may be performed concurrently with applicable scheduled pressure tests providing the requirements of paragraph 4.2.6 are not violated.

E. Visual examination performed after the required test pressure holding time has been satisfied.

NOTE: During the required visual examination test conditions shall remain essentially constant.

4.2.8 The appropriate leak test for items which have been opened and reclosed may be performed during or before the System Leak Test and recorded on Attachment 7.7 and a completed copy of Attachment 7.7 will be attached to the appropriate MWR.

4.2.9 For Leak Tests required after opening and reclosing a system or component Attachment 7.8 shall be used to determine the maximum leakage rate without further engineering evaluation.

4.3 Pressure and Temperature Requirements (Class 1)

4.3.1 Class 1 system leakage tests shall be performed at a test pressure not less than the nominal operating pressure associated with 100% rated reactor power. The system test pressure and temperature shall be attained at a rate in accordance with the heatup limitations specified for the system.

4.3.2 Class 1 system hydrostatic tests shall be performed at a test pressure of 1.10 times the system nominal operating pressure (P_o) that corresponds with 100% rated reactor power or may be conducted at temperatures above 100°F in accordance with the following temperature-pressure criteria except as modified in 4.3.2(A) and/or 4.3.2(B), as applicable.

<u>Test Temperature</u>	<u>Test Pressure</u>
200°F	1.08 P_o
300°F	1.08 P_o
400°F	1.04 P_o
500°F	1.02 P_o

A. Class 1 hydrostatic tests shall meet the requirements as specified by fracture prevention criteria applicable to ferritic materials of system components.

B. Class 1 test temperature shall be modified as required by the results obtained from each set of material surveillance specimens withdrawn from the reactor vessel during the service lifetime.

4.4 Pressure and Temperature Requirements (Class 2).

- 4.4.1 Class 2 system and component leakage or functional tests shall be performed at nominal operating pressure of such systems or components, as applicable.
- 4.4.2 Class 2 system and/or component hydrostatic test pressures, as applicable, shall be determined as follows, except as described in 4.4.3 through 4.4.7 where Psv is the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested.

<u>Design Temperature</u>	<u>Test Pressure</u>
< 200°F	1.10 Psv
> 200°F	1.25 Psv

- 4.4.3 In the case of class 2 atmospheric storage tanks, hydrostatic test pressure developed with the tank filled to its design capacity shall be the acceptable test pressure.
- 4.4.4 For 0 - 15 PSI class 2 storage tanks the test pressure shall be 1.1 times P_g where P_g is the design pressure of the vapor or gas space above the liquid level for which overpressure protection is provided.
- 4.4.5 Open ended portions of class 2 suction or drain lines from a storage tank to the first shutoff valve shall be considered as part of either an atmospheric storage tank or a 0 - 15 PSI storage tank, as applicable.
- 4.4.6 In the case of open ended portions of class 2 discharge lines in non-closed systems (such as the containment spray header), any test that demonstrates unimpaired flow shall be acceptable in lieu of system hydrostatic pressure test.
- 4.4.7 The test temperature for class 2 systems and components containing ferritic steel items shall meet the requirements specified by fracture prevention criteria. In systems containing ferritic steel components in which fracture toughness and/or fracture prevention criteria were neither specified nor required the system test temperature shall be determined by SCE&G. There is no established limit on system or component test temperature for such systems and/or components constructed entirely of austenitic steel materials.

4.5 Pressure and Temperature Requirements (Class 3)

- 4.5.1 For Class 3 system inservice tests the inservice operating pressure during system operation shall be acceptable as the system test pressure.
- 4.5.2 For Class 3 system functional tests the nominal operating pressure of the system shall be acceptable as the system test pressure.
- 4.5.3 For Class 3 system and component hydrostatic tests, the pressure and temperature shall be determined as specified in paragraphs 4.4.2 through 4.4.7 of this procedure.

4.6 Pressure Holding Times for Class 1, 2, and 3 Items

- 4.6.1 SYSTEM LEAKAGE TEST - No holding time required after attaining test pressure and temperature conditions.
- 4.6.2 SYSTEM HYDROSTATIC TEST
 - A. Non-insulated system or component - 10 minutes required after attaining test pressure and temperature conditions.
 - B. Insulated system or component - 4 hours required after attaining test pressure and temperature conditions.
- 4.6.3 SYSTEM FUNCTIONAL TEST - 10 minutes after attaining the required test pressure and temperature conditions.
- 4.6.4 SYSTEM INSERVICE TESTS - No holding time required providing the system has been in operation for 4 hours, otherwise, an additional amount of holding time is required to obtain 4 hours total.
- 4.6.5 SYSTEM PNEUMATIC TESTS - 10 minutes after attaining the required test pressure.

4.7 Visual Examination (VT-2)

4.7.1 Visual examinations (VT-2) shall be performed after attaining the required test pressure and temperature conditions in accordance with the requirements of applicable Surveillance Test Procedures except as permitted by 4.7.2.

4.7.2 The visual examination, VT-2, following a repair or replacement of a component, or the alteration of a system may be limited to the repaired or replaced components, or the altered portion of a system, but shall include any connection made to the existing system.

4.8 Repair, Replacement or Rework Pressure Tests

4.8.1 Repair Pressure Tests (Class 1, 2, and 3)

- A. After repairs by welding on the pressure retaining boundary a hydrostatic test shall be performed and a visual examination (VT-2) shall be conducted as specified by paragraph 4.7.2 except as noted in 4.8.1(B).
- B. The following may be exempted from the required hydrostatic test(s):
- 1) Cladding repairs.
 - 2) heat exchanger tube plugging
 - 3) piping, pump and valve repairs that do not penetrate through the pressure boundary
 - 4) pressure vessel repairs where the repaired cavity does not exceed 10% of the minimum design wall thickness.
 - 5) Component connections, piping and associated valves that are 1" nominal pipe size and smaller.

NOTE: Repairs made in accordance with a procedure which allows exception from postweld heat treatment shall not be exempted from hydrostatic tests.

4.8.2 Rework and Replacement Tests (Class 1, 2, and 3)

- A. Pressure tests shall be performed subsequent to rework or replacement welding activities as specified in 4.8.1.
- B. Subsequent to rework or replacement activities not involving welding a leakage test shall be conducted following reclosing of a component in the system.

4.9 Test Gages, Instrumentation, and Equipment.

- 4.9.1 System instrumentation, test instruments, or test gages may be used for the system tests described in this procedure providing the applicable requirements of 4.9.1 through 4.9.7 have been satisfied.
- 4.9.2 The test gages used in pressure testing shall provide results accurate to within .5% of full scale.
- 4.9.3 All test gages shall be calibrated against a standard dead weight tester or a calibrated master gage. The test gages shall be calibrated before each test or before each series of tests. A series of tests is a group of tests that use the same pressure test gage(s) and such tests are conducted within a period not exceeding 2 weeks.
- 4.9.4 Indicating pressure gages used in testing shall have their dials graduated over a range of at least 1.5 times, but not more than 4 times, the intended maximum test pressure.
- 4.9.5 When testing an isolated component, the pressure measuring gage, instrument or sensor shall be connected as close to the component as practical.
- 4.9.6 When testing a group of components or a multicomponent system, the pressure measuring gage, instrument or sensor shall be connected to any point within the pressure boundary of the components or system such that the imposed pressure on any component, including static head, will not exceed .06% of the specified test pressure for those part of the system under consideration.

4.9.7 Any equipment required to perform pressure testing shall meet as a minimum, the cleanliness requirements of the system or component to be tested.

4.9.8 Test gages and instrumentation shall be calibrated in accordance with the requirements of SAP-141.

4.10 Corrective Measures

4.10.1 The source of leakages described during the performance of system pressure test shall be located and evaluated for corrective measures as follows:

- A. Buried components with leakage losses in excess of limits acceptable for continued service shall be repaired or replaced;
- B. Repairs to components shall be performed in accordance with the requirements of SAP-302, SAP-304 WM-1.0, WM-2.0 and other criteria of the applicable design specifications.
- C. Replacement of components shall be performed in accordance with IWA-7000 of the Code.
- D. The detection of boric acid residues on ferritic steel components shall require the location of the leakage source and the areas of general corrosion, if any. Components or other items with local areas of general corrosion that reduce the wall thickness by more than 10% or that would inhibit the capability of such items or components to perform their intended function shall be evaluated to determine whether the component may be acceptable for continued service, or repair or replacement is required.

NOTE: General Corrosion is an approximate uniform wastage of a surface of a component, through chemical or electro chemical reaction, free of deep pits or cracks.

5.0 DOCUMENTATION

- 5.1 Examinations and test plans and schedule shall be developed, approved and distributed in accordance with the requirements of this procedure.
- 5.2 Surveillance Test Procedures used for system pressure tests during Inservice Inspection either have been or will be prepared and approved in accordance with, SAP-139 prior to performing the applicable test(s).
- 5.3 NDE personnel Qualification records shall be maintained in accordance with the requirements of Operations and Station Quality Control Procedures, as applicable.
- 5.4 System pressure tests shall be documented in accordance with the requirements of this procedure and/or the applicable Surveillance Test Procedure.
- 5.5 When required, Radiation Work Permits will be initiated and completed in accordance with Health Physics Procedures.
- 5.6 When required, safety tags shall be issued, completed, attached to appropriate equipment, and filed in accordance with SAP-201.
- 5.7 A copy of the evaluation and, if required, disposition and corrective measure records shall become part of the Surveillance Test Procedure record.
- 5.8 Test summary reports shall be prepared from the Surveillance Test Procedure records and submitted to the Regulatory Authority within 90 days after completion of the inservice inspection outage.
- 5.9 Test, evaluation, disposition and corrective measure records shall be maintained for the service lifetime of the component.
- 5.10 Visual examination (VT-2) records shall be maintained in accordance with the applicable Surveillance Test Procedures.
- 5.11 When required, a non-conforming condition shall be documented in accordance with the requirements of SAP-146.
- 5.12 Flow drawings, as referenced in Attachment 7.4, shall be available for review during system hydrostatic testing activities.

- 5.13 Relief requests, if any, shall be referenced on Attachment 7.5 as applicable. Such relief requests shall be indexed, stored and maintained under separate cover.

6.0 RESULTS

- 6.1 Evaluation of the pressure test and examination data shall be performed in accordance with the requirements of the applicable code, standard or specification and included as part of the Surveillance Test Procedure Record as described in paragraph 5.7.
- 6.2 Disposition and corrective measures, as a result of unacceptable tests or examinations, may be implemented using original design data, improved design data, newly developed techniques, appropriate standards and codes, or a combination thereof.
- 6.3 Corrective measures implemented to correct a non-conforming condition shall detail the activities performed including the action taken to prevent recurrence of the condition.

7.0 ATTACHMENTS

- 7.1 Code class 1, 2, and 3 System and Component Inspection Program (1 Page)
- 7.2 Code class 1, 2, and 3 Test and Examination Schedule (4 pages)
- 7.3 Code class 1, 2, and 3 ISI Hydrostatic Test Reference Index (6 pages)
- 7.4 Code class 1, 2 and 3 System Leak Testing (1 page)
- 7.5 Code class 1, 2, and 3 Relief Request Identification
- 7.6 Appendix C Testing
- 7.7 System Open/Reclose Test Record.
- 7.8 System Open/Reclose Test Acceptance Criteria

CODE Class 1, 2, & 3 Component Inspection Program

Inspection Interval	Inspection Period Calendar Years of Plant Service
1st	3 7 10
2nd	13 17 20
3rd	23 27 30
4th	33 37 40

TEST AND EXAMINATION SCHEDULE
 CLASS 1

ITEM NO.	PARTS EXAMINED	TEST REQUIRED (1)(2)(3)	EXAMINATION METHOD (4)	1ST INSPECTION INTERVAL	SUCCESSIVE INSPECTION INTERVALS 2ND, 3RD, 4TH	DEFERRAL OF INSPECTION TO END OF INTERVAL
	<u>REACTOR VESSEL</u>					
B15.10	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.11	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible
	<u>PRESSURIZER</u>					
B15.20	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.21	Pressure Boundary	Hydrostatic	VT-2	One test interval	One test per interval	Permissible
	<u>STEAM GENERATORS</u>					
B15.30	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.31	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible
	<u>HEAT EXCHANGERS</u>					
B15.40	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.41	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible

- NOTES: (1) - Entire pressure retaining boundary of the reactor coolant system is subject to system pressure test conducted in accordance with IWA-5000 with the exceptions specified in IWA-5214 when system pressure tests are conducted for repaired, replaced or altered components.
- (2) - Leakage test IWB-5221, Hydrostatic Test IWB-5222.
- (3) - Acceptance standard IWA-5250.
- (4) - Visual examination of IWA-5240.

TEST AND EXAMINATION SCHEDULE
 CLASS 1

ITEM NO.	PARTS EXAMINED	TEST REQUIRED (1)(2)(3)	EXAMINATION METHOD (4)	1ST INSPECTION INTERVAL	SUCCESSIVE INSPECTION INTERVALS 2ND, 3RD, 4TH	DEFERRAL OF INSPECTION TO END OF INTERVAL
	<u>PIPING</u>					
B15.50	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling Outage	
B15.51	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible
	<u>PUMPS</u>					
B15.60	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.61	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible
	<u>VALVES</u>					
B15.70	Pressure Boundary	Leakage	VT-2	Each refueling outage	Each refueling outage	
B15.71	Pressure Boundary	Hydrostatic	VT-2	One test	One test per interval	Permissible

- NOTES: (1) - Entire pressure retaining boundary of the reactor coolant system is subject to system pressure test conducted in accordance with IWA-5000 with the exceptions specified in IWA-5214 when system pressure tests are conducted for repaired, replaced or altered components.
 (2) - Leakage test IWB-5221, Hydrostatic Test IWB-5222.
 (3) - Acceptance standard IWA-5250.
 (4) - Visual examination of IWA-5240.

TEST AND EXAMINATION SCHEDULE
CLASS 2

ITEM NO.	PARTS EXAMINED	TEST REQUIRED (1)(2)(3)	EXAMINATION METHOD (4)	EXTENT OF EXAMINATION (5)	FREQUENCY OF EXAMINATION (6)
	<u>PRESSURE VESSELS</u>				
C7.10	Pressure Components	Leakage	VT-2	Pressure Boundary	Each Inspection Period
C7.11	Pressure Components	Hydrostatic	VT-2	Pressure Boundary	Each Inspection Interval
	<u>PIPING</u>				
C7.20	Pressure Components	Leakage	VT-2	Pressure Boundary	Each Inspection Period
C7.21	Pressure Components	Hydrostatic	VT-2	Pressure Boundary	Each Inspection Interval
	<u>PUMPS</u>				
C7.30	Pressure Components	Leakage	VT-2	Pressure Boundary	Each Inspection Period
C7.31	Pressure Components	Hydrostatic	VT-2	Pressure Boundary	Each Inspection Interval
	<u>VALVES</u>				
C7.40	Pressure Components	Leakage	VT-2	Pressure Boundary	Each Inspection Period (7)
C7.41	Pressure Components	Hydrostatic	VT-2	Pressure Boundary	Each Inspection Interval

- NOTES: (1) - Other than open-ended portions of systems.
(2) - System pressure tests of IWA-5000 and IWC-5000; Leakage test IWC-5221, Hydrostatic Test IWC-5222.
(3) - Acceptance Standard IWA-5250.
(4) - Visual examination of IWA-5240.
(5) - There are no exemptions or exclusions from these requirements except as specified in IWA-5214.
(6) - The system hydrostatic test shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval.
(7) - A system functional test (IWC-5221) serves as a required system pressure test.

TEST AND EXAMINATION SCHEDULE
CLASS 3

ITEM NO.	PARTS EXAMINED	TEST REQUIRED (3)	EXAMINATION METHOD	EXTENT OF EXAMINATION	FREQUENCY OF EXAMINATION
D-A D.1.1	Pressure Components (1)	Leakage (2)	VT-2	NOTE (4)	Each Period
	Pressure Components (1)	Hydrostatic	VT-2	NOTE (4)	Same Period (5) of each interval
D-B D.2.1	Pressure Components (6)	Leakage (7)	VT-2	NOTE (6)	Each Period
	Pressure Components (6)	Hydrostatic	VT-2	NOTE (6)	Same Period (5) of each interval
C D.3.1	Piping (8) Pumps, Valves	Leakage (2)	VT-2	NOTE (8)	Each Period
	Piping (8) Pumps, Valves	Hydrostatic	VT-2	NOTE (8)	Same Period (5) of each interval

- NOTES:
- (1) - Pressure retaining components within the boundary of systems or portions of systems required to operate in support of normal plant safety functions of shutting down and maintaining the reactor in cold shutdown condition.
 - (2) - Operating system inservice test (IWD-5221).
 - (3) - Hydrostatic Pressure Test (IWD-5223).
 - (4) - The system boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve or valve capable of automatic closure when the safety function is required.
 - (5) - For Inspection Program B, the hydrostatic test and subsequent visual examination shall be performed during the same period of each inspection interval.
 - (6) - Pressure retaining components within the boundary of systems or portions of systems required to operate in support of the post-accident safety functions of emergency core cooling, containment heat removal and atmosphere cleanup, and long term residual heat removal from the reactor.
 - (7) - Operating system functional test (IWD-5222).
 - (8) - Pressure retaining piping, pumps and valves within the boundary of systems or portions of systems required to operate in support of residual heat removal from spent fuel storage pool.

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>STP NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.001	CC-01-H1	3	Component Cooling Water Low Pressure Hydro Loop A, Loop B, Loop C and Suction Piping	D-302-611
149.002	CC-02-H1	3	Static Test of Component Cooling Water Surge Tank	D-302-611
149.003	CC-04-H1	2/3	Component Cooling Inside Reactor Building Hydro	D-302-612
149.004	CC-04-H2	2/3	Component Cooling Water Booster Pump Discharge Piping Hydro	D-302-612
149.005	CC-04-H3	3	Hydrostatic Testing of Component Cooling Water Piping to the Reactor Cooling Pump Thermal Barriers	D-302-612
149.006	CC-05-H1	3	Hydrostatic Testing of Component Cooling to Non-Essential Equipment	D-302-613
149.007	CS-01-H1	2	Chemical and Volume Control Charging Pump Suction Header Hydro	E-302-675
9.008	CS-02-H1	2	Hydrostatic Testing of the Volume Control Tank	E-302-675
149.009	CS-02-H3	3	Hydrostatic Testing of the Chemical and Volume Control Make Up Piping	E-302-677 E-302-675
149.010	CS-03-H1	2	Hydrostatic Testing of Chemical and Volume Control Charging Pump A, B, and C Discharge Piping.	E-302-675
149.011	CS-04-H1	2	Hydrostatic Testing of Chemical and Volume Control Charging Header Piping	E-302-677 E-302-675

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.012	CS-05-H1	2	Hydrostatic Testing of Chemical and Volume Control Seal Injection Piping	E-302-671, 672, 673, 675
149.013	CS-07-H1	2	Hydrostatic Testing of Chemical and Volume Control Seal Return Lines (To valves S142, S141A, B and C)	E-302-671 E-302-672 E-302-673
149.014	CS-07-H2	2	Hydrostatic Testing of Reactor Coolant Pump A, B and C Seal Return Line (from S141A, B and C and S142 to S100)	E-302-673 E-302-675
149.015	CS-07-H3	2	Hydrostatic Test of Reactor Coolant Pumps A, B, and C Common Seal Return Line (From valve S100 to VCT).	E-302-673 E-302-675
149.016	CS-08-H1	1	Hydrostatic Testing of the Chemical and Volume Control Excess Letdown Line	E-302-673
149.017	CS-09-H1	1	Hydrostatic Testing of the Chemical and Volume Control High Pressure Letdown Line (from valve S085 to Orifice Isolation Valves S149A, B and C)	E-302-671 E-302-673
149.018	CS-11-H1	2	Hydrostatic Testing of the Chemical and Volume Control Letdown Line (From Orifice Isolation Valves S149A, B, and C to PCV-145)	E-302-671, 672, 673, 674
149.019	CS-12-H1	2/3	Hydrostatic Testing of Chemical and Volume Control Low Pressure Letdown and Mixed Bed Demineralizer Line	E-302-674 E-302-675 E-302-676
149.020	CS-13-H1	2	Hydrostatic Testing of the Boron Concentration Measurement System	E-302-674
149.021	CS-17-H1	3	Hydrostatic Testing of the Boric Acid Transfer Pump Suction Line	E-302-677
149.022	CS-17-H2	3	Hydrostatic Testing of the Boric Acid Pumps Discharge Line	E-302-677
149.023	CS-17-H3	2	Static Test of the Boric Acid Storage Tanks	E-302-677

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>S.I.P. NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.024	CS-20-H1	3	Hydrostatic Testing of the Boron Thermal Regeneration System	E-302-675
149.025	CS-21-H1	3	Hydrostatic Testing of the Recycle Evaporator Feed Demineralizer Inlet Header	E-302-751
149.026	CS-22-H1	3	Hydrostatic Testing of Recycle Holdup Tank Eductor Line	E-302-751
149.027	CS-23-H1	3	Hydrostatic Testing of Recycle Evaporator Feed Demineralizer Line	E-302-751
149.028	CS-24-H1	3	Hydrostatic Testing of the Recycle Evaporator Package	E-302-751
149.029	CS-25-H1	3	Hydrostatic Testing of the Recycle Evaporator Feed Pump Suction and Discharge Line	E-302-751
149.030	CS-25-H2	3	Static Head Testing of Recycle Holdup Tank No. 1	E-302-751
149.031	CS-25-H3	3	Static Head Testing of Recycle Holdup Tank No. 2	E-302-751
149.032	CS-27-H1	3	Hydrostatic Testing of the Boron Recycle System Relief Valve Header	E-302-751
149.033	DG-02-H1	3	Pneumatic Testing of Diesel Generator Fuel Oil Tank A Piping	D-302-351
149.034	DG-03-H1	3	Pneumatic Testing of Diesel Generator Fuel Oil Tank B Piping	D-302-351
149.035	DG-04-H1	3	Pneumatic Testing of Diesel Generator B Day Tank and Piping	D-302-351
149.036	DG-05-H1	3	Pneumatic Testing of Diesel Generator A Day Tank and Piping	D-302-351
149.037	DG-08-H1	3	Pneumatic Testing of Diesel Generator A Starting Air System	D-302-353
149.038	DG-09-H1	3	Pneumatic Testing of Diesel Generator B Starting Air System	D-302-353
149.039	DG-10-H1	3	Hydrostatic Testing of Diesel Generator A Oil Separator and Piping	D-302-353
149.040	DG-11-H1	3	Hydrostatic Testing of Diesel Generator B Oil Separator and Piping	D-302-353

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>STP NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.041	DG-12-H1	3	Static Testing of Diesel Generator A Jacket Cooling Water System	D-302-353
149.042	DG-13-H1	3	Static Testing of Diesel Generator B Jacket Cooling Water	D-302-353
*115.025	DN-03-H2	2	Demineralization Water System Valve Leakage Test (Penetration 231)	D-302-715
149.043	EF-01-H1	3	Hydrostatic Testing of Emergency Feedwater Pump Suction Piping	D-302-085
149.044	EF-02-H1	3	Hydrostatic Testing of Emergency Feedwater Pumps and Discharge Piping	D-302-085
*115.023	FS-01-H1	2	Fire Service System Valve Leakage Test (Pen #404)	D-302-231
*115.023	FS-19-H2	2	Fire Service System Valve Leakage Test (Pen #427)	D-302-231
149.045	FW-01-H1	2	Hydrostatic Testing of FW Nuclear Lines	D-302-083
149.046	GH-02-H1	3	Pneumatic Testing of Waste Gas Compressor Suction Header and Recirculation	E-302-741, 742, 743
150.020	GH-03-H1	3	Gaseous Waste Disposal System Leak Test (Waste Gas Decay Tank and Piping)	E-302-741, E-302-742
150.020	GH-04-H1	3	Gaseous Waste Disposal System Leak Test (Waste Gas Shutdown Tank)	E-302-741, E-302-742
149.049	HR-02-H1	2	Pneumatic Testing of Post Accident Hydrogen Removal System Reactor Penetrations (Pen 103 and 302)	D-302-861
149.050	HR-03-H1	2/3	Pneumatic Testing of Post Accident Hydrogen Removal System Analyzer A Piping	D-302-861
149.051	HR-03-H2	2/3	Pneumatic Testing of Post Accident Hydrogen Removal System Analyzer B Piping	D-302-861
*115.014	IA-08-H2	2	Instrument Air System Valve Leakage Test (Pen 319)	D-302-273
*115.014	IA-11-H2	2	Instrument Air System Valve Leakage Test (Pen 311)	D-302-273

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>APP NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
GTP-007	LR-01,02 03,04-H1	2	General Procedure for Valve/Penetration Leakage Testing	D-302-311
149.052	MS-01-H1	2/3	Hydrostatic Testing of Steam Generator and Main Steam Piping	D-302-011
149.053	MU-03-H1	2	Hydrostatic Testing of Reactor Makeup Water Pump Suction Piping	D-302-791
149.054	MU-02-H1	2	Hydrostatic Testing of the Reactor Makeup Water Storage Tank (Degassifier)	D-302-791
149.055	MU-04-H1	2	Hydrostatic Testing of the Reactor Makeup Water Discharge Piping	D-302-791
115.020	ND-35-H1	2	Nuclear Drains System Valve Leakage Test (Incore Sump Discharge Piping)	D-302-321
115.020	NG-01-H2	2	Nuclear Drains System Valve Leakage Test (Nitrogen Blanket; Pen 313)	D-302-311
149.056	RC-01-H1	1	Reactor Coolant System Hydro	E-302-601
149.057	RC-01-H2	2	Hydrostatic Testing of Reactor Vessel O'Ring Leak Monitoring System	E-302-601 thru 605
149.058	RC-02-H1	2	Hydrostatic Testing of Pressurizer Dead Weight Tester Tubing	E-302-062
149.059	RC-03-H1	1	Hydrostatic Testing of Reactor Coolant System RTD Manifold Loops	E-302-603 E-302-605
149.060	RC-05-H1	2	Hydrostatic Testing of Reactor Makeup Water Supply Piping to Pressurizer Relief Tank and Reactor Coolant Pump Standpipes	E-302-602
149.061	RC-06-H3	3	Pneumatic Test of the N ₂ Gas Supply Piping to the Pressurizer Relief Tank	E-302-602
149.062	RH-01-H1	2	Hydrostatic Testing of the Residual Heat Removal System	E-302-641 E-302-693
*115.013	SA-03-H2	2	Service Air System Valve Leakage Test (Pen 310)	D-302-241

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>STP NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.063	SF-01-H1	2	Static Head Testing of the Refueling Water Storage Tank	D-302-651
149.064	SF-03-H1	2	Hydrostatic Testing of the Spent Fuel Cooling Train A and B	D-302-651
149.065	SF-04-H1	2	Hydrostatic Testing of the Spent Fuel Cooling Demineralizer Suction and Discharge Line for the Refueling Cavity	D-302-651
149.066	SI-01-H1	1	Hydrostatic Testing of the Safety Injection High Head and Boron Injection Lines	E-302-691 E-302-692
149.067	SI-02-H1	3	Hydrostatic Testing of the Boron Injection Recirculation Pump Suction Line	E-302-691
149.068	SI-02-H2	3	Static Head Testing of the Boron Injection Surge Tank	E-302-691
149.069	SI-03-H1	2	Hydrostatic Testing of the RWST Supply Line to the RHR Pumps, Charging Pumps and RB Spray Pumps	E-302-676 D-302-651 D-302-661
149.070	SI-04-H1	2	Hydrostatic Testing of the Residual Heat Removal Suction Lines from Containment Sump	E-302-693
*115.007	SI-04-H2	2	Safety Injection System Valve Leakage Test (Pen 329)	E-302-692
*115.007	SI-04-H3	2	Safety Injection System Valve Leakage Test (Pen 425)	E-302-692
149.071	SI-05-H1	2	Hydrostatic Testing of the Safety Injection Accumulators and Accumulator Fill Line	E-302-692
149.072	SI-05-H2	2	Pneumatic Testing of the Nitrogen Supply Line to the Safety Injection Accumulators and Power Operated Relief Valves 445A,B	E-302-692 D-302-661
149.073	SP-01-H1	2	Hydrostatic Testing of Reactor Building Spray Pump Suction Piping	D-302-661

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>SIP NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.074	SP-02-H1	2	Hydrostatic Testing of Reactor Building Spray Ring Piping	D-302-661
149.075	SP-03-H1	2	Hydrostatic Testing of the Reactor Building Spray Pump Discharge Piping	D-302-661
*115.017	SP-C4-H1	2	Reactor Building Spray System Valve Leakage Test (Pen 327 Pneumatic; 3004A Chamber and Guard Piping)	D-302-661
*115.017	SP-04-H2	2	Reactor Building Spray System Valve Leakage Test (Pen 328 Pneumatic; 3004B Chamber and Guard Piping)	D-302-661
149.076	SP-05-H1	3	Hydrostatic Testing of the Reactor Building Spray System Caustic Addition Tank	D-302-661
*115.018	SS-01-H1	3	Sampling System Valve Leakage Test (Primary Sample Station)	D-302-771
*115.018	SS-01-H2	3	Sampling System Valve Leakage Test (Reactor Coolant Drain Tank Sample Station)	D-302-771
*115.018	SS-02-H1	2	Sampling System Valve Leakage Test (Sampling from PWR)	D-302-771
*115.018	SS-04-H1	2	Sampling System Valve Leakage Test (Sampling from RCS)	D-302-771
149.077	SS-07-H1	2	Hydrostatic Testing of the Sample System Line from the Steam Generators (Sampling from S/G Blowdown)	D-302-771
149.078	SW-01-H1	3	Hydrostatic Testing of the Service Water Train A Discharge	D-302-222
149.079	SW-01-H2	3	Hydrostatic Testing of the Service Water Train B Discharge	D-302-222
149.080	SW-01-H3	3	Hydrostatic Testing of the Service Water Pump A Discharge Line	D-302-221

ISI HYDRO AND/OR PNEUMATIC TESTING INDEX

<u>NO.</u>	<u>SUBSYSTEM(#)</u>	<u>CODE CLASS</u>	<u>DESCRIPTION</u>	<u>FLOW DWG.</u>
149.081	SW-01-H4	3	Hydrostatic Testing of the Service Water Pump B Discharge Line	D-302-221
149.082	SW-01-H5	3	Hydrostatic Testing of the Service Water Pump C Discharge Line	D-302-222
149.083	SW-01-H8	3	Testing of the Service Water Train A and B Discharge to the Service Water Pond	D-302-222
149.084	SW-04-H1	2	Hydrostatic Testing of the Service Water to Reactor Building Cooling Units Train A	D-302-222
149.085	SW-04-H2	2	Hydrostatic Testing of the Service Water to Reactor Building Cooling Units Train B	D-302-222
149.086	VU-05-H1	3	Hydrostatic Testing of Chilled Water System Loop B	D-302-841
149.087	VU-06-H1	3	Hydrostatic Testing of Chilled Water System Loop A	D-302-841
149.088	WD-01-H1	3	Hydrostatic Testing of Spent Resin Storage Tank Supply	E-302-736, 737, 738, D-302-651
149.089	WD-04-H1	2/3	Hydrostatic Testing of Reactor Coolant Drain Tank Pumps	E-302-735
149.090	WD-06-H1	3	Waste Holdup Tank Static Test	E-302-736
149.091	WD-06-H2	3	Hydrostatic Testing of Waste Evaporator Feed Pump and Associated Piping	E-302-736
149.092	WD-10-H1	3	Hydrostatic Testing of Waste Evaporator Package	E-302-736
149.093	WD-12-H1	3	Hydrostatic Testing of Spent Resin Storage Transfer Piping	E-302-737
149.094	WD-13-H1	3	Hydrostatic Testing of Spent Resin Storage Tank and Associated Piping	E-302-737

The first two alpha designations identify the system

* Relief Request - See Attachment 7.5

"SYSTEM LEAK TESTING"

150 SERIES STP's

- 150.001 Reactor Coolant System Leak Test
- 150.002 Chemical and Volume Control System Leak Test
- 150.003 Safety Injection System Leak Test
- 150.004 Residual Heat Removal System Leak Test
- 150.005 Component Cooling Water System Leak Test
- 150.006 Reactor Building Spray System Leak Test
- 150.007 Service Water System Leak Test
- 150.008 "A" Emergency Diesel Generator Support System Leak Test
- 150.009 "B" Emergency Diesel Generator Support Systems Leak Test
- 150.010 Emergency Feedwater System Leak Test
- 150.011 Feedwater (Nuclear) System Leak Test
- 150.012 Main Steam/Steam Generators Leak Test
- 150.013 Chilled Water System Leak Test
- 150.014 Reactor Building Cooling System Leak Test
- 150.015 Spent Fuel Cooling System Leak Test.
- 150.016 Post Accident Hydrogen Removal and Alternate Purge System Leak Test
- 150.017 Boron Recycle System Leak Test
- 150.018 Reactor Makeup Water System Leak Test
- 150.019 Liquid/Solid Waste Disposal System Leak Test
- 150.020 Gaseous Waste Disposal System Leak Test

CODE CLASS 1, 2, and 3 SYSTEM PRESSURE TESTING
RELIEF REQUEST IDENTIFICATION

<u>SYSTEM</u>	<u>RELIEF REQUEST NO.</u>
(AC) CRDM Cooling System	2-AC-1
(AH) Air Handling	2-AH-1
(BA) Breathing Air System	2-BA-1
(DN) Demineralized Water System	2-DN-1
(FS) Fire Protection System	2-FS-1
(HR) Post Accident H ₂ Removal System	2-HR-1
(IA) Instrument Air System	2-IA-1
(LR) RB Leak Rate Testing System	2-LR-1
(ND) Nuclear Drain System	2-ND-1
(RH) Residual Heat Removal	2-RH-1
(NG) Nitrogen Supply System	2-NG-1
(SS) Nuclear Sample System	2-SS-1
(SA) System Air System	2-SA-1
(SP) RB Spray	2-SP-1

APPENDIX J TESTING

<u>SYSTEM</u>	<u>APPENDIX J TEST</u>
(AC) CRDM Cooling	STP-115.029
(AH) Air Handling	STP-115.022
(BA) Breathing Air	JTP-115.014
(DN) Demineralized Water	STP-115.025
(FS) Fire Protection	STP-115.023
(HR) Post Accident H ₂ Removal System	STP-115.021
(IA) Instrument Air	STP-115.014
(LR) RB Leak Rate Testing	GTP-007
(ND) Nuclear Drains	STP-115.020
(NG) Nitrogen Supply	STP-115.015
(RH) Residual Heat Removal	STP-115.008
(SS) Nuclear Sampling	STP-115.018
(SA) Station Service Air	STP-115.013
(SP) RB Spray	STP-115.017

SYSTEM OPEN/RECLOSE LEAK TEST RECORD

A. General

1. System _____
2. Item Description I.D. Number MWR No.
- | | | |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

3. Justification
- a. Replacement b. Rework c. Inspection
- d. Investigation e. Other _____

 QUALIFIED OPERATOR / DATE

B. Test Data

1. Nominal Operating Pressure _____
2. Leak Test Pressure _____
3. Instrument Serial No. _____ Cal. Due Date _____

4.

<u>ITEM I.D. NO.</u>	<u>ITEM NOMINAL SIZE</u>	<u>LEAK RATE (cc/min)</u>	<u>MAX LEAK RATE (cc/min) (Att 7.8)</u>	<u>SAT</u>	<u>UNSAT</u>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>

 QUALIFIED Q.C. INSPECTOR
 OR OPERATOR (VT-2 EXAMINER / DATE

Reviewed By: _____
 ISI COORDINATOR / DATE

SYSTEM OPEN/RECLOSE LEAK TEST
 ACCEPTANCE CRITERIA

* ITEM NOMINAL SIZE	MAXIMUM LEAKAGE (cc/min)
1/8"	10
1/4"	30
3/8"	50
3/4"	150
1"	200
1-1/2"	250
2	300
3	450
4	590
6	885
8	1180
10	1475
12	1769
14	2064
16	2359
18	2654
32	4718
36	5308
VESSELS	5308

* ITEM NOMINAL SIZE

A. Piping & Tubing - Nominal size of pipe as defined in ANSI B36.10 and ANSI 36.19

B. Pumps & Valves - Nominal pipe size of the inlet connection

NOTE: For those sizes not listed, the maximum leakage rate may be Extrapolated. For valves with limits specified by Technical Specifications, the Tech. Spec. limit takes precedence over Attachment 7.8.