

**INSPECTION TECHNICAL PROCEDURE**

**I-116**

**EQUIPMENT LAY-UP AND MAINTENANCE INSPECTION**

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Revision 0

Reviewed by: \_\_\_\_\_  
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## **INSPECTION TECHNICAL PROCEDURE I-116, REV.0 EQUIPMENT LAY-UP AND MAINTENANCE INSPECTION**

### **1.0 PURPOSE**

This procedure provides guidance to assess the Contractor's activities for the lay-up and maintenance of special or large rotating equipment. This guidance is based on the requirements set forth in the Safety Requirements Document (SRD), the Integrated Safety Management Plan (ISMP), and the Quality Assurance Manual (QAM).

This inspection procedure assesses the adequacy and effectiveness of the following:

- Procedures and programs implementing preventive maintenance activities for equipment in storage or lay-up
- Preventive maintenance activities applied to equipment in storage or lay-up
- The training and qualification of personnel implementing the program and procedures
- The records system demonstrating the management and accomplishment of the required preventive maintenance activities.

### **2.0 OBJECTIVES**

This procedure verifies the Contractor has established and implemented effective programs and procedures to ensure important-to-safety equipment in storage or lay-up is maintained according to manufacturers' requirements. This includes programs and procedures for (1) implementing manufacturers' requirements for storing equipment that requires special storage conditions; (2) managing and providing oversight to ensure special storage conditions have been adequately addressed by specifications, drawings, and procedures; and (3) managing and providing oversight to ensure the as-constructed condition of the facility equipment is maintained according to the design and manufacturers' requirements.

This inspection procedure is one component of a complete construction inspection program. This inspection procedure and others will be used, as needed, to ensure construction activities are being conducted as required by authorization basis commitments and Contractor procedures. During the construction phase, a significant portion of this procedure is expected to be accomplished at least once for the Contractor and each major subcontractor involved with the activities addressed by this procedure. However, the entire procedure is not expected to be completed during any one inspection or every time the inspection procedure is used.

### **3.0 INSPECTION REQUIREMENTS**

#### **3.1 Adequacy and Effectiveness of Construction Implementing Procedures**

- 3.1.1 The inspector should verify the Contractor and any subcontractors with responsibilities for storing and maintaining important-to-safety equipment have approved procedures describing the administrative controls and work processes that ensure equipment manufacturers' requirements for storage and lay-up maintenance are met. (QAM, Policy Q-05, Sections 3.1.1 and 3.3; ISMP, Table 1-3, item 5; and SRD, Safety Criterion (SC) 4.1-2 and 7.3-5)
- 3.1.2 The inspector should verify procedures provide for inspections to ensure important quality-related aspects of the equipment storage and maintenance work are verified and documented. (QAM, Policy Q-05.1, Section 3.5.1; NQA-1, ISMP, Table 1-3, items 5 and 8; and SRD SC 4.1-2, and 7.3-7)
- 3.1.3 The inspector should verify the Contractor has established procedures for ensuring craft and inspection personnel performing work that implements the storage and maintenance requirements of important-to-safety equipment are qualified to perform their assigned work. (QAM, Policy Q-02.2, Section 3.3.2; and ISMP, Table 1-3, item 2)

#### **3.2 Adequacy and Effectiveness of Construction Activities**

The inspector should verify work is being accomplished under controlled conditions according to the Contractor's approved procedures. (QAM, Policy Q-05.1, Section 3.1.1; NQA-1, Basic Requirements, Paragraph 5; SRD, SC 4.1-2 and 7.3-5; and ISMP, Table 1-3, item 5)

#### **3.3 Adequacy and Effectiveness of the Training and Qualification of Personnel**

The inspector should verify craft and quality control (QC) personnel involved in performing inspection and preventive maintenance activities related to equipment storage and lay-up are qualified to perform their job functions. (QAM, Policy Q-05.1, Section 3.1.1; SRD, SC 7.3-5; and ISMP, Table 1-3, item 5)

#### **3.4 Adequacy and Effectiveness of the Records System**

The inspector should verify records reflect the required quality of the equipment storage and lay-up has been achieved and the requirements specified in approved procedures. The inspector should also verify records have been reviewed for accuracy and assurance that the recorded information meets project requirements, have been approved, and have been stored and maintained sufficiently to support technical requirements and contractual regulatory compliance.

(QAM, Policy Q-17.1, Sections 3.1.2, 3.3.1 and 3.6.1; SRD, SC 4.0-3, 4.1-2, and 7.3-4; and ISMP, Section 8 and Table 1-3, item 4)

## **4.0 INSPECTION GUIDANCE**

### **4.1 Adequacy and Effectiveness of the Construction Implementing Procedures**

4.1.1 The inspector should review equipment manufacturers' technical manuals and the Contractor's procedures for storing and maintaining important-to-safety equipment that requires special storage and maintenance conditions. The objective of this review is to ensure that manufacturers' requirements related to equipment storage and lay-up are included in the Contractor's procedures. For these examinations, select (if available) from the list of important-to- safety equipment two large pumps, two large electrical motors, four valve operator motors, one diesel-driven electrical generator, one instrumentation panel, and one electrical panel. The Contractor's procedures for storage and lay-up of this equipment should implement the requirements of equipment manufacturers' technical manuals.

4.1.2 The inspector should review the Contractor's procedures for the equipment selected in Section 4.1.1 above, to ensure that inspections and tests are included and scheduled to verify that the storage and lay-up condition of the selected equipment conforms to manufacturers' requirements.

4.1.3 No additional guidance.

### **4.2 Adequacy and Effectiveness of Construction Activities**

Before work observation inspections are performed in the field, the inspector should review the Contractor's procedures for accomplishing manufacturers' specified preventive maintenance activities on the equipment selected in Section 4.1.1 above. In addition, to verify implementation of the program, review the procedures for the periodic preventive maintenance and inspection activities on equipment in storage or lay-up. During the field observations, carry a copy of the procedure(s) pertinent to the planned observations.

During the field observations, the inspector should also interview a sample of the craft and QC personnel performing the observed activities. The interviews should focus on determining whether the interviewees' job and procedure knowledge is satisfactory. Obtain the names and job functions of those interviewed and use later to verify proper implementation of personnel qualification requirements as specified in Sections 4.3 and 4.4 below.

The following areas/activities are suggested inspection items during work observation activities:

- Large electrical motors and generators and valve operator motors frequently contain electrical space heaters to maintain the internal temperature of the equipment well above

the dew point, thus ensuring the equipment's insulation resistance will not be degraded by moisture intrusion. Verify the space heaters are energized, as applicable, and functioning as required.

- Large rotating equipment, such as large pumps, motors, and generators, usually requires partial rotation periodically to ensure the bearings and shafts do not develop a "set." Verify the Contractor has achieved the manufacturer's required rotation angular distance and periodicity.
- The openings of pumps should be capped to prevent foreign material from being introduced.
- The manufacturers of electrical and instrument panels sometimes require a desiccant be maintained inside the panel to prevent moisture buildup. Determine whether the panel manufacturer requires desiccant and whether measures are in place to periodically verify the desiccant's condition.
- Frequently, the equipment requiring special maintenance activities is temporarily placed in the room where it will be permanently located. These locations frequently contain large amounts of construction dirt and debris. Ensure the equipment is suitably protected through coverings that effectively prohibit the entry of dirt or debris that could harm or preclude the design operation of the equipment. (National Electric Code, NFPA 70-96, Article 110-12)

### **4.3 Adequacy and Effectiveness of the Training and Qualification of Personnel**

4.3.1 The inspector should review the Contractor's procedures specifying the requirements for education, experience, training, and certification of craft and QC personnel associated with performing and inspecting preventive maintenance activities on equipment in lay-up or storage. Interview and record the names of at least the following personnel if this was not done while performing the activities listed in Section 4.2:

- Three craftsmen involved in implementing the procedures' storage and lay-up requirements
- Three QC personnel involved in verifying specified storage and lay-up conditions have been achieved.

During the interviews, verify the personnel are sufficiently knowledgeable of applicable procedure requirements. Also, examine the training and qualification records of the craft and QC personnel interviewed and determine whether the records demonstrate they conform to Contractor's requirements for personnel training, qualification, and certification.

#### 4.4 Adequacy and Effectiveness of the Records System

The inspector should sample and examine the completed records generated during the storage and lay-up activities observed in Section 4.2. Focus on verifying the records conform to applicable procedure requirements.

The inspector should examine the records for storage and lay-up and for the training and qualification of personnel to verify they have been approved by the proper authority, they have been stored and maintained according to procedure requirements, and they document the acceptable performance of the activity.

#### 5.0 REFERENCES

*Integrated Safety Management Plan (ISMP)*, 24590-WTP-ISMP-ESH-01-001, Rev. 1, Bechtel National, Inc., 2002.

National Fire Protection Association, "National Electric Code," NFPA-70, 1999 Edition.

*Quality Assurance Manual (QAM)*, 24590-WTP-QAM-QA-01-001, Rev. 0a, Bechtel National, Inc., 2002.

*Safety Requirements Document (SRD)*, Volume I, 24590-WTP-SRD-ESH-01-001-01, Rev. 0, Volume 2, 24590-WTP-SRD-ESH-01-001-02, Rev 0d, Bechtel National, Inc., 2002.

#### 6.0 LIST OF TERMS

ISMP	Integrated Safety Management Plan
QAP	Quality Assurance Program
QC	quality control
RPP	River Protection Program
SC	Safety Criteria
SRD	Safety Requirements Document
WTP	Waste Treatment Plant

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