

SUBJECT: MAINTENANCE MANAGEMENT PROGRAM FOR DOE NUCLEAR FACILITIES

1. **OBJECTIVE.** To define the safety management program required by 10 CFR 830.204(b)(5) for maintenance and the reliable performance of Structures, Systems and Components (SSCs) that are part of the safety basis required by 10 CFR 830.202.1 at hazard category 1, 2 and 3 Department of Energy (DOE) nuclear facilities.
2. **CANCELLATION.** DOE O 433.1, *Maintenance Management Program for DOE Nuclear Facilities*, dated 6-1-01. Cancellation of an Order does not, by itself, modify or otherwise affect any contractual obligation to comply with the Order. Contractor requirement documents (CRDs) that have been incorporated into or attached to a contract remain in effect until the contract is modified to either eliminate requirements that are no longer applicable or substitute a new set of requirements.
3. **APPLICABILITY.**
 - a. **DOE Elements.** Except for the exclusions in paragraph 3c, this Order applies to all DOE elements involved in the maintenance of DOE nuclear facilities and automatically applies to DOE elements created after it is issued. (Go to <http://www.directives.doe.gov/pdfs/reftools/org-list.pdf> for the current listing of Departmental elements.)

The National Nuclear Security Administration (NNSA) Administrator will assure that NNSA employees and contractors comply with their respective responsibilities under this Order. Nothing in this Order will be construed to interfere with the NNSA Administrator's authority under section 3212(d) of Public Law (P.L.) 106-65 to establish Administration specific policies, unless disapproved by the Secretary.
 - b. **DOE Contractors.** Except for the exclusions in paragraph 3c, the CRD (Attachment 1) sets forth requirements to be applied to all contractors responsible for managing and maintaining DOE-owned or -leased nuclear facilities. Contractors must comply with the requirements listed in the CRD to the extent set forth in their contracts.
 - c. **Exclusions.**
 - (1) Naval Nuclear Propulsion Program maintenance covered under Executive Order 12344, in force under Section 3216(c) of Public Law (P.L.) 106-65 (50 U.S.C. 2406), is excluded from the provisions of this Order.
 - (2) Radiological facilities, as defined by DOE Standard 1027-92, are excluded from the provisions of this Order.

- (3) Maintenance of radiation detection instrumentation at radiological facilities is governed by the requirements of Title 10, Code of Federal Regulations (CFR) 835, Section 835.1001, 835.1003, and 835.401(b). Appropriate maintenance management program elements of this Order may be used applying the graded approach until specific guidance is developed for radiological facilities in DOE G 433.1-1, *Nuclear Facility Maintenance Management Program for Use with DOE O 433.1A*, dated 9-5-01.
- (4) This Order does not apply to those portions of nuclear facility maintenance programs that are subject to regulation by other Federal agencies such as the U.S. Nuclear Regulatory Commission.
- (5) Any deviations from the maintenance management program elements of this Order will be identified and formally documented with supporting justification within the Maintenance Implementation Plan (MIP).

4. REQUIREMENTS.

- a. To ensure that nuclear facility maintenance meets expectations, DOE elements may impose additional requirements and/or specific standards as necessary to preserve DOE property. A single maintenance program may be used to satisfy the regulated work; the requirements of DOE O 430.1B, *Real Property Asset Management*; any additional requirements imposed by DOE elements; and the requirements of this Order.
- b. Guidance for compliance with this Order is available in DOE G 433.1-1, which references Federal regulations, DOE directives, and industry best practices using a graded approach to clarify requirements and guidance for maintaining DOE-owned Government property.
- c. In addition to maintenance program requirements of DOE O 430.1B, *Real Property Asset Management*, dated 9-24-03, a nuclear facility maintenance management program must include an MIP that must be approved by the DOE approval authority and address the following elements using a graded approach:
 - (1) structures, systems, and components (SSCs) included in the program;
 - (2) periodic inspection of SSCs and equipment required to determine whether degradation or technical obsolescence threatens performance and/or safety;
 - (3) management systems used to control maintenance activities associated with the defined SSCs (work control, postmaintenance testing, material procurement and handling, and control and calibration of test equipment);

- (4) assignment of roles and responsibilities and appropriate maintenance-related training and qualification requirements;
 - (5) interfaces between the maintenance organization and other organizations (e.g., operations, engineering, quality, training, and industrial health);
 - (6) configuration management process established to ensure the integrity of the identified SSCs;
 - (7) prioritization process used to properly emphasize safety requirements, maintenance backlog, system availability, and requirements for those infrastructure elements identified as part of the nuclear facility safety basis;
 - (8) process for feedback and improvement established to provide relevant information regarding operations, maintenance, and assessment efforts;
 - (9) how system engineers assigned to safety systems are involved in the planning and execution of maintenance activities affecting their assigned systems with—
 - (a) the requisite knowledge of the system safety design basis and operating limits from the safety analysis;
 - (b) the lead responsibility for the configuration management of design; and
 - (10) an accurate maintenance history that compiles maintenance, resource, and cost data in a system which is retrievable and allows entering required and actual maintenance costs and availability data, and failure rates for mission-critical and safety SSCs into the DOE Facility Information Management System (See DOE O 430.1B and Section 4.15 of DOE G 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*, dated 9-5-01).
- d. The program must establish metrics to measure program performance and problems needing correction.
- e. The program must be integrated with—
- (1) the Integrated Safety Management System (ISMS) established by DOE P 450.4, *Safety Management System Policy*, dated 10-15-96, and 48 CFR 970.5204-2;
 - (2) real property asset management programs defined in DOE O 430.1B;

- (3) required nuclear safety basis established under 10 CFR Part 830, Subpart B;
 - (4) radiation protection requirements mandated under 10 CFR 835;
 - (5) a quality assurance program established in 10 CFR 830, Subpart A;
 - (6) DOE O 210.2, *Corporate Operating Experience Program*, dated 6-12-06, to ensure appropriate communication of important external and internal operating experience information.;
 - (7) The DOE Lessons Learned Program, as well as the site's Issues Management Program/System; and
 - (8) DOE O 414.1C, *Quality Assurance*, dated 6-17-05.
- f. The program must identify appropriate voluntary consensus standards that are incorporated into the program.
- g. The MIP should be reviewed and approved every two years and any changes submitted to the DOE approval authority.

5. RESPONSIBILITIES.

- a. Director, Office of Health, Safety and Security.
- (1) Develops and coordinates proposed new or revised policy, requirements, guidance, and technical standards relating to this Order and CRD with Central Technical Authorities (CTAs).
 - (2) Provides input to CTAs regarding interpretation of DOE safety policy relating to the requirements of this Order.
 - (3) Provides advice and assistance on policy implementation.
 - (4) Provides comments on requests for exemptions from the requirements of this Order.
 - (5) Acts as an independent authority responsible for monitoring environment, safety and health for the Department.
 - (6) Plans and conducts appraisals to determine compliance with the requirements of this Order. (See DOE O 470.B, *Independent Oversight and Performance Assurance Program*, dated 10-31-02.)
- b. Secretarial Officers, including NNSA Administrator and Deputy Administrator for Defense Programs (SOs). NOTE: According to DOE M 251.1-1B, dated: 8-16-06, Secretarial Officers are the Secretary, Deputy Secretary, and Under

Secretaries and the Assistant Secretaries and Program Office Directors reporting to the Secretary either directly or through the Deputy Secretary or Under Secretaries. The NNSA Administrator and Deputy Administrators are Secretarial Officers.

- (1) Ensure that the requirements of this Order and the CRD are implemented for facilities, activities, or programs under their cognizance.
- (2) Serve as approval authorities unless delegated per DOE M 411.1-1C, Table 6.
- (3) Review and approve requests for exemptions from requirements of this Order after resolving comments, if any, from the Director of the Office of Health, Safety and Security.
- (4) For requests for exemptions involving one or more NNSA elements, consider comments from the Director of the Office of Health, Safety and Security as part of the exemption approval process.
- (5) Ensure that field office managers notify contracting officers when contracts are affected by this Order.

c. Central Technical Authorities (CTAs). NOTE: The Secretary established the NNSA Principal Deputy Administrator (or other line official designated by the Administrator) and the Under Secretary of Energy as central technical authorities by memo on April 26, 2005, and directed that their responsibilities be reflected in the next revision of the DOE FRAM).

- (1) Concur with decisions regarding applicability of contractor requirements documents related to this Order.
- (2) Concur with exemptions from this Order.
- (3) Provide authoritative expectations and guidance for implementing this Order.

d. Field Office Managers (including NNSA).

- (1) Ensure that maintenance activities and programs at nuclear facilities under their purview are conducted in compliance with the requirements of this Order.
- (2) Review contractor MIPs every 2 years and forward to the appropriate approval authority approval.
- (3) Ensure that sufficient resources are budgeted in a timely manner to provide DOE with the highest confidence in the reliable performance of

mission critical and safety SSCs through proactive maintenance practices.

- (4) Ensure that cost-effective maintenance management programs are developed and implemented for all hazard category 1, 2 and 3 nuclear facilities consistent with DOE's mission, safety and health, reliability, quality, and environmental protection objectives.
- (5) Ensure that maintenance responsibility, authority, and accountability are clearly defined, appropriately assigned and executed.
- (6) Where maintenance requirements or accepted maintenance standards cannot be met, ensure that such instances are appropriately documented and acknowledged by the appropriate Secretarial Officer, including the granting of exemptions by DOE/NNSA, as appropriate, when requested. NOTE: From the time of discovery until DOE/NNSA approval of such requests, ensure that sufficient compensatory measures are in place to sustain the level of protection that DOE/NNSA assumed to be present in its approval of facility operations.
- (7) Ensure that the requirements for maintenance of nuclear facilities are incorporated into contracts, subcontracts, and support services contracts as appropriate.
- (8) Ensure that descriptions of maintenance management program requirements of this Order which ensure safe operation are conveyed accurately by contractors operating hazard category 1, 2 and 3 nuclear facilities and contained in the documented safety analyses (DSAs) for the facilities as required by 10 CFR 830.204.
- (9) Notify contracting officers when contracts are affected by this Order.
- (10) Coordinate with contracting officers the revisions of contracts to comply with requirements of this Order and require contractors to appropriately flow down requirements to subcontractors.
- (11) Ensure that procurement requests include applicable requirements in the CRD for this Order to be applied to awards or subawards.
- (12) If delegated by the SO, review and approve exemption requests after resolving comments from the Director, Office of Health, Safety and Security at non-NNSA facilities and after considering such requests, for NNSA facilities. If not delegated, forward requests for exemptions to the SO.

- (13) Conduct comprehensive self assessments and assessments of contractor maintenance management programs periodically with appropriate frequency and followup.
 - (14) Ensure that all procurement requests for work within the scope of this Order, including work requests to be performed through subcontracts, include the appropriate requirements of the attached CRD.
- e. Contracting Officers.
- (1) Incorporate the CRD into affected contracts in a timely manner when notified.
 - (2) Ensure that applicable maintenance related codes and standards are incorporated into contracts and other procurement documents.

6. REFERENCES.

- a. DOE O 226.1, *Implementation of Department of Energy Oversight Policy*, dated 9-15-05.
- b. DOE M 251.1-1B, *DOE Directives Program Manual*, dated 8-16-06.
- c. DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, dated 12-31-03.
- d. DOE O 414.1C, *Quality Assurance*, dated 6-17-05.
- e. DOE O 420.1B, *Facility Safety*, dated 12-22-05.
- f. DOE G 424.1-1A, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*, dated 7-24-06.
- g. DOE O 430.1B, *Real Property Asset Management*, dated 9-24-03.
- h. DOE G 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*, dated 9-5-01.
- i. DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, dated 3-27-98.
- j. DOE G 450.4-1B, *Integrated Safety Management System Guide for Use with Safety Management System Policies (DOE P 450.4 and DOE P 450.6); and, the Department of Energy Acquisition Regulation, Volumes I and II*, dated 3-1-01.
- k. DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.

- l. DOE O 5400.5, *Radiation Protection of the Public and the Environment*, dated 1-7-93.
 - m. DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, dated 7-9-90 (Chg 2, 10-23-01).
 - n. 10 CFR 830, Nuclear Safety Management; Subpart A, Quality Assurance Requirements.
 - o. 10 CFR 830, Nuclear Safety Management; Subpart B, Safety Basis Requirements.
 - p. 10 CFR 830.122, Quality Assurance Criteria.
 - q. 10 CFR 835, Occupational Radiation Protection.
 - r. 10 CFR 850, Chronic Beryllium Disease Prevention Program.
 - s. 10 CFR 851, Worker Safety and Health.
 - t. 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals.
 - u. 41 CFR 101, Federal Property Management Regulations.
 - v. 41 CFR 101.3, Annual Real Property Inventories.
 - w. 41 CFR 102, Federal Management Regulation.
 - x. 41 CFR Subtitle C, Chapter 109, Department of Energy Property Management Regulations.
 - y. 48 CFR 45.509, Federal Acquisition Regulation, Care, Maintenance, and Use.
 - z. 48 CFR 945.102-71, Maintenance of Records.
 - aa. 48 CFR 970.5204-2, Integration of Environment, Safety and Health into Work Planning and Execution.
 - bb. 48 CFR 970.5204-78, Laws, Regulations, and DOE Directives.
 - cc. DOE Personal Property Letter 970-3, High-Risk Personal Property.
 - dd. Executive Order 12344, Naval Nuclear Propulsion Program.
 - ee. P.L. 106-65, National Defense Authorization Act for Fiscal year 2000; Section 3216(c), Deputy Administrator for Naval Reactors (50 U.S.C. 2406).
7. NECESSITY FINDING STATEMENT. In compliance with the statutory requirements in P.L. 104-201, Sec. 3174, Orders relating to the execution of environmental restoration,

waste management, or technology development activities at defense nuclear facilities under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq) the Secretary finds that this Order is necessary for the protection of human health and the environment or safety, the fulfillment of current legal requirements, and the conduct of critical administrative functions.

8. CONTACT. Questions concerning this Order should be addressed to the Office of Nuclear Safety and Environmental Policy at 301-903-5999.

BY ORDER OF THE SECRETARY OF ENERGY:



CLAY SELL
Deputy Secretary

CONTRACTOR REQUIREMENTS DOCUMENT
DOE O 433.1A, *Maintenance Management Program for DOE Nuclear Facilities*

Regardless of the performer of the work, the contractor is responsible for complying with the requirements of this Contractor Requirements Document (CRD) and flowing down CRD requirements to subcontractors at any tier to the extent necessary to ensure contractor compliance.

Contractors at hazard category 1, 2, and 3 nuclear facilities must comply with the requirements listed in this CRD to the extent set forth in their contracts.

The requirements contained in this CRD include those in DOE O 430.1B, *Real Property Asset Management*, dated 9-24-03.

1. CONTRACTOR MAINTENANCE MANAGEMENT PROGRAMS should be developed in an integrated manner. Other regulations and Orders independent of this CRD that apply to nuclear facility maintenance programs include the following.
 - a. The CRDs attached to—
 - (1) DOE O 226.1, *Implementation of Department of Energy Oversight Policy*, dated 9-15-05.
 - (2) DOE O 414.1C, *Quality Assurance*, dated 6-17-05.
 - (3) DOE O 420.1B, *Facility Safety*, dated 12-22-05.
 - (4) DOE O 430.1B, *Real Property Asset Management*, dated 9-24-03.
 - (5) DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, dated 3-27-98.
 - (6) DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, dated 7-9-90 (Chg 2, 10-23-01).
 - (7) DOE O 5400.5, *Radiation Protection of the Public and the Environment*, dated 1-7-93.
 - b. DOE Guides and Manuals
 - (1) DOE M 251.1-1B, *DOE Directives Program Manual*, dated 8-16-06.
 - (2) DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, dated 12-31-03.
 - (3) DOE G 424.1-1A, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*, dated 7-24-06.

- (4) DOE G 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*, dated 9-5-01.
 - (5) DOE G 450.4-1B, *Integrated Safety Management System Guide for Use with Safety Management System Policies (DOE P 450.4 and DOE P 450.6)*; and, *the Department of Energy Acquisition Regulation, Volumes I and II*, dated 3-1-01.
 - (6) DOE O 5400.5, *Radiation Protection of the Public and the Environment*, dated 1-7-93.
 - (7) DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.
 - (8) DOE Personal Property Letter 970.3, *High-Risk Personal Property*.
 - (9) DOE-HDBK-1003-96, *Guide to Good Practices for Training and Qualification of Maintenance Personnel*.
 - (10) DOE-HDBK-1206-98, *Guide to Good Practices for on-the-Job Training*.
 - (11) DOE-STD-1027-92, Change Notice 1, September 1997, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23*, Nuclear Safety Analysis Reports.
 - (12) DOE-STD-1029-92, *Writer's Guide for Technical Procedures*.
 - (13) DOE-STD-1039-93, *Guide to Good Practices for Control of Equipment and System Status*.
 - (14) DOE-STD-1073-2003, *Configuration Management Program*.
- c. Code of Federal Regulations
- (1) 10 CFR 830, Nuclear Safety Management; Subpart A, Quality Assurance Requirements.
 - (2) 10 CFR 830, Nuclear Safety Management; Subpart B, Safety Basis Requirements.
 - (3) 10 CFR 835, Occupational Radiation Protection.
 - (4) 10 CFR 850, Chronic Beryllium Disease Prevention Program.
 - (5) 10 CFR 851, Worker Safety and Health.
 - (6) 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals.

- (7) 41 CFR 101, Federal Property Management Regulations.
- (8) 41 CFR Part 101.3, Annual Real Property Inventories.
- (9) 41 CFR Chapter 102, Federal Management Regulations.
- (10) 41 CFR, Chapter 109, Department of Energy Property Management Regulations.
- (11) 48 CFR 45.509, Federal Acquisition Regulation, Care, Maintenance, and Use (of Government property).
- (12) 48 CFR 945.102-71, Maintenance of Records.
- (13) 48 CFR 970.5223-1, Integration of Environment, Safety and Health into Work Planning and Execution.
- (14) 48 CFR 5204-2, Laws, Regulations, and DOE Directives.

2. REQUIREMENTS.

- a. Contractors must develop and submit for DOE approval maintenance implementation plans (MIPs) that clearly define the following:
 - (1) master equipment lists (MELs) of structures, systems, and components (SSCs) included in the program, typically all safety SSCs identified in the nuclear facility safety basis, critical to mission objectives or facility operations or desirable for inclusion in the maintenance program for other reasons (See Sections 4.4.2 and 4.4.3 of DOE G 433.1-1, and 10 CFR 830.204);
 - (2) periodic inspection of SSCs and equipment to determine whether degradation or technical obsolescence threatens performance or safety;
 - (3) management systems that control maintenance of defined SSCs (work control, post-maintenance testing, material procurement and handling, and control and calibration of test equipment);
 - (4) assignment of roles and responsibilities;
 - (5) interfaces between maintenance and other organizations (e.g., operations, engineering, and training);
 - (6) integration with—
 - (a) the ISMS established by DOE P 450.4 and 48 CFR 970.5204-2,

- (b) real property asset management programs under DOE O 430.1B [See 10 CFR 830.121(c)(2) and 10 CFR 830.122(a), DOE G 450.4-1B; ISMS Principles 1 and 2 and ISMS Function 1],
 - (c) required nuclear safety bases established under 10 CFR Part 830, Subpart B, and
 - (d) quality assurance programs established in 10 CFR Part 830, Subpart A;
- (7) configuration management processes to ensure the integrity of the identified nuclear facility safety SSCs using a graded approach [DOE-STD-1073-93; 10 CFR 830.122(d) and (e)];
 - (8) prioritization processes that place proper emphasis on safety requirements, maintenance backlog, system availability, and requirements for infrastructure elements identified as part of nuclear facility safety bases;
 - (9) processes for feedback and improvement based on relevant information from the results of operations, maintenance, and assessment efforts [10 CFR 830.122(c), (i), and (j); and DOE G 450.4-1B, ISMS Function 5];
 - (10) descriptions of how system engineers assigned to safety systems are involved in the planning and execution of maintenance activities affecting their assigned systems with—
 - (a) requisite knowledge of the system safety design basis and operating limits from the safety analysis and
 - (b) lead responsibility for the configuration management of the design;
 - (11) accurate maintenance histories that compile retrievable structures, systems, and components data and other maintenance, resource, and cost data in a form that allows entering required maintenance costs, actual maintenance costs, and availability data and failure rates for mission-critical and safety SSCs into the DOE Facility Information Management System (see DOE O 430.1B and DOE G 433.1-1, Section 4.15).
- b. Contractor maintenance management programs should—
- (1) establish metrics to measure performance and identify maintenance issues requiring corrective action and lessons learned,
 - (2) incorporate appropriate voluntary consensus standards, and

- (3) address the following elements as appropriate.
- (a) Maintenance Organization and Administration that must ensure a high level of performance through effective implementation and control of activities. [See DOE G 433.1-1, Section 4.1; 10 CFR 830.122(a) and 10 CFR 830.121(c)(4); and DOE G 450.4-1B, ISMS Principles 1, 2 and 7.]
 - (b) Training and Qualification for Maintenance Personnel that must be implemented to develop and maintain the knowledge and skills needed by personnel to perform maintenance activities effectively. [See DOE 5480.20A; DOE O 414.1C; DOE G 433.1-1, Section 4.2; DOE-HDBK-1206-98; DOE-HDBK-1003-96; 10 CFR 830.122(b); and DOE G 450.4-1B, ISMS Principle 3.]
 - (c) Maintenance Facilities, Equipment and Tools that support nuclear facility maintenance and training efficiently. [See DOE G 433.1-1, Section 4.3.]
 - (d) Types of Maintenance that balance corrective and preventive maintenance properly to provide a high degree of confidence that nuclear facility equipment degradation is identified and corrected, that equipment life is optimized, and that the maintenance program is cost effective. [See 48 CFR 45.509; DOE G 433.1-1, Section 4.4; 10 CFR 830.122(c) and (e); and DOE G 450.4-1B, ISMS Principle 4 and ISMS Function 1.]
 - (e) Maintenance Procedures and other work-related documents (e.g., drawings and instructions) prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently. [See DOE G 433.1-1, Section 4.5; DOE-STD-1029-92; 10 CFR 830.122(d) and (e); and DOE G 450.4-1B, ISMS Principles 5 and 6 and ISMS Functions 4 and 5.]
 - (f) Planning, Scheduling, and Coordination of Maintenance system implemented to—
 - 1 ensure that maintenance and surveillance associated with technical safety requirements (TSRs) are accomplished in a timely manner,
 - 2 improve efficiency,
 - 3 reduce chemical and physical hazard and radiation exposure to as-low-as-reasonably-achievable (ALARA),

- 4 increase equipment availability,
 - 5 ensure worker safety through training and proper use of personal protective equipment,
 - 6 ensure that hazardous waste is properly segregated, treated, or disposed [See DOE G 433.1-1, Section 4.6; 10 CFR 830.122(a); and DOE G 450.4-1B, ISMS Principles 1 and 4 and ISMS Function 1.], and
 - 7 ensure that hazards are appropriately identified, assessed and controlled prior to commencing maintenance work [DOE G 433.1-1, Section 4.6 and 4.7, ISMS Principles 1 and 4 and ISMS Function 1].
- (g) Control of Maintenance Activities that includes management involvement to ensure that safe, reliable nuclear facility operations that are integrated with work authorization and control requirements for conduct of operations. [See DOE 5480.19; DOE-STD-1039-93; DOE G 433.1-1, Section 4.7; 10 CFR 830.122(a) and (e); DOE G 450.4-1B, ISMS Principles 1, 2, and 7 and ISMS Function 4.]
- (h) Post-maintenance Testing performed to verify that components fulfill their design functions when returned to service after maintenance. [See DOE-STD-1039-93; DOE G 433.1-1, Section 4.8; and 10 CFR 830.122(h).]
- (i) Procurement of Parts, Materials, and Services required for maintenance activities available when needed. [See DOE G 433.1-1, Section 4.9; DOE G 440.1-6; and 10 CFR 830.122(g).]
- (j) Receipt, Inspection, Handling, Storage, Retrieval, Issuance, and Disposal Turn-in of Personal Property used for maintenance covered by effective implementation of policies and procedures; suspect and counterfeit item control requirements; and high-risk personal property management and control requirements from the time an item is received for installation in or maintenance of the nuclear facility until it is turned in for disposal. [See DOE O 414.1C; DOE O 440.1A; DOE G 433.1-1, Section 4.10; DOE G 440.1-6; DOE Personal Property Letter 970-3; and 10 CFR 830.122(g).]
- (k) Control and Calibration of Measuring and Test Equipment consistent with quality assurance requirements to ensure the acceptable accuracy and precision of nuclear instrumentation and

equipment. [See DOE O 414.1C; DOE G 433.1-1, Section 4.11; and 10 CFR 830.122(e) and (h).]

- (l) Maintenance Tools and Equipment Control methods established to provide for storage, issuance, and maintenance of an adequate and readily available supply of tools and equipment and for the development of special tools and equipment as needed. [See DOE G 433.1-1, Section 4.12 and 10 CFR 830.122(e).]
- (m) Facility Condition Inspection conducted by management periodically direct independent assessments of equipment and facilities to ensure safe nuclear facility condition and housekeeping and to meet fire protection and natural hazard phenomena mitigation requirements of DOE O 420.1B, *Facility Safety*. [See DOE O 420.1B; DOE G 433.1-1, Section 4.13; and 10 CFR 830.122(h) and (j).]
- (n) Management Involvement of corporate and nuclear facility officials sufficiently to be technically informed and personally familiar with facility status and conditions. [See DOE G 433.1-1, Section 4.14 and 10 CFR 830.122(a) and (i).]
- (o) Maintenance History and trending program to document historical information for maintenance planning and support maintenance and performance trending of nuclear facility systems and components with all records and documentation maintained according to an approved site-specific records retention and disposition schedule. [See DOE G 433.1-1, Section 4.15; DOE O 200.1; and 10 CFR 830.122(d).]
- (p) Analysis of Maintenance Problems to determine and correct root causes of unplanned occurrences related to maintenance. [See DOE-NE-STD-1004-92; DOE G 433.1-1, Section 4.16; and 10 CFR 830.122(c).]
- (q) Modification Work at nuclear facilities accomplished under the same basic administrative controls as those applied to nuclear facility maintenance so that risk to the facility, equipment, environment, or personnel does not increase because of modifications. [See DOE-STD-1039-93; DOE G 433.1-1, Section 4.17; DOE-STD-1073-2003; 10 CFR 830, Subparts A and B; and DOE G 450.4-1B, ISMS Principle 7 and ISMS Function 4] Controls should be integrated with—

1 safety basis, nuclear safety, fire protection, and natural hazard phenomena mitigation [See DOE O 420.1B];

