Entergy
Nuclear Northeast

Procedure Use Is:

☐ Continuous

☐ Reference

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OPERATIONS TESTING

Approved By:

P E Gaudet 12/6/06

Procedure Sponsor, RPO/ Designee — Date

Staff
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EDITORIAL REVISION

REVISION SUMMARY

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1.0 REASON FOR REVISION

1.1 CR-IP2-2006-05241, CA-3, Update OAP-24 regarding use of ultrasonic flowmeters

2.0 SUMMARY OF CHANGES

2.1 Added P&L 2.1 to clarify the use of ultrasonic flowmeters. (CR-IP2-2006-05241, CA-3) (Editorial 4.6.11)

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1.0 PURPOSE

1.1 This procedure establishes the requirements for:

- Identifying the Post-Work Test (PWT) requirements following routine maintenance and repairs performed on plant systems, structures and components.
- Conducting the Modification Acceptance Test (MAT) program following modifications.
- Preparing special tests (i.e. tests other than post work tests, modification acceptance tests or surveillance tests).

1.2 This procedure applies to:

- IP2
- IP3

2.0 PRECAUTIONS AND LIMITATIONS

2.1 IF flow readings taken from an ultrasonic flowmeter are zero OR are erratic, THEN CONTACT Performance Technicians for assistance in troubleshooting possible problems with the ultrasonic flowmeter. IF flow indications are accurate and reflect system problems, THEN, if necessary, EXIT test in a safe manner.

3.0 PREREQUISITES

NONE

4.0 PROCEDURE

4.1 General

4.1.1 The objective of testing is to verify that systems, structures and components required for continued safe plant operations are capable of performing their intended function when returned to service following routine work or modification and to ensure that the original deficiency is corrected. However, not all work will require a post work test.

4.1.2 Testing should be conducted under conditions that represent normal operating parameters such as flow, differential pressure, temperature, input signal values and fluid type. In some cases, tests may be conducted under conditions that represent abnormal or emergency operating conditions

4.1.3 Testing shall be conducted using written instructions or formal procedures, as appropriate. The test should measure and document the performance and review of test data for the equipment and/or system. The data may become baseline data depending on the extent of the work. The test should verify satisfactory completion of the work activity and the operability of the equipment, if applicable.

4.1.4 It is not the purpose of this procedure to specifically identify the actual requirements of any documents that must be adhered to (i.e., Technical Specifications, F.S.A.R., Code of Federal Regulations, etc.), but rather to ensure that their requirements are reviewed and addressed for applicability.

4.1.5 The test procedure formats are only generally described in this directive. For detailed formats examples should be taken from recent applications. Those portions that are not applicable should be designated as "Not Applicable" or words to that effect. When station or equipment vendor procedures are included as an attachment, applicable sections in the test may refer to the corresponding sections of the station or vendor procedure.

4.1.6 A variety of sources are available for use in creating a test procedure. Available sources include, (but are not limited to) engineering test procedures, surveillance test procedures, plant operating procedures, maintenance procedures, calibration procedures, license documents, vendor manual recommendations, performance tests and activity-specific generated instructions in MAXIMO.

4.1.7 If an applicable surveillance test procedure exists, then that procedure is generally used to verify operability of the equipment. A surveillance test should test all components and features that were affected by the work activity and verify that work was performed properly and that the initial deficiency was corrected.

4.1.8 Often the use of a partial surveillance test will be utilized to return a component to service. Only that portion of a procedure that applies to the component worked should be performed (i.e., if 31 Safety Injection Pump was worked, only that section of the surveillance test that dealt with 31 Safety Injection Pump need be performed).

4.1.9 If only sections of a procedure are used, caution must be used to ensure that previous sections are reviewed for system status, line-ups or prerequisites. Sections with supplemental precautions or prerequisites should be specifically referenced. When a surveillance is used for a PWT, the Operability and Acceptance Criteria of the procedure do not require the Shift Manager's (S.M.) or Control Room Supervisor's (C.R.S.) signature. Their signature for operability of the equipment and/or system can be recorded on the test work request; also a peer review is not required. However, the job supervisor may request a peer review be performed at their discretion.

4.1.10 When sections of a procedure are used for testing, then the job supervisor shall N/A and initial, in accordance with IP-SMM-AD-106 Procedure Feedback those steps or sections of the procedure that do NOT apply.

4.1.11 If a surveillance, calibration or special procedure does not exist to test a particular component, a test may be written using a MAXIMO work request. The required and actual testing performed should be described, data recorded, and acceptance criteria specified.

4.1.12 Test instructions may include details such as initial conditions and prerequisites, hold points, cautions, personnel qualification requirements, personnel safety requirements, acceptance criteria and post-test restoration.

4.1.13 Test equipment may be specified and provisions made for recording the equipment identification and calibration due date of all test equipment utilized. All test equipment should be of the proper capacity or range, purchased and calibrated to the appropriate standard.

4.1.14 For each test procedure that involves the positioning of switches, valves, breakers, etc., an as-left component lineup shall be provided and is typically the last section of the test.

4.1.15 For MAT's or PWT's that require changing the configuration of permanently installed plant equipment, a plant procedure (SOP, COL or surveillance test) should be used. In those cases where it is prudent to incorporate the necessary steps to alter plant configuration in the test itself, the test shall provide steps to restore the system equipment to the COL positions or as required by Station Operating Procedures in accordance with OAP-019, Component Verification and System Status Control or as directed by the Shift Manager or designee.

4.1.16 The lifting of wires should only be done if there is no other way to test. Actuate relays electrically, stroke valves or position the plant equipment in such a manner as to avoid lifting wires. If wires must be lifted, then a test should be performed on the wires that were lifted or double verification of wire re-land is required.

4.1.17 Transmitters or microcomputer equipment should be bench tested prior to installation. Generally, a bench test should not be a substitute for a post-work test since handling and installation may cause equipment malfunction.

4.1.18 Personnel and equipment safety concerns such as identifying rubber gloves, rubber apron and face shields for battery testing should be addressed.

4.1.19 Support activities such as scaffolding, portable lighting, make-up water of proper quality and quantity, visicorder setup, load bank availability, etc should be addressed.

4.1.20 Attachment 3, "Pressure and Leak Test Requirements Following Maintenance, Repair, Replacement, and Modification Activities" shall be used for guidance in determining when a pressure or leak test is required following work or modification activities.

4.1.21 Any tests performed on components or piping identified as being within the ASME Section XI Class 1, 2 or 3 (Quality Group A, B, or C) boundaries shall be performed in accordance with ASME Section XI per IP-SMM-DC-907 section 6.5. Section XI Class 1, 2 and 3 (Quality Group A, B, and C) boundaries are delineated on the ISI Flow diagrams.

4.1.22 Pressure testing involving ASME Section XI Articles IWA-5000, IWB-5000, IWC-5000, IWD-5000; ANSI B31.1, and NFPA shall use PFM-44 "Generic Inservice Pressure Test Program" as a reference document. PFM-44 provides guidance on details such as overpressure protection, ANI Coordination, elevation compensation, leakage criteria, pressure hold times, etc.

4.1.23 All work activities performed on equipment outside of the scope of ASME Section XI but within the scope of ANSI B31.1 will be tested accordingly. Attachment 3 delineates the requirements for testing outside the scope of Section XI.

4.1.24 Applicable Design Codes, Standards and Regulatory Code Commitments should be researched and implemented where applicable in the test program. Some of the Codes and Standards in use at IPEC which could impact testing include:

- ASME Section XI
- ANSI B31.1 1967 (IP2- 1955)
- IEEE 450
- Con Edison Bon Fire Tests
- 10CFR50 Appendix J
- 10CFR50 Appendix R
- NFPA
- ANSI N510, N509
- ASME PTC 25.2
- ANSI N45.2.1, 2, 3, 6
- IEEE 323, 344 (primarily Installation/Design Concern)

4.1.25 To ensure an adequate test procedure is prepared, verify:

- The details provide enough information
- Users can comprehend the information.
- The appropriate format is used for the type of information presented: text tables or graphs.
- Any sequencing or branching in the decision-making process of a procedure is appropriate.
- Location information is complete and accurate.
- Equipment responds to user action are as expected.

4.1.26 Tests should be issued directly to the department that will be performing the test.

4.1.27 Testing performed by vendors or outside contractors shall be performed and documented in accordance with procedures approved by the plant.

4.1.28 When developing the Test, consideration should be given to any input from Operations, Engineering, Maintenance, Instrumentation and Controls or any personnel with a specific knowledge for the particular component or system being tested. Personnel that will be performing the test may have valuable insight on the component, system or test to be performed.

4.1.29 Some tests may be excluded from the Testing Program because they are part of the installation process. Activities that are categorized as installation/construction tests are usually the responsibility of the installer/repairer/contractor and should be included in the work step-lists (i.e., continuity check, megger tests, pump rotational check, pump-motor alignments, etc.). This testing is considered installation testing.

4.1.30 Testing should normally be performed following work activities. Although exception may be made to perform installation type testing, or delay or defer post work testing due to plant conditions.

4.2 Post-Work Testing

4.2.1 Testing may be required following certain maintenance and troubleshooting activities that might have impaired proper functioning of the component (i.e., inspected diesel generator air starting motor internals).

4.2.2 The scope of the post-work test should be based on the extent of the work performed. The test shall verify that the original problem has been corrected, and no new problems have resulted from the work. All Category I and M equipment maintenance should be evaluated for testing requirements; however, other equipment may also be tested for various reasons (i.e., generation dependent, personnel safety, etc.).

4.2.3 Post work testing will not be performed following all maintenance activities. Post work testing will normally be performed when required to demonstrate operability, if potential personnel or equipment hazards exist, or if unit capacity could be affected.

4.2.4 The test preparer initially determines if a formal post-work test is required, however the SM/designee during the Test Requirement Review per Site Management Manual SMM-WM-100 makes the final determination.

4.2.5 In those cases where no formal PWT is performed, the equipment will be placed in service using plant operating procedures and any deficiencies will be processed per Site Management Manual SMM-WM-100.

4.2.6 The following activities are representative of common post-work tests:

- Visual or dimensional inspection and nondestructive tests.
- Voltage or current checks.
- Operational test of the component (including vibration, pressure, flow, temperature, distance of travel, and other measurements where applicable).
- Calibration or alignment of a component or instrument loop.
- Valve stroke and response times.
- Hydrostatic tests if a pressure boundary was affected.

4.2.7 Examples of work activities and associated post work tests are given in Attachment 1. The examples are provided as guidance. The actual required testing should be tailored to the specific work performed.

4.2.8 Post-work tests shall normally be in work request format, and are generally an WRT to a maintenance work request. Where appropriate, a single test WR may satisfy multiple maintenance work requests on the same or related components, or systems. The best format for presenting the subject material should be used. However, the post work test format developed should be the result of sound engineering, administrative, and managerial judgment.

4.3 Special Tests

4.3.1 Tests that are not post work tests, modification acceptance tests, or surveillance tests are considered "special tests". Special tests may range in scope and sophistication from simplistic to very complex. An Engineering Test (ENG) is an example of a type of special test.

4.3.2 Special tests shall be prepared, reviewed and approved in accordance with IP-SMM-AD-102, IPEC Implementing Procedure Preparation, Review, and Approval.

4.3.3 The Acceptance Criteria shall be based upon criteria as found in the applicable Technical Specifications, Design Basis Documents, FSAR and other system references.

4.3.4 The test should encompass the entire work activity and its interfaces. As an example, suppose the work activity is lifting a wire to a safety-related device but not disturbing (theoretically) the other wires on that device. Consideration must be given to testing the device itself since the installer may inadvertently cause it or the other wires on it to become inoperable. The decision to test the device is made based on the likelihood of device failure and the significance of its failure.

4.4 Modification Acceptance Testing

4.4.1 MAT's must demonstrate the following:

- The scope of the Mod is tested.
- Systems, structures or components that the Mod interfaces with or has potentially affected have been restored to operability.
- Cross-channelization has not occurred (Separation criteria has not been violated)
- The full channel or loop is tested.

4.4.2 If a MAT is performed piecemeal (not preferred), additional testing is strongly recommended to ensure the above items were adequately completed. MAT's must be sufficient within the scope of work to demonstrate the intended design, including abnormal operating and failure modes. Real vs. simulated signals/conditions should be used whenever practical. Equipment should be tested over its full range of operation and in the worst case/highest demand configuration; i.e.; both pumps running at the same time to verify adequate suction pressure switch setting vs. only one pump at a time.

4.4.3 MAT's must be sufficient depending on the scope of work to demonstrate the intended design, including abnormal operating and failure modes. Real vs. simulated signals/conditions should be used whenever practical.

4.4.4 Proper operation of equipment interlocks should be verified whenever practical, including verification of trip set points. Normal/abnormal system operating parameter values, the stability of those parameters, and the actuation set points should all be considered in evaluating set point adequacy and acceptance criteria. Instrument loop accuracy (including test equipment accuracy) should also be factored into acceptance criteria tolerances.

4.4.5 MAT's should be written to verify alarms, when possible, either by system operation or by simulated condition from output of alarm sensor.

4.4.6 Pump performance curves (Total Developed Head vs. Flow) should be checked at three different points (including design point) to match shop performance curve + 10%. This should include consideration of pressure drops between pump suction and suction pressure gauge, pump discharge and discharge pressure gauge, and gauge elevation relative to pump centerline.

4.4.7 Heat removal capabilities of coolers, heat exchangers, ventilating fans, etc., may not be specifically verified in functional tests; however, they should be monitored during integrated plant operation when there is sufficient heat load present to determine the adequacy of design. Design heat transfer specification/conditions need to be referenced to the conditions at which heat transfer is measured in order to determine design adequacy.

4.4.8 Consideration shall be given to using the site simulator as a modeling or training tool for complex tests.

4.4.9 Test requirements shall be based upon ENN-DC-117 and the modification test requirements document.

4.4.10 All testing which could impact Environmentally Qualified (EQ) equipment should be reviewed by the IP3 EQ Group to independently verify items such as:

- the testing performed does not violate the components qualification (i.e., excessive pressure differential on capsule)
- the Acceptance Criteria are consistent with design assumptions (i.e., temperature switch activates at 135 F)

4.4.11 When writing procedures that require a calculation (s) as support documentation, the calculation(s) will be prepared, reviewed and approved as a separate but related document. The calculation(s) will be filed with the original procedure. Use of ENN-DC-126 is required.

4.4.12 Testing should demonstrate, as nearly as can be simulated, the overall integrated operation of the modified systems at rated conditions, including simultaneous operation of auxiliary systems.

4.4.13 A verification and validation (V & V) shall be performed on each test to verify that the modification acceptance test procedure will be complete and practical

4.4.14 A review of the MAT shall be performed by personnel involved with the modification and with the performance of the MAT as applicable (e.g., Design Engineer, Responsible Engineer, System Engineer, OPS Test Group, I&C Department etc.). Review and Comment forms should be attached to the MAT for distribution purposes and final documentation of comment resolution.

4.4.15 If the MAT is not written in MAXIMO, then the approved MAT is forwarded to the Document Center for distribution.

4.5 MAT Test Format

4.5.1 All Modification tests shall have a MAXIMO work request. The test may be contained in MAXIMO or it may be a procedure that is tracked by the MAXIMO work request. If a procedure is used, the format is shown by current guidelines maintained in the test group.

4.5.2 At times, vendor procedures are used for testing. In these instances, any of the following is acceptable.

- Rewrite the vendor procedure using current guidelines.
- Include all or applicable sections of the vendor procedure as an attachment to a test procedure. If the vendor procedure is included in its entirety, but only sections or specific steps are used, the remaining sections or steps should be marked as not applicable.

4.5.3 In all cases, the test should contain the following sections: prerequisites, limits and precautions, acceptance criteria, review and approval (including plant input and approvals).

4.5.4 When vendor procedures are used for bench testing there is no potential nuclear safety impact therefore; no specific procedure structure requirements apply.

4.5.5 Non Intent Change Record and Test Deficiencies

- This section is required for revisions to modification related tests.
- Test procedure changes that do not affect the intent of the MAT (non-intent changes) shall be recorded on a Non Intent Change Record (ENN-DC-117). When required, TPC's for non-intent changes shall be processed IAW IP-SMM-AD-102, IPEC Implementing Procedure Preparation, Review, and Approval. The TPC shall be approved prior to MAT acceptance.
- The test engineer and a currently licensed S.R.O shall approve each non-intent change prior to use. Approval is documented on the Non Intent Change Record.
- Any change to an approved MAT requires authorization by the Test Engineer. The Test Engineer shall ensure the change does not compromise any portion of the modification design acceptance.
- Actual test data may not fall within the given acceptance criteria. If the data is determined to be acceptable, an ECN is issued for a change to the Acceptance Criteria stated in the MOD. A change to the MAT is acceptable after the ECN is approved.
- Each test procedure should contain a "Non Intent Change Record" attached as Attachment 1 to the MAT.

4.5.6 The responsible engineer or FSS may mark a line through the "Operations Review" section on the cover sheet of the work request. This section is marked N/A and noted to see the MTD (Modification Turnover Document) for signatures.

4.5.7 The test work request should be marked with a single line through the "Work Completion, Testing and Operations Review" sections on the cover sheet of the test work request. This section is marked N/A and is noted to see the MTD (Modification Turnover Document) for signatures.

4.6 Test Preparation Checklist, Attachment 2

4.6.1 This checklist is intended to be an aid, or mental "tickler" for test developers. The items on the checklist are not requirements; no item on the checklist is required to be on any test. The checklist is intended to be a tool for helping test developers considers various issues during the development of tests. The checklist may be changed or enhanced without requiring a revision to this procedure

5.0 RESPONSIBILITIES

5.1 Work Control Manager or Designated Alternate

- Oversees the Operations Testing Program

5.2 Test Planner

- Identifies post work testing as required by per Site Management Manual SMM-WM-100.

6.0 DEFINITIONS

6.1 **Modification Acceptance Tests (MAT)** - Are developed to determine that installed modifications meet the design requirements of the modification. MAT's generally employ the work request format and are limited to a scope determined by the associated modification.

6.2 **Post Work Tests (PWT)** - Are developed to determine that systems, structures, and components operate properly when a maintenance activity is complete. PWT's generally employ the work request format and will normally consist of activities that are within the scope of approved procedures. With the concurrence of the Work Control Manager special tests may be developed using the work request format similar to that of PWT. When deemed appropriate by the test developer a PWT may be developed as a special test or ENG in accordance with ENN-DC-117.

6.3 **Special Tests** - Are normally developed using current guidelines maintained in the test group or in accordance with ENN-DC-117. Tests that are not post work tests, modification acceptance tests, or surveillance tests are considered special tests (including ENG's). As noted above certain special tests maybe developed using the work request format similar to PWT's with the concurrence of the Work Control Manager.

7.0 REFERENCES

7.1 Commitment Documents

None

7.2 Development Documents

7.2.1 PFM-05, Guidance for Post-Maintenance Testing

7.2.2 INPO Good Practice MA-306

7.2.3 DCM-2

7.2.4 MCM-1 Attachment 1

7.2.5 EPRI Post-Maintenance Testing Guide

7.3 Interface Documents

7.3.1 IP-SMM-AD-102, IPEC Implementing Procedure Preparation, Review, and Approval

7.3.2 Administrative Procedure, IP-SMM-AD-106, Procedure Feedback

7.3.3 Site Management Manual SMM-WM-100

7.3.4 Station Directive, TCS-SD-01, OAP-002 Shift Relief And Turnover.

7.3.5 OAP-019, Component Verification and System Status Control

7.3.6 ENN-DC-117, Post Modification Testing and Special Testing Instructions

7.3.7 IP-SMM-DC-907, ASME Code Section XI- Repair/ Replacement Program

8.0 RECORDS AND DOCUMENTATION

8.1 Records

The following required records are generated by this procedure and SHALL be maintained in accordance with IPEC Records Retention Schedule:

None

8.2 Documentation

The following documentation resulting from this procedure are NOT required to be controlled and maintained in accordance with the IPEC Records Retention Schedule:

None

ATTACHMENT 1
OPERATIONS TESTING

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NOTE:

- This list of activities and tests is a guide and is not meant to be all-inclusive. The selection of testing should depend on the scope of completed work and requirements of applicable codes, standards, Technical Specifications and vendor recommendations.
- An appropriate test for nearly all-mechanical work would be a general leakage inspection and any testing required by ASME codes.

WORK ACTIVITY	RECOMMENDED TEST
REPAIR OF ELECTRIC MOTOR	OPERATE THE EQUIPMENT AND VERIFY THERE ARE NO ABNORMAL NOISES
	OBTAIN BASELINE VIBRATION ANALYSIS DATA
	OBTAIN CURRENT READINGS
	MEASURE BEARING TEMPERATURES
	CHECK FOR PROPER ROTATION
REPAIR OF CIRCUIT BREAKER	PERFORM FUNCTIONAL TEST ON THE BREAKER (OPEN AND CLOSE ON REQUIRED SIGNALS)
	PERFORM MANUAL OPERATIONAL CHECK ON THE BREAKER
REPLACE THERMAL OVERLOAD HEATER RELAY WITH LIKE IN KIND.	
	WHEN FEASIBLE - START AND RUN COMPONENT FOR 10 MINUTES
MODIFY THERMAL OVERLOAD HEATER RELAY (REPLACEMENT RELAY IS DIFFERENT THEN WHAT IS INDICATED ON PLANT EQUIPMENT SPECIFICATION SHEET).	TEST REQUIREMENT - RUN COMPONENT FOR MINIMUM OF 20 MINUTES.
ADJUST PACKING OR REPACK AIR-OPERATED OR MOTOR-OPERATED VALVE	STROKE TIMING TEST
	INSERVICE LEAKAGE INSPECTION AT NORMAL OPERATING PRESSURE

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OPERATIONS TESTING

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WORK ACTIVITY	RECOMMENDED TEST
REPAIR INTERNALS OF AIR-OPERATED OR MOTOR-OPERATED VALVE	LEAK TEST VALVE IF REQUIRED BY TECHNICAL SPECIFICATIONS, SURVEILLANCE PROCEDURES OR ASME CODE
	PERFORM RETESTING REQUIRED FOR ADJUSTING PACKING
REPACK MANUAL VALVE OR ADJUST PACKING	VERIFY VALVE STEM WILL MOVE FREELY WITHOUT BINDING
	CHECK FOR LEAKAGE AT OPERATING PRESSURE
PAINTING/PAINTING REMOVAL	FUNCTIONAL TEST VERIFYING THE AFFECTED COMPONENTS WERE NOT AFFECTED BY THE PAINT/PAINT REMOVAL ACTIVITY
MOV MOTOR OPERATOR REPAIR OR REPLACEMENT	SEAT LEAKAGE TEST
	STROKE TIMING TEST
	AUTOMATIC FUNCTION TESTS
	POSITION VERIFICATION CHECK
	PACKING LEAKAGE, CHECK AT OPERATING PRESSURE
AIR-OPERATED VALVE REPAIR OR REPLACEMENT	FULL-STROKE EXERCISING CHECK AT NORMAL SYSTEM PARAMETERS, PNEUMATIC LEAKAGE TEST
	SEAT LEAKAGE TEST
	STROKE TIMING TEST
	AUTOMATIC FUNCTION TEST
	POSITION VERIFICATION CHECK
	PACKING LEAKAGE, CHECK AT OPERATING PRESSURE
SOLENOID VALVE REPAIR OR REPLACEMENT	FULL-STROKE EXERCISING CHECK
	SEAT LEAKAGE TEST
	AUTOMATIC FUNCTION TEST
	POSITION INDICATION VERIFICATION CHECK
	STROKE TIMING TEST
REPAIR OR REPLACEMENT OF CONTAINMENT ISOLATION VALVE	PERFORM ANY CODE-REQUIRED STRENGTH OR SEAT TIGHTNESS TESTING
	PERFORM TECHNICAL SPECIFICATION REQUIRED LEAK RATE AND OPERABILITY TESTING

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WORK ACTIVITY	RECOMMENDED TEST
PRESSURE REGULATING VALVE REPAIR OR REPLACEMENT	FUNCTIONAL CHECK
SAFETY VALVE/RELIEF VALVE REPAIRS	CHECK FOR SIMMER, PACKING AND MECHANICAL LEAKAGE
REPAIR OR REPLACEMENT OF SAFETY OR NON-SAFETY-RELATED PUMPS	TEST IN ACCORDANCE WITH ASME CODE, AS REQUIRED
	PERFORM APPROPRIATE SURVEILLANCE TEST
	MEASURE APPLICABLE PUMP AND MOTOR PERFORMANCE DATA
	PERFORM AUTO FUNCTION TESTS
VENTILATION SYSTEM FAN/FILTER UNIT MAINTENANCE	FUNCTION TESTS AND MANUAL START
	CHECK BEARING TEMPERATURES, VIBRATION LEVELS, ABNORMAL NOISE, AIR FLOWS
MANUAL, MOTOR AND AIR-OPERATED DAMPERS REPAIR OR REPLACEMENT	AUTOMATIC FUNCTION AND INTERLOCK CHECKS
	STROKE TIMING CHECK
AIR COMPRESSOR REBUILD OR REPAIR	CHECK FOR LEAKAGE AT OPERATING PRESSURES
	BEARING TEMPERATURE MEASUREMENT
	CHECK FOR UNUSUAL NOISE
	CHECK PARAMETERS (DISCHARGE PRESSURE, COOLING FLOW, OIL LEVEL, AIR TEMPERATURES)
TURBINE MAINTENANCE	AUTO START FUNCTIONAL TEST
	TURBINE (PUMP) PERFORMANCE CHECK (FLOW, SPEED, BEARING TEMPERATURE AND VIBRATION AMPLITUDE)
	TURBINE PROTECTIVE FEATURE TEST
	MANUAL START TEST
	CHECK FOR FLUID LEAKAGE AT NORMAL SYSTEM PARAMETERS
	AUXILIARIES FOR HEATING AND COOLING

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OPERATIONS TESTING

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WORK ACTIVITY	RECOMMENDED TEST
MAINTENANCE OF EMERGENCY DIESEL GENERATOR (EDG) AND RELATED COMPONENTS	AUTO START FUNTIONAL TEST
	EDG PROTECTIVE FEATURES AUTO TEST (OVERSPEED, GENERATOR DIFFERENTIAL, LOW LUBE OIL PRESSURE, HIGH CRANKCASE PRESSURE, ETC.)
	EDG SYNCHRONIZATION AND LOAD TEST
	EDG MANUAL START TEST
HEAT EXCHANGER MAINTENANCE	HEAT EXCHANGER PARAMETER CHECK (TEMPERATURE, FLOW, EXTERNAL LEAKAGE, ETC.)
	HYDROSTATIC OR OPERATIONAL TEST FOR TUBE AND TUBE SHEET LEAKAGE TEST
PIPING SYSTEM MAINTENANCE	ASME CODE REQUIREMENTS
	PRESSURE/HYDROSTATIC CHECK
	INTEGRITY CHECK OF MECHANICAL JOINTS
NEW OR REPAIR WELD	TESTING IN ACCORDANCE WITH THE ASME CODE IS REQUIRED FOR SYSTEMS COVERED BY THE CODE. PLANT GUIDELINE TO BE SPECIFIC FOR APPLICABLE CATEGORIES
REPLACE COMPONENT IN LOOP	INSPECT MECHANICAL JOINTS UNDER NORMAL OPERATING OR HYDROSTATIC TEST PRESSURE TO VERIFY NO LEAKAGE
	VERIFY PROPER OPERATION OF INSTRUMENT LOOP BY COMPARING WITH · OTHER READINGS OF THE SAME PARAMETER ON DIFFERENT INSTRUMENT CHANNELS · READINGS BETWEEN CHANNELS THAT MONITOR THE SAME VARIABLE AND BEAR A KNOWN RELATIONSHIP TO EACH OTHER · READING BETWEEN CHANNELS THAT MONITOR DIFFERENT VARIABLES AND BEAR A KNOWN RELATIONSHIP TO ONE ANOTHER
	OPERATIONAL CHECK ON PROCESS
REPLACE SWITCH DEVICES (PRESSURE, FLOW, TEMPERATURE, LEVEL)	INSPECT MECHANICAL JOINTS UNDER NORMAL OPERATING OR HYDROSTATIC TEST PRESSURE TO VERIFY NO LEAKAGE Functional check of switch

ATTACHMENT 1
OPERATIONS TESTING

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WORK ACTIVITY	RECOMMENDED TEST
INSTRUMENTATION TRANSMITTER CHANNEL MAINTENANCE	CHANNEL CHECK
	TRIP ACTUATING DEVICE OPERATIONAL TEST
	COMPARE OUTPUT AGAINST REDUNDANT CHANNEL INDICATION
TEMPERATURE CHANNEL MAINTENANCE	CHANNEL CHECK
	TRIP ACTUATING DEVICE OPERATIONAL TEST
NUCLEAR INSTRUMENTATION MAINTENANCE	CHANNEL CHECK
	TRIP ACTIVATION DEVICE OPERATIONAL TEST
	INCORE DETECTOR DRIVE OPERATIONAL TEST
RADIATION MONITORS MTC	CHANNEL CHECK
	AUTO FUNCTION TEST
TRANSFORMER MAINTENANCE	TRANSFORMER OPERABILITY TEST (PRIMARY/SECONDARY VOLTAGE AND CURRENT)
STATIC INVERTERS REPAIR REPLACEMENT	INVERTER LOAD CHECK
	TRANSFER TEST, IF APPLICABLE
LOAD CENTER AND DIST. PANEL ELECTRICAL MTC	VERIFY VOLTAGE AND LOAD CURRENT
CONTROL ROD DRIVE MECHANISM (CRDM)	CRDM GROUP STEP COUNTERS (OR OTHER POSITION INDICATION)
	CRDM ROD DROP TIME CHECK
CRANES AND HOIST REPAIRS	LOAD TEST
	LIMIT SWITCH OPERABILITY CHECK
BATTERY MAINTENANCE	BATTERY SERVICE DISCHARGE TEST
	BATTERY PERFORMANCE DISCHARGE TEST
TANK/PRESSURE VESSEL REPAIRS OR REPLACEMENT	TANK/VESSEL INTEGRITY CHECKS FOR LEAKAGE
	TANK PARAMETER CHECK (PROPER LEVEL, PRESSURE, TEMPERATURE INDICATIONS)
	ASME CODE REQUIREMENTS, AS APPROPRIATE
REPAIR OF SERVICE WATER VACUUM BREAKERS	PLACE SYSTEM IN SERVICE, AFTER INITIAL PUMP START CHECK FOR NO GROSS LEAKAGE (REQUIRES USE OF OPERATOR JUDGEMENT). IF PUMP RUN IS LONG ENOUGH CHECK FOR NO LEAKAGE AFTER 2 HOURS.

ATTACHMENT 2
TEST PREPARATION CHECKLIST

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1.0 Is this an operations test? (Correct Resp Dept, Dept Billed, crew designation on text page?)

2.0 Special notes required? (Interdepartmental coordination, special equipment required?)

3.0 Is tech spec, TRM, app 'R', FP equipment, components, systems affected?

4.0 Are there potential personnel or equipment safety concerns?

5.0 Does this equipment pose a potential threat to plant operations or unit load?

6.0 Is this test REQUIRED? If not, assess what value is added by performing this test.

7.0 Test boundaries properly identified (specific joints/components identified, avoid use of "all affected mechanical joints")

8.0 Are test inspection requirements sufficiently specific (ISLT, seat leakage, etc.)?

9.0 Are all of the proper design characteristics tested (which are required), i.e. valve stroke, seat leakage, ISLT, stroke time, pump curves, etc.

10.0 Acceptance criteria sufficiently specific (avoid use of "operates as required" or "minimal leakage")?

11.0 Are test directions sufficiently detailed (is use of SOP's or surveillance tests appropriate)?

12.0 Does this test require support from another department? If so is this reflected work request permits (PP) page?

13.0 Does this test require the use of a test pressure gauge? For example a hydro, if so add a note for performance engineering to enter work request in the performance database.

ATTACHMENT 3
PRESSURE AND LEAK TEST REQUIREMENTS FOLLOWING MAINTENANCE, REPAIR, REPLACEMENT AND MODIFICATION ACTIVITIES
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This attachment provides guidance to determine when a pressure or leak test is required following maintenance, repair, replacement and modification activities on system piping and components that are OUTSIDE the ASME Section XI boundaries.

This guidance is based upon the fact that the pressure and leak test criteria acceptable for Code piping & components within the ASME Section XI boundaries is also suitable for piping & components OUTSIDE the ASME Section XI boundaries. The requirements resulting from the application of the guidance specified herein are in addition to the requirements of the applicable fabrication/ construction specifications and codes. This guidance results in additional NDE on "high-energy" piping & components above 2" nominal diameter. The 1992 Edition of B31.1 gives "the owner" an alternative to perform a service leak test at normal operating pressure on non-boiler external piping in lieu of a hydrostatic test. The required leak test provides assurance that any defects in 2" and smaller "high-energy" and all sized intermediate & low energy piping & components will be discovered in a timely manor. This documents the Engineering justification for this guidance and changes require Engineering approval.

NOTES:

i. Pressure and leak test requirements for activities on system piping and components that are INSIDE the ASME Section XI boundaries are covered in procedure IP-SMM-SD-907 Section 6.5.

ii. This guidance does NOT apply to surveillance requirements contained in the IP2 and IP3 plant Technical Specification or regularly scheduled pressure tests associated with the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI. Surveillance testing is covered in procedure IP-SMM-DC-904.

iii. The National Fire Protection Association Codes define the requirements for Fire Protection System leak testing.

iv. This guidance does NOT apply to the ISFSI System.

v. Where a system leakage test would require manipulation of valves expressly prohibited by Technical Specifications, the valves shall not be manipulated and the system leakage test shall be performed at nominal operating temperature and pressure.

ATTACHMENT 3
PRESSURE AND LEAK TEST REQUIREMENTS FOLLOWING MAINTENANCE, REPAIR, REPLACEMENT AND MODIFICATION ACTIVITIES

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1. A code pressure test is required following maintenance, repair, replacement, and modification activities UNLESS one or more of the following conditions are met **AND** a visual leak check is performed in accordance with 2 below:

   - All water, compressed air, nitrogen, or carbon dioxide lines below 200 PSIG and 200 Degrees F
   - Component connections, piping, and associated valves that are 1" NPS and smaller. The connection weld of 1" NPS and smaller to components or piping larger than 1" NPS are to follow the guidance for the piping size larger than 1".
   - Fluid system piping and components where pressure testing is not practicable. E.g.- Systems not isolatable by design- piping open to atmosphere with no means of isolation.
   - Fluid system piping and components where radiography is performed on 100% of the welded joints. Radiography does not apply to socket welds.
   - Disassembly and reassembly of mechanical joints
   - Activities listed in 3 below.
   - A hydrostatic pressure test is performed in accordance with ANSI B31.1 code for Power Piping or other ASME Code Sections.
   - NDE is performed as required by IP-SMM-DC-907 Attachment 10.8 section titled "Class 3 Piping".

2. Requirements For A Visual Leak Check

   a. As a minimum, when a fluid system has been opened, a visual leak check shall be performed while the system is in service.

   b. For liquid and steam systems, post work visual leak checks at normal operating pressure can be made by operators during normal watch tours after completion of maintenance. These checks would not require a formal post work test to be written or performed.

   c. A leak detection fluid shall be used on all lines containing compressed gases.

   d. IF a pressure test is required and or if a vacuum test is performed, THEN the visual leak check is not required.

ATTACHMENT 3
PRESSURE AND LEAK TEST REQUIREMENTS FOLLOWING MAINTENANCE, REPAIR, REPLACEMENT AND MODIFICATION ACTIVITIES
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3. Criteria for exclusion from Pressure Testing

The following are examples of maintenance, repair, replacement and modification activities which do not require a pressure test.

GENERAL

1. Piping, pump and valve repairs that do not penetrate through the pressure boundary (e.g. penetrate from the OD through the ID).
2. Pressure vessel repairs where the repaired cavity does not exceed 10% of the minimum design wall thickness.
3. Replacement of bolting, nuts and/or studs.
4. Component connections, piping and associated valves that are one inch nominal pipe size and smaller.
5. Replacement of non-structural pump and valve internals except when the original equipment was constructed in accordance with a Construction Code or Code Case.
6. Stopgap measures to limit leakage, which are reversible and do not affect the structural integrity of the flawed components in accordance with Generic Letter 90-05.
7. Replacement of elastomer parts in valves or other components which do not form part of the pressure boundary.
8. Adjustment of packing or repacking of valves or pumps.
9. Replacement of pump seal packages or mechanical seal maintenance.
10. Replacing spacer washers or cotter pins.
11. Replacement of gaskets.
12. Replacement of instruments.
13. Adjusting and tightening of fasteners.
14. Sandblasting, buffing, polishing and honing.
15. Chasing and dressing of threads.

ATTACHMENT 3
PRESSURE AND LEAK TEST REQUIREMENTS FOLLOWING MAINTENANCE, REPAIR, REPLACEMENT AND MODIFICATION ACTIVITIES
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16. Cladding repairs.

17. Heat exchanger tube plugging.

18. Tube to tubesheet repair welds where such welds are made on the cladding.

19. Removal, testing and replacement of shock suppressors on existing supports.

20. Use of low pressure injector sealants, such as grease or oil, and application of non-metallic paints and coatings which have been approved for system use.

21. Replacement of electrical conducting and insulating material.

22. Piping for hydraulic or pneumatic components of tools and equipment.

23. Systems that are vacuum tested.

24. Removal, cleaning and reinstalling strainers and filters which do not form part of the pressure boundary.

25. Replacement of orifice plates and spacer rings ½" nominal thickness and less which do not form part of the pressure boundary.

VALVES

1. Grinding or machining on valve disc seating surfaces.

2. Lapping of sealing surfaces on valves and valve discs where no pressure boundary material is removed. Hardfacing or cladding is not considered pressure boundary material.

3. Removal and replacement of stem assembly on a valve.

4. Removal and replacement of valve actuators.

5. Seal welding valves to prevent gasket leaks.

ATTACHMENT 3

PRESSURE AND LEAK TEST REQUIREMENTS FOLLOWING MAINTENANCE, REPAIR, REPLACEMENT AND MODIFICATION ACTIVITIES

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PUMPS

1. Pump rotating bowl assembly replacement which is not directly associated with the pressure boundary.
2. Changing oil in a pump.
3. Flushing the cooling system of a pump.
4. Seal welding pumps to prevent gasket leaks.