

## SECTION I

### INSPECTION OBJECTIVE

Ascertain whether the licensee has developed and implemented a QA Program relating to maintenance activities that is in conformance with proposed Technical Specifications, regulatory requirements, commitments in the application and industry guides or standards.

## SECTION II

### INSPECTION REQUIREMENTS

#### 1. Program Review

##### a. Corrective Maintenance

For the licensee's corrective maintenance program, verify that:

- (1) Written procedures have been established for initiating requests for routine and emergency maintenance.
- (2) Criteria and responsibilities for review and approval of maintenance requests including emergency maintenance requests, have been established.
- (3) Criteria and responsibilities that form the basis for designating the activity as safety/non-safety related have been established.
- (4) Criteria and responsibilities have been designated for performing work inspection of maintenance activities.
- (5) Provisions and responsibilities have been established for the identification of appropriate inspection hold points related to maintenance activities.
- (6) Methods and responsibilities have been designated for performing functional testing of structures, systems or components following maintenance work and/or prior to their being returned to service.
- (7) Administrative controls for maintenance activities require that the following records will be prepared, assembled and reviewed for transfer to records storage:
  - (a) Approvals of maintenance requests
  - (b) Identification of the personnel who performed the maintenance task
  - (c) Identification of the personnel who inspected the maintenance work

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- (d) Cause of the malfunction or failure which necessitated the maintenance work
  - (e) Description of the corrective action taken
  - (f) Identification of the post maintenance functional testing performed
  - (g) Identification of personnel that performed the post maintenance testing
  - (h) Identification of replacement parts or materials used
  - (i) Identification of test and measuring equipment used
- (8) Responsibility to assemble and review the records identified in a.(7) above for transfer to record storage has been established.
  - (9) A program has been established for reviewing completed corrective maintenance records to assess the adequacy of the preventive maintenance program, to identify repetitive failures of parts and components, and to identify design deficiencies.
  - (10) Responsibilities have been assigned to assure implementation of records review identified in a.(8) above.
  - (11) Work Control procedures require special authorization for activities involving welding, open flame, or other ignition sources and that they take cognizance of nearby flammable material, cable trays, or critical process shipment.
  - (12) Work Control procedures require a firewatch, with capability for communication with the control room, if an activity identified in (5) above is to be performed in the proximity of flammable material, cable trays, or vital process equipment.

b. Equipment Control

- (1) Verify that methods and responsibilities for equipment control have been clearly defined including the following:
  - (a) Permission to release equipment or systems for maintenance shall be granted by the operating staff.

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- (b) Prior to granting permission for removal of equipment for service, the operating staff is required to verify that the equipment or system can be released without violating Technical Specification requirements. Additionally, they shall determine how long it may be out of service. Granting of such permission shall be documented.
  - (c) When testing of redundant components or systems is required by Technical Specification or 10 CFR 50, such testing shall be documented.
  - (d) The status of equipment and systems shall be clearly identified.
  - (e) Procedures and responsibility to determine when independent verification to insure that necessary measures, such as tagging equipment, have been implemented correctly have been established.
  - (f) Procedures and responsibility for returning equipment to service have been established.
- (2) Verify that the licensee has clearly defined controls for the locking devices on the locked-open or locked-closed valves and circuit breakers which include the following:
- " (a) The type of locking devices which are acceptable."
  - " (b) The responsibilities for authorizing the removal of the locking device under routine and emergency conditions."

c. Motor Operated Valve Maintenance Program

Verify that the licensee maintenance program for motor operated valves includes:

- (1) A tabulation of performance data which as a minimum provide:
  - (a) Torque required to open and close valve
  - (b) Type of torque switch and settings for open and close direction
  - (c) Motor size, voltage, and full load and locked rotor amps
  - (d) Overload relay and heater size
  - (e) Breaker size and breaker trip setting

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- (f) Identification of whether magnetic trip is automatic or requires manual reset at the breaker
- (g) Identification of valves which have operators with nonlocking gears or brake assemblies
- (2) Determinations to assure that:
  - (a) The torque switches supplied cannot demand a larger torque than the motor can supply.
  - (b) The valve operator motors are not under or marginally sized for their particular load.
  - (c) The breakers are not under or marginally sized. The magnetic trip settings, if applicable, shall be based on motor maximum torque output.
  - (d) The thermal overload relays and heaters have been sized for the licensee's desired locked rotor tripping time. Some licensees prefer to trip the breakers within 5 to 10 seconds while others prefer 1 to 2 minutes. In any case they should be consistent to demonstrate that the sizing was studied and not randomly selected.
- (3) A study to ensure that the torque switch settings will generate the required torque to open and close the valve. One method to perform this correlation is with the help of torque switch setting vs. developed torque charts which can be obtained from the operator manufacturer. Another method consists of correlating running current with developed torque and torque switch setting. In any case, the licensee should be able to show that the system used to determine the torque switch settings was based on good engineering practice.

d. Preventive Maintenance

Verify that a written preventive maintenance program for safety-related structures, systems and components has been established including:

- (1) Responsibility for the program
- \* (2) Master schedule for preventive maintenance
- (3) Documentation and review of completion of preventive maintenance activities
- (4) Responsibilities and methods for establishing PM frequencies

e. Special Processes

- (1) Verify that administrative controls for special processes have been established as follows:
  - (a) A requirement that only qualified procedures will be used.
  - (b) A requirement that only qualified personnel will be used.
  - (c) A requirement that a current file of special processes will be maintained which would include qualification records of procedures and personnel.
  - (d) Criteria to establish when the use of mock-ups or other special training will be required.
- (2) Verify that responsibilities have been assigned to assure that the requirements identified in e. (1) above will be accomplished.

f. Cleanliness Controls

- (1) Verify that procedures have been developed for cleaning safety related components and systems.
- (2) Verify that procedures for maintaining the cleanliness of previously cleaned systems have been established.
- (3) Verify that the cleanliness classifications of plant systems have been established.
- (4) Verify that responsibilities for implementing the requirements of f.(1) and f.(2) above have been established.

g. Housekeeping Controls

Verify that administrative controls and responsibilities for general housekeeping have been established which include:

- (1) Establishment of Housekeeping Zones.
- (2) Control of housekeeping during work activities.

2. Implementation

- \*a. Select 3 completed routine maintenance activities. For each of those selected, verify the following:

- \*(1) The maintenance requests were properly initiated, reviewed and approved.

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- \*(2) Appropriate procedures were prepared, reviewed and approved covering the maintenance activities.
- \*(3) Test and measurement equipment used was identified.
- \*(4) Inspections were performed and documented in accordance with designated inspection hold points.
- \*(5) If special processes were performed in conjunction with the maintenance activities, verify that personnel and procedures used were properly qualified.
- \*(6) Appropriate post maintenance functional testing was performed.
- \*(7) The cause of the malfunction was documented.
- \*(8) Corrective action taken was documented.
- \*(9) Personnel performing the maintenance activity are identified.
- \*(10) Replacement parts and materials used are identified.
- \*(11) If the boundaries of clean systems were opened, verify that appropriate measures were taken to preserve or re-establish system cleanliness.
- \*(12) Equipment released for maintenance was released per equipment control procedures identified in l.b.(1) above.
- \*b. Verify that the file of qualifications for personnel and procedures used for performance of special processes is current.
- \*c. Select 5 pieces of equipment on preventive maintenance master schedule and verify that the required maintenance activities were performed and documented.
- d. Verify that personnel responsible for designation of maintenance classifications (safety related/non-safety related) are cognizant of program classification requirements (Interview 10% or 2 of affected personnel).
- e. Inspect a maintenance activity in progress to verify that the controls established above are being utilized.

### SECTION III

#### INSPECTION GUIDANCE

References: ANSI N18.7-1976; ANSI N45.2.6-1973;  
ANSI N45.2.1-1973; ANSI N45.2.3-1973 proposed  
Technical Specifications; Regulatory Guide 1.33;  
Sections 13 and 17 of the FSAR.

The objectives and key ingredients of an acceptable plant maintenance program are discussed in Section 5.2.7 of ANSI N18.7-1976. The inspection requirements identified in this procedure are primarily based on the guidance contained therein. The applicant's commitments relative to this standard and other standards should be reviewed to establish inspection acceptance criteria. Only inspection guidance not contained in Section 5.2.7 of ANSI N18.7 is provided below.

1.a.(4) & (5) See ANSI N18.7 referenced above for inspection guidance.

1.a.(7) The requirements for developing and maintaining maintenance records are discussed in Section 6 of the Technical Specifications; Section 17.2 of the FSAR; Section 5.2.12 of ANSI N18.7-1976; and ANSI N45.2.9-1974.

1.a.(11) and (12) Regulatory Guide 1.120 or the approved NRC alternate identify fire protection/prevention requirements which should be included in work control procedures for maintenance activities.

Records of these activities may be documented in the maintenance procedure, on the work request or trouble ticket or in other documents. The inspector should establish that the system developed by the applicant provides for generation of the required records in some manner.

1.b. Section 5.2.6 of ANSI N18.7-1976 provides guidance relative to equipment control.

1.b.(1)(f) ASME, Section XI, articles LWP 3000 and LWV 3000 require operational readiness testing of pumps and valves following maintenance which could affect performance. Such maintenance includes packing replacement or tightening, adjustment of limit torque switches and settings, etc. 10 CFR 50.55a(g) references Section XI of the code.

- 1.c. Experience has shown that limitorque switch and limit switch settings constitute the largest number of motor operated valve problems. Therefore, the purpose of this inspection requirement is to limit the problem by ensuring that switch settings are identified and engineered.
- 1.d. Lubricants, filters, and other expandables should be clearly identified.
- 1.e. Section 5.2.18 of ANSI N18.7-1976 provides guidance relative to control of special processes. ANSI N45.2.6-1976 provides guidance relative to qualification of personnel responsible for inspection and testing activities. See Regulatory Guide 1.71 for guidance on use of mock-ups and Special Training.
- 1.f. ANSI N45.2.1-1973 provides guidance relative to cleanliness of fluid systems and components. R.G. 1.37 endorses ANSI N45.2.1-1973 and states that many of the requirements and recommendations are applicable during the operations phase and should be used when applicable.
- 1.g. ANSI N45.2.3-1973 provides guidance relative to general housekeeping requirements. R.G. 1.39 endorses ANSI N45.2.3-1973 as applicable for operations phase activities at nuclear power plants.

The applicant should establish standard flushing procedures, identify authorized solvents and provide other guidance as necessary to establish and maintain the required degree of cleanliness of safety related components and systems.

- Notes:
- 1. Only \* requirements need to be inspected when another reactor facility at the site using the same site management has been inspected within 24 months of the time this procedure must be completed.
  - 2. The program review function should be completed during the operational preparedness phase.
  - 3. A Maintenance Program for plant operations is not required until the facility license is issued. Therefore, inspection of program implementation may be deferred if necessary but should be completed within the first six-month period of operation.
  - 4. For record keeping purposes, the program review and program implementation phases of the inspection will be assigned 50% of the total inspection effort.

End of Procedure