

# Maintenance Implementation Plan for Solid Waste

J. D. Adrian

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Prepared for the U.S. Department of Energy  
Office of Environmental Restoration and  
Waste Management



**Westinghouse  
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Hanford Operations and Engineering Contractor for the  
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Approved for Public Release

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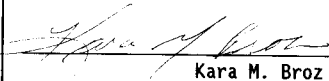
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## **Maintenance Implementation Plan for Solid Waste Management**

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LIST OF TERMS

ALARA	As Low As Reasonably Achievable
CAEG	Corrective Action Evaluation Group
CSS	Central Site Services
DOE	U. S. Department of Energy
ECN	Engineering Change Notice
EPA	Environmental Protection Agency
FY	Fiscal Year
HGET	Hanford General Employee Training
JCA	Job Control Administrator
JCS	Job Control System
M&TE	Measuring and Testing Equipment
MEL	Master Equipment List
MIP	Maintenance Implementation Plan
MOP	Management Oversight Plan
NIST	National Institute of Standards and Technology
OJT	On-the-Job-Training
OSHA	Occupational Safety and Health Administration
PSCP	Plant Site Calibration Procedures
PM	Preventive Maintenance
PNL	Pacific Northwest Laboratory
QUEST	Quality, Environment, and Safety Tracking
RCRA	Resource Conservation and Recovery Act of 1976
SMOP	Senior Management Oversight Plan
SRE	Sodium Reactor Experiment
SWM	Solid Waste Management
TRU	Transuranic Waste
TRUSAF	Transuranic Waste Storage and Assay Facility
WHC	Westinghouse Hanford Company
WIMS	Warehouse Inventory Management System
WIPP	Waste Isolation Pilot Plant
WRAP	Waste Receiving and Processing
WRCOSF	Work Release for Construction/Service Organizations form

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## MAINTENANCE IMPLEMENTATION PLAN FOR Solid Waste Management

### 1.0 EXECUTIVE SUMMARY

This Maintenance Implementation Plan (MIP) was developed for implementation of the U.S. Department of Energy (DOE) Order 4330.4A, *A Maintenance Implementation Program* (DOE 1990) which has been replaced by 4330.4B (DOE 1994) at the Hanford Site SWM complex. It addresses maintenance functions associated with SWM, which includes the field operational group and the facilities operational group. An assessment of the existing maintenance programs for SWM was performed, and the results of this assessment were evaluated to determine corrective actions required to bring Solid Waste Maintenance into compliance with the order.

The objective of this MIP is to provide baseline information for the control and execution of SWM Maintenance activities relative to the requirements of Order 4330.4B, Chapter II. (Nuclear Facilities) It also describes actions that are planned to achieve compliance.

Section 2.0 of this MIP summarizes the mission, history, and future plans of SWM. Section 3.0 describes maintenance scope and requirements, and outlines the overall strategy (both near-term and long-term) for implementing improvements to the maintenance program. Specific elements of DOE Order 4330.4B are addressed in Section 4.0, including objectives of each element, a discussion of how SWM addresses these objectives, proposed improvements, and references to Westinghouse Hanford Company (Westinghouse Hanford) policies and procedures. Section 5.0 addresses deviations from policy requirements, and Section 6.0 presents the implementation schedule for planned improvements.

Revision number one to the MIP discloses that all elements defined in the order are currently implemented for SWM. It also identified issues which have been addressed to bring the maintenance function into full compliance with DOE Order 4330.4B. These include documentation of the maintenance training program, expanded scope of inspections to address the As Low As Reasonably Achievable (ALARA) concept, development of a Master Equipment List (MEL), evaluating predictive maintenance and more adequate facilities to provide enhanced storage and control of tools and equipment.

The implementation schedule that was developed for the planned corrective measures shows that the identified actions have been completed. Of the nine total elements that were shown in Section 6.0 requiring corrective actions, three were completed in FY 92, one in FY 93, two in FY 94, and three in FY 95.





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## 2.0 INTRODUCTION

This MIP addresses all maintenance activities associated with the structures and facilities designated as the SWM complexes. These facilities include the physical structures, systems, and processes, and all associated equipment specifically assigned to SWM which is part of the Solid Waste Disposal Division.

### 2.1 FACILITY DESCRIPTIONS: MISSION, HISTORY, AND FUTURE

The mission of SWM is to manage, maintain, operate, and upgrade SWM facilities and activities in an environmentally safe and efficient manner to achieve the objectives of the Hanford Site Programs. The responsibilities of SWM focus on all aspects of solid waste management. These include a commitment to provide work control services and to support all necessary tasks to maintain, repair, replace, install, or modify equipment pertaining to SWM facilities. Establishment and maintenance of controls for planning, scheduling, organizing, directing and controlling maintenance-related work also is a significant aspect of the SWM mission.

SWM includes two functional groups of facilities/complexes that require maintenance program implementation: field operational and facility operational groups. Descriptions of facilities within each group are provided below.

#### 2.1.1 FIELD OPERATIONAL GROUP

200 Area East and West Burial Grounds. Waste was placed in burial grounds throughout the Hanford Site from 1942 to 1965, after which only the 200 East and West Area burial grounds were used for waste emplacement. In both the 200 Areas, low-level radioactive wastes generated at government-owned or funded facilities were packaged, shipped, placed in trenches, and back-filled with excavated soil. Since 1987, onsite burial of TRU wastes in the 200 Area has not occurred, and waste extraction will be performed in the future as part of SWM operations. Waste Management facilities and other operational functions (i.e., the below-grade asphalt pads for retrievable storage of TRU waste containers) will require maintenance. In December of 1994, the first of two linear leachate trenches for disposal of radioactive mixed waste was completed. The second trench will be operational by October of 1995.

**Sodium Storage.** Sodium is a liquid metal coolant used for specific nuclear reactors, and approximately 336 tons of sodium metal removed from decommissioned reactors were placed into storage at Westinghouse Hanford and Idaho Falls, Idaho, in the 1960's. At Hanford, the sodium storage facility consists of one storage building (2727-W) and eight sodium storage modules, wherein this reusable sodium is stored.

## 2.1.2 FACILITY OPERATIONAL GROUP

Non-Radioactive Dangerous Waste Storage Facility (616 facility). Hazardous waste from numerous areas at the Hanford Site are stored at this facility, which was constructed in 1986 and is located approximately midway between the 200 East and 200 West Areas. Hazardous wastes stored at the 616 facility are eventually shipped offsite to a treatment, recycling, and disposal firm. The facility currently operates under the *Resource Conservation and Recovery Act of 1976 (RCRA)* Part B permit approved by the Environmental Protection Agency (EPA) and State of Washington.

Transuranic Storage and Assay Facility. Transuranic wastes generated on the Hanford Site must be examined, assayed and temporarily stored as part of the Waste Isolation Pilot Plant (WIPP) waste certification programs. These functions are performed at the Transuranic Waste Storage and Assay Facility (TRUSAF). TRUSAF has been in operation since 1986, and TRU waste- containing drums are stored at the 224-T Building in the 200 West Area until shipment to WIPP or other processes. TRUSAF operates under RCRA interim status, and the Part B permit application has been submitted to EPA and the State of Washington for review and approval.

Central Waste Complex. Mixed waste consisting of low-level radioactive waste with dangerous (hazardous) waste constituents are received and stored in the Central Waste Complex (CWC) buildings for eventual treatment and disposal. The CWC has been in operation since 1988 in the 200 West Area. The 200 West area facilities will eventually process the waste through the Waste Receiving and Processing (WRAP) facility currently under construction and scheduled to be completed in FY 96. The CWC operates under RCRA interim status, and the Part B Permit application has been submitted to EPA and the State of Washington for review and approval.

Compactor. The compactor (213-W facility) has been in operation since 1985. However, 213-W's no longer used as a compactor facility. 213-W is presently being used for verification sampling.

## **2.2 MAINTENANCE IMPLEMENTATION PLAN SCHEDULE**

The schedule in Section 6.0 of this plan is provided to present an overview of work activities that have been completed to bring the SWM Maintenance Program into compliance with DOE Order 4330.4B. This schedule uses a graded approach to implementation (refer to Section 3.4) as allowed by the order, and provides the completed timeframes demonstrating compliance.

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### **3.0 DOE ORDER 4330.4B REQUIREMENTS**

#### **3.1 MAINTENANCE SCOPE**

Maintenance for SWM includes all facilities, systems, and equipment as defined in Section 2.0 of this plan.

#### **3.2 MAINTENANCE REQUIREMENTS**

All of the DOE order requirements are being fulfilled by implementing the requirements set forth in various SWM Operations Administration and WHC manuals as well as other facility-specific guidance. All of the facility system and component maintenance requirements have been established based on analysis which considers safety classification and risk assessments of facility, system, and component as well as technical specifications, process standards, and standards and code requirements. Maintenance analysis was used to determine the level and frequency of maintenance necessary to ensure optimum safe-operating cycles in an efficient and cost-effective manner. The Preventive Maintenance (PM) Program has been revised for SWM as part of this effort. These programs include requirements necessary to meet health, safety, and environmental protection standards for the facility, site and public. The preventive maintenance program provides for performance of preventive maintenance that conducts periodic checks and calibration of the systems/equipment.

Guidance specific to corrective maintenance for SWM is available (including facility specific instructions), and corrective maintenance activities are performed in accordance with required DOE orders. These are included as part of Job Control System (JCS) instructions.

An equipment identification effort has been completed by SWM so that appropriate tracking (i.e., historic) can be implemented. Because it is anticipated that SWM's long-term future will include expansion, maintenance requirements must be flexible to include new maintenance procedures, equipment, and systems, while still conforming to DOE order requirements.

### 3.3 SELF-ASSESSMENT PROGRAM

Relative to evaluation of DOE Order 4330.4B, SWM maintenance compliance was evaluated by an independent contractor to provide an unbiased, yet comprehensive evaluation of facility compliance. Approaching the compliance evaluation in this manner accomplished the task of internal review, while at the same time providing an independent assessment of facility compliance.

Periodic self assessment as part of ongoing programs is regularly performed. These programs provide for periodic walkthroughs, housekeeping inspection, and manager-level inspections to ensure compliance with DOE orders. Additionally, assessments/audits from various internal organizations are performed (e.g., third party inspections), as well as day-to-day monitoring of maintenance performed by maintenance supervision, work control organization, and by external audit and oversight.

A formal program (WHC-CM-5-34, Section 1.11) of periodic self assessment has been developed and implemented at SWM to monitor all the areas of facility operations. This program included the approach, philosophies and technical guidance necessary to ensure consistency, and to make sure that reproducible and meaningful data was obtained. Action item reporting responsibility assignment, analysis, and tracking was generated by this program.

### 3.4 GRADED APPROACH STRATEGY

#### 3.4.1 Overall Strategy and Basis

The graded approach, as applied at SWM, refers to the action of directing resources as a function of the level of "importance" for a particular maintenance management element relative to safety, environmental compliance, safeguards and security, programmatic mission, facility preservation, and/or other facility-specific requirements. By applying this approach, SWM is allowed to focus resources on the more important requirements to ensure best maintenance performance, as well as the safest and most cost-effective working conditions.

The following discussion outlines the proposed methods for near-term (interim) and long-range (formal) implementation of the DOE order.

#### 3.4.2 Long-Range Plan (Formal)

For long-range planning, the MELs will be examined and updated to ensure that all appropriate equipment has been identified and proper system assignments are made. Equipment safety risk analysis will continue to be conducted to determine consequences of system and/or component failure and to establish the level of maintenance appropriate to that risk level. Changes to

or development of equipment safety classification and risk categories will be made as necessary. Procedures generated and maintenance activities initiated in support of safety classifications assignments will be reviewed to ensure that appropriate levels of control and maintenance have been applied.

Long-term maintenance plans will also include the following:

- Timing of planned maintenance items to correspond with operational activities.
- Planning for equipment replacement as components reach the end of their service life.
- Projects and modifications requiring maintenance organization involvement.
- Recurring maintenance items such as inspections and component replacements.
- Update of maintenance-related documents to support the mission of SWM.

#### 3.4.3 Strategy for Safety-Related Items

Safety classification of systems was assigned by the facility-specific cognizant engineering group to establish level or risk analyses of work to be performed.

The level of supervisory control, procedural guidance, performance skills, and training required in support of activities associated with Safety Class levels will be as follows.

Safety Class 1 - Activities will require the highest level of work instruction detail, craft skills, and supervision.

Safety Class 2 - Activities will require a moderately high level of work instruction detail, craft skills, and supervision.

Safety Class 3 - Activities will require a normal level of work instruction detail, craft skills, and supervision commensurate with the complexity of the work activity.

Safety Class 4 - Activities will require a minimal level of work instruction detail, craft skills, and supervision.

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#### 4.0 DOE ORDER 4330.4B CHAPTER II REQUIREMENTS

##### 4.1 EVALUATION OF COMPLIANCE ELEMENTS

SWM's compliance with specific elements of DOE Order 4330.4B, Chapter II, Sections 2-19 were evaluated on an element-by-element basis by:

- Summarizing the order objectives under the specific element
- Discussing how SWM addresses these objectives
- Identifying improvements that SWM must make to meet the objective of the element (if required)
- Listing Westinghouse Hanford documentation that addresses the specific element of the DOE order.

The following subsections are identified by both the Section 4 sub-heading and the specific DOE Order Chapter II element which is being discussed. This allows for efficient cross-referencing between the MIP and the DOE order. It must be noted that Chapter I of DOE Order 4330.4B is for non-nuclear facilities; it is, therefore, not included in the MIP evaluation and the following sections begin with DOE Order 4330.4B, Chapter II, Section 2. Further, the introduction and discussion sub-sections of specific DOE order elements (i.e., Sections 2.1 and 2.2) were not evaluated, and DOE order discussions therefore begin with the third order sub-section, which are guidelines that must be met (i.e., Section 2.3).

## 4.2 DOE ORDER SECTION 2: MAINTENANCE ORGANIZATION AND ADMINISTRATION

The organization and administration of the maintenance function should ensure that a high level of performance in maintenance is achieved through effective implementation and control of maintenance activities.

### Maintenance Organization Policies

- Objective: Westinghouse Hanford and facility-specific policies, procedures, and standards shall be clearly defined and communicated to maintenance personnel.
- Discussion: General policies, procedures, and standards are outlined, and are relayed to employees through formal and informal training, staff and safety meetings, and required reading programs.
- Improvement: None required.
- References: WHC-CM-1 WHC-CM-5-34; 3.6  
WHC-CM-1-3

### Maintenance Strategy

#### Working Relationships

- Objective: Develop an integrated approach to maintenance so that working relationships are defined among organizational groups supporting the maintenance functions including responsibilities, authority, and accountability.
- Discussion: Working relationships among supporting groups are required and responsibilities are generally identified. Lines of authority and accountability among groups including Safety, Quality Assurance, Environmental, Security, Training, Operations, and Maintenance are defined and described in the SWM JCS.
- Improvement: None required.
- References: WHC-CM-1 WHC-CM-2-5  
WHC-CM-1-3 WHC-CM-5-34; 2.11, 3.6  
WHC-CM-1-8



### Long-Range Planning

**Objective:** Establish a scope of long-range major activities to effectively plan management of funding and staff resources.

**Discussion:** Documentation indicates that long-range planning is performed for maintenance as part of Maintenance Integration and Material Support. Long-range planning relative to operational goals have been developed for SWM, which includes associated long-range maintenance plans.

**Improvement:** None required.

**References:** WHC-CM-1-8 WHC-CM-5-34; 2.11  
WHC-CM-2-5

### Staffing Resources

**Objective:** Assemble and maintain a high-quality maintenance organization staff specifically selected to accomplish designated tasks; allocate resources appropriately.

**Discussion:** Maintenance personnel are selected to perform specific tasks based on internal guidance/standards, and personnel are selected based on qualifications, training, and skills (craft) required for the task.

**Improvement:** None required.

**References:** WHC-CM-1-8 WHC-CM-5-34; 2.11

### Goals and Objectives

**Objective:** Facility-specific maintenance goals are used to improve maintenance performance and measure maintenance program effectiveness.

**Discussion:** Numerous maintenance-specific goals have been developed, including backlog reduction, backlog management, and lost work day initiatives. Maintenance policies, procedures, and responsibilities had been developed to support goal attainment.

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Improvement: None required.

References: WHC-CM-1 WHC-CM-5-34; 3.6  
WHC-CM-1-8

Accountability

Objective: Performance appraisals, recognition for superior performance, and specific discipline policy assure accountability for maintenance performance.

Discussion: Westinghouse Hanford policies and procedures require annual performance appraisals and other evaluations for all employees to ensure that personnel are appropriately recognized for accomplishments and that any personnel problems are identified and remedied. Specific job responsibilities and performance expectations are discussed with each individual, and Standards of Conduct and disciplinary procedures are specifically defined and communicated to all employees. In addition, other company recognized programs have been implemented.

Improvement: None required.

References: WHC-CM-1 WHC-CM-1-3  
SHC-5-34; 3.6

#### 4.3 DOE ORDER SECTION 3: TRAINING AND QUALIFICATION OF MAINTENANCE PERSONNEL

A maintenance training and qualification program consistent with DOE 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities* (DOE 1991); and DOE 5700.6C *Quality Assurance* (DOE 1991) has been implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities.

##### Responsibilities

- Objective:** Responsibilities for establishing, maintaining, and implementing maintenance training programs are clearly defined. The training organization/administration, in coordination with maintenance managers and supervisors, ensures effective implementation and control of training activities.
- Discussion:** Technical training activities instituted by Westinghouse Hanford are delineated in numerous Westinghouse Hanford documents (i.e., WHC-CM-5-34). Responsibilities are clearly defined for the development, delivery, documentation, and evaluation of technical training for personnel assigned to Westinghouse Hanford facilities, and specific training responsibilities have been outlined for SWM Maintenance personnel.
- Improvement:** None required
- References:**
- |            |                  |
|------------|------------------|
| WHC-CM-1   | WHC-CM-2-15      |
| WHC-CM-1-8 | WHC-CM-5-34; 1.8 |
| WHC-CM-1-3 | HSRCM-1          |

##### Maintenance Training Programs

- Objective:** Maintenance personnel training qualification programs are well-defined and developed to improve the knowledge and skills necessary to perform assigned maintenance job functions.
- Discussion:** Requisite training relative to specific skilled craft maintenance personnel is included in Westinghouse Hanford documentation. In accordance with union contracts, only craftsmen with journeyman status are used by Westinghouse Hanford in maintenance work in order to ensure a high degree of job knowledge and skills. Maintenance policies are

designed to ensure that personnel are appropriately trained to provide highest quality work. Training programs are in place to develop specialized skills within the crafts (e.g., electrical code, waterworks) and to provide qualification for state certification in these areas.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 1.8  
WHC-CM-2-15 HSRCM-1  
WHC CM-4-11

#### Training Schedules and Support

Objective: Maintenance management and training organizations coordinate schedules for initial and continuing training of maintenance employees, and training appropriate for each employee is performed.

Discussion: Safety, security, and general employee training schedules and requirements are provided, and documentation of maintenance-specific and facility-specific training for SWM has been developed. There is an individual assigned to ensure timely scheduling of training for SWM Maintenance personnel. Course development, training facilities, and instructors are provided by the training organization.

Improvement: None required.

References: WHC-CM-1 WHC-CM-4-10  
WHC-CM-1-8 WHC-CM-5-34; 1.8  
WHC-CM-2-15

#### On-the-Job Training

Objective: Formal on-the-job training (OJT) programs are developed and performed under the supervision of qualified OJT trainers; employees independently perform maintenance only on equipment for which they are qualified.

Discussion: On-the-job training programs are established for SWM personnel, and follow guidance provided in Westinghouse Hanford documentation, which is in compliance with DOE Order 4330.4B requirements. OJT trainer qualification requirements are followed, and OJT training records have been established to ensure that facility personnel receive appropriate OJT.

Improvement: None required.

References: WHC-2-15 WHC-CM-5-34; 1.8; 3.10

#### Qualification

Objective: Maintenance management reviews employees' training prior to work assignment to a given task to verify that all maintenance personnel are adequately qualified and/or certified.

Discussion: Requirements for maintenance-specific personnel training/retraining are documented, as well as craft-specific certification. Maintenance supervisors verify from training records that an individual has completed the required training and qualification prior to making job assignments. This ensures that personnel are qualified to perform job-specific tasks to meet safety and quality requirements.

Improvement: None required.

References: WHC-CM-1 WHC-CM-5-34; 1.8; 2.11  
WHC-CM-2-15

#### Root Cause Analysis Training

Objective: A select technical maintenance group/team is schooled in principles and methods of root cause analysis. Group members should be trained in various approaches to cause-and-effect analysis and should be given the background necessary to select and implement an approach that is suitable for a particular situation.

Discussion: A team of individuals (the Plant Review Committee [PRC]) assigned to SWM Operations has been designated and trained in root cause analysis and accident investigation techniques.

Improvement: None required.

References: WHC-CM-1-3 WHC-CM-5-34; 1.22

### Training Program Approval, Effectiveness, and Feedback

**Objective:** The maintenance manager should be directly involved in periodically reviewing, making recommendations for improvement, and approving the maintenance training program. Performance indicators are established; trainee feedback and performance trends are used to evaluate effectiveness of the training program.

**Discussion:** Westinghouse Hanford performance indicators such as evaluation of accident frequency and work package backlogs are evaluated and reported frequently (monthly, quarterly) as part of the SWM Performance Indicator program. These are used to evaluate the effectiveness of maintenance training programs. Several systems are also in place in Westinghouse Hanford to allow personnel to voice their concerns.

**Improvement:** None required.

**References:** WHC-CM-1-3; MRP 6.1 WHC-CM-5-34;1.8  
WHC-CM-2-15 HATS

### Management and Supervisory Training

**Objective:** Formalized training programs are established to develop and maintain management and supervisory skills. Training should include position-specific technical areas as well as generic management skills to prepare supervisors for assigned responsibilities, and career progression planning should be used to help customize the training program.

**Discussion:** Formal manager training programs to provide company philosophy and managerial and communications skills are available. A qualification program is in place for supervisors, managers, and certain technical personnel. Specific supervisor qualifications are not documented.

**Improvement:** None required.

**References:** WHC-CM-1 WHC-CM-2-15  
WHC-CM-1-3 WHC-CM-5-34; 1.8

#### 4.4 DOE ORDER SECTION 4: MAINTENANCE FACILITIES, EQUIPMENT AND TOOLS

Maintenance facilities, equipment, and tools should efficiently support facility maintenance and maintenance training.

##### Facilities

##### Shops and Satellite Work Areas

- Objective: Maintenance facilities are designed and arranged to promote the safe and efficient completion of work. Environmental controls are maintained to encourage increased maintenance quality, and storage is sufficient and convenient.
- Discussion: Good housekeeping practices and inspections of maintenance facilities are performed. Shop layout, organization, and furnishing must be evaluated relative to DOE criteria to ensure that industrial safety and worker convenience are achieved. A new maintenance facility was installed in FY 94 providing the necessary controls and storage for maintenance efficiency.
- Improvement: None required.
- References: WHC-CM-1-8                      WHC-CM-4-3  
WHC-CM-2-3

##### Laydown and Staging Area

- Objective: A plan for identification and use of maintenance laydown and staging areas is developed, including responsibility for area upkeep and control.
- Discussion: Laydown and staging areas have been designated, and state-of-the-art Conex boxes are provided for staged, stored materials. Responsibility for area upkeep and control has been assigned to appropriate, designated personnel.
- Improvement: None required.
- References: WHC-CM-5-34; 3.1

### Storage Facilities

Objective: Suitable storage is provided for tools, supplies, and - maintenance equipment; environmental controls are considered.

Discussion: Designated storage areas are provided for SWM maintenance; SWM has purchased specifically designed Conex boxes and has identified receiving areas, including a tool crib for storing of tools, in the new maintenance facility.

Improvement: None required.

References: WHC-CM-5-34; 3.1 WHC-IP-0845; 4.1

### Temporary Facilities

Objective: Temporary facilities for activities involving airborne radioactivity and contamination control afford safe and efficient working and operating conditions.

Discussion: Procedures provide safe and efficient working and operating conditions for all work spaces.

Improvement: None required.

References: WHC-CM-5-34; 2.11 HSCRM-1  
WHC-CM-4-11

### Decontamination Facilities

Objective: Suitable facilities and methods are available to decontaminate tools and equipment.

Discussion: SWM Operations is responsible for decontamination of maintenance tools and equipment; SWM Maintenance does not perform this function.

Improvement: None required.

References: T Plant POPs Burial Ground SOPs



#### Tool and Equipment Storage

Objective: Centrally located storage facilities are available, accessible, and of appropriate design for segregation, calibration, and repair of maintenance tools and test equipment.

Discussion: Procedures require adequate storage facilities for all tools, test equipment, and other supplies. Storage is provided for SWM maintenance equipment and tools.

Improvement: None required.

References: WHC-CM-2-3 WHC-IP-084; 4.1  
WHC-CM-5-34; 3.1

#### Office Equipment

Objective: Maintenance facilities include office equipment that supports the maintenance organization in a high-quality manner. Adequate communication, calculation, reproduction, and other office equipment including computer terminals should be accessible and maintained in a reliable working condition.

Discussion: Adequate office equipment such as furniture, computers, reproduction equipment, is required and is sufficiently provided to support maintenance.

Improvement: None required.

References: WHC-CM-1-3

#### 4.5 DOE ORDER SECTION 5: TYPES OF MAINTENANCE

A proper balance of corrective and preventive maintenance should be employed to provide a high degree of confidence that facility equipment degradation is identified and corrected, that equipment life is optimized, and that the maintenance program is cost effective.

##### Master Equipment List

- Objective: Develop, maintain, and use a MEL of both safety-related and non-safety-related equipment and components.
- Discussion: A comprehensive list has been developed which includes component indexes for all of SWM facilities. This list is controlled and updated by facility Cognizant Engineering.
- Improvement: SWM Maintenance will generate a MEL to ensure that effective maintenance of all equipment is performed.
- References: WHC-CM-1-8 WHC-CM-5-34; 2.11  
WHC-CM-2-3

##### Types of Maintenance

##### Corrective Maintenance

- Objective: Corrective maintenance is performed to restore mechanical systems and equipment to good working order. Root cause analysis of failure should be performed, and priorities for corrective maintenance should be established based on plant objectives and the relative importance of the equipment.
- Discussion: Corrective maintenance requirements are addressed in Westinghouse Hanford documentation, as well as conditions for acceptability and frequency of performance. Corrective maintenance in accordance with DOE requirements, including root cause analysis, is performed as necessary for SWM; documentation and procedures are provided through JCS.
- Improvement: None required.
- References: WHC-CM-1-8 WHC-CM-5-34; 1.22, 2.11  
WHC-CM-2-3

### Preventive Maintenance

**Objective:** A PM program consisting of systematically planned and scheduled actions performed for the purpose of preventing equipment failure is in existence.

**Discussion:** Guidelines for preventive maintenance programs have been developed which ensure that maintenance is performed according to procedures, including documentation. Documentation for SWM preventive maintenance has been developed based on manufacturers' recommendations, plant experience, and good engineering practices.

**Improvement:** None required.

**References:** WHC-CM-1-8                      WHC-CM-5-34; 3.6 ;2.11

### Predictive Maintenance

**Objective:** Predictive maintenance actions are effective in reducing the failure of structures, systems, and components by using techniques that indicate the need for preventive maintenance before equipment failure.

**Discussion:** Predictive maintenance procedures are provided and the MEL has been developed to construct maintenance history files.

**Improvement:** None required.

**References:** WHC-CM-1-8                      WHC-CM-5-34; 2.1; 3.6

### Maintenance Action and Frequency Selection

**Objective:** Using the MEL, the effectiveness of the preventive maintenance program is periodically evaluated in relation to satisfying code and specification requirements and to ensure optimum equipment performance in a cost effective manner.

**Discussion:** Self-evaluation testing (with followup evaluation of deficiencies) is required and has been performed as part of the PM program. PM frequencies are established using specification and code requirements, manufacturers' recommendations, plant operating experience, engineering requirements, cost/benefit evaluations, and operating history, and the MEL.

Improvement: None required.

References: WHC-CM-1-8 SWM/PMs  
WHC-CM-5-34; 2.11

#### Scheduling

Objective: Scheduling and control of identified preventive maintenance actions are properly completed and coordinated with corrective maintenance activities when possible.

Discussion: Guidelines state that preventive maintenance is conducted/scheduled in accordance with plant operations to avoid disruptions. Further, when corrective maintenance actions are required, they are integrated with preventive maintenance using the JCS requirements.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2.11, 3.6

#### 4.6 DOE ORDER SECTION 6: MAINTENANCE PROCEDURES

Maintenance procedures and other work-related documents (e.g., drawings and instructions) should be prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently.

##### Procedures Development and Writing

- Objective:** Maintenance procedures have been prepared which detail the specific procedures in a clear, concise manner and consistent format, with easily understood text that details all aspects of the procedure.
- Discussion:** Guidance for the development, writing, and review of maintenance procedures is provided and used by SWM. Guidance includes requirements for testing and approval of procedures. Workmanship standards are provided for some commonly performed Westinghouse Hanford work activities, and specific detailed documentation for all maintenance procedures is included.
- Improvement:** None required.
- References:** WHC-CM-1-8 WHC-IP-1140  
WHC-CM-4-3

##### Procedure Verification

- Objective:** Verification through appropriate review and revision of procedures and documents is performed to ensure proper format and technical accuracy.
- Discussion:** Procedures are distributed for review to appropriate organizations. As a minimum, procedures are reviewed and approved by a cognizant engineer, a cognizant engineer manager, a safety representative and a maintenance representative. The stated task is successfully accomplished consistent with facility requirements. ESQ approval is determined by the cognizant engineer for review and signatures.
- Improvement:** None required.
- References:** WHC-CM-1-3 WHC-CM-5-34; 1.1  
WHC-CM-3-5 SHC-IP-1140

#### Procedure Validation

**Objective:** Procedures are validated to ensure usability and correctness before use.

**Discussion:** SWM Maintenance procedures are validated before issuance through "User Testing" by an individual having signature authority. Validation methods include actual performance of the procedure, mockup, walkthrough, and tabletop review.

**Improvement:** None required.

**References:** WHC-CM-1-3                      WHC-IP-1140  
WHC-CM-5-34; 1.1

#### Procedure Approval

**Objective:** Procedures are approved by the maintenance manager or designee.

**Discussion:** Appropriate approval is required for maintenance procedures, and the procedure control program must address procedure development, revision, and issuance control. Procedure control is established in a documented, well defined, and proven program, detailing individual and organizational responsibilities and authorities.

**Improvement:** None required.

**References:** WHC-CM-1-3                      WHC-CM-4-3  
WHC-CM-3-5                      WHC-CM-5-34; 1.1  
WHC-CM-4-2                      WHC-IP-1140

#### Procedure Use

**Objective:** Procedures are clear, concise, and contain adequate information for users to understand and perform their activities safely and effectively. Procedural compliance requirements should be clearly stated in the procedure or provided as general administrative guidance and should be thoroughly understood by each plant craftsman.

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Discussion: Maintenance procedures are required to be clear and concise, and to contain adequate information to enable safe and effective performance of the activity. Procedural compliance requirements are clearly defined and communicated to employees.

Improvement: None required.

References: WHC-CM-1-3 WHC-IP-1140  
WHC-CM-5-34; 1.1

Procedure Control, Periodic Review, and Revision

Objective: A policy governing maintenance procedure development, control, revision, and periodic review is implemented, including clearly defined responsibilities for program administration.

Discussion: Specific requirements for development and control of maintenance policies and procedures are provided in Westinghouse Hanford guidance, and SWM uses these directives to control procedures, revisions of said procedures, and review of procedures once developed.

Improvement: None required.

References: WHC-CM-1-3 WHC-IP-1140  
WHC-CM-5-34; 1.1

#### 4.7 DOE ORDER SECTION 7: PLANNING, SCHEDULING, AND COORDINATION OF MAINTENANCE

An effective system for planning, scheduling, and coordinating maintenance activities should be implemented to: ensure that maintenance is accomplished in a timely manner; improve maintenance efficiency; reduce radiation exposure (ALARA); and increase equipment availability.

##### Planning for Maintenance Activities

##### Planning Group Organization

**Objective:** Planning of maintenance activities is performed by a centralized planning group that is dedicated to this function.

**Discussion:** SWM maintenance planning is performed through the work control group which coordinates and integrates maintenance work on a daily and weekly basis. For example, work control is responsible for the PM/RECALL program planning, and all planning is accomplished through the JCS system.

**Improvement:** None required.

**References:** WHC-CM-1-8 WHC-CM-5-34; 2.11

##### Planning Group Responsibilities

**Objective:** All work packages are pre-reviewed and post-reviewed by the planning group or a representative of this group.

**Discussion:** Pre-review and post-review are performed by various organizations represented in the planning group, including quality assurance (QA), safety, environmental, and the cognizant engineer. SWM work packages are tracked by the Work Control Center and are maintained in long-term storage when closed out.

**Improvement:** None required.

**References:** WHC-CM-1-8 WHC-CM-5-34; 2.11  
WHC-CM-3-5



## Scheduling Maintenance Activities

### Control of Work Backlog

**Objective:** A work control system is in place so that maintenance backlog is controlled and effectively managed, including prioritizing, coordinating preventive and corrective maintenance, and delays.

**Discussion:** Data management/tracking is required, and the JCS is used for maintenance-specific work control, monitoring, and coordinating maintenance efforts.

**Improvement:** None required.

**References:** WHC-CM-1-8                      WHC-CM-5-34; 2. 11

### Work Priority

**Objective:** Management control of work is accomplished through the use of an effective priority assignment system based on safety and reliability.

**Discussion:** The work priority system designates importance of work activities relative to the facility, plant safety, environmental requirements, and personnel. Also, Level 4 schedules, plan-of-the-day, and plan-of-the-week are used to prioritize work.

**Improvement:** None required.

**References:** WHC-CM-1-8                      WHC-CM-5-34; 2. 11

## Coordination of Maintenance Activities

**Objective:** Coordinating of maintenance activities with support organizations is facilitated through periodic and frequent meetings to ensure that work can be accomplished effectively.

**Discussion:** A weekly planning meeting is held to coordinate scheduling of SWM activities. A daily plan-of-the-day meeting is held with operations, maintenance, engineering, health physics, scheduling, and other work control personnel to status ongoing work, identify problem areas, and discuss emergency work. Maintenance safety meetings are held weekly to ensure

that activities are coordinated. Additionally, other meetings, such as the monthly facility function review meeting, serve to support in-house coordination efforts relative to maintenance activities.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2.11

#### Planned Outages

Objective: Advanced planning is established for scheduled outages.

Discussion: Routine planning is required for scheduled outages, but this requirement is applicable only to nuclear reactors and processing facilities, not to SWM operations.

Improvement: None required.

References: WHC-CM-1-8

#### Forced Outages

Objective: Advanced planning is established for forced outages, power reductions, or other limitations to facility operations.

Discussion: Routine planning is designated, as well as advanced planning for unscheduled outages, but this requirement is applicable only to nuclear reactors and processing facilities, not to SWM operations

Improvement: None required.

References: WHC-CM-1-8

#### 4.8 DOE ORDER SECTION 8: CONTROL OF MAINTENANCE ACTIVITIES

Management-directed and -delegated involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable facility operations.

##### Work Control Procedure

- Objective:** Procedures and policies are established for overall direction of the work control system. The basic intent of the work control system is to identify all facility deficiencies and work needed, to avoid redundant identification of these deficiencies, and to guide the accomplishment of work and subsequent postmaintenance activities.
- Discussion:** Work control, as well as procedural requirements specific to SWM maintenance, is provided by the JCS as described in WHC-CM-5-34. The JCS outlines requirements, responsibilities, and administrative procedures that are used to provide a safe and efficient operation. Completed JCS packages are kept on file.
- Improvement:** None required.
- References:** WHC-CM-1-8 WHC-CM-5-34; 2.11  
WHC-CM-2-5

##### Work Request

- Objective:** Proper work request packages are prepared for all work. The work request should clearly define the work to be performed, including equipment identification, work instructions, safety requirements, hold points, and acceptance criteria. The work request should be reviewed by affected groups during the planning process.
- Discussion:** SWM maintenance uses standard forms throughout the Site, which generally address the requirements listed in the objectives outlined in the order to ensure work is performed correctly within the facility. Work package documents clearly define the work to be performed, equipment to be used, and documentation requirements, as well as appropriate work review both before job initiation and after job completion. Work packages are prioritized and are reviewed by the planning group before release and after completion.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2.11

#### Supervision of Maintenance Activities

Objective: Maintenance managers and supervisors routinely monitor work and take an active role in maintenance activities being performed, prejob briefings, quality of workmanship, work progress, and procedure use.

Discussion: Supervisors assign work in accordance with the daily schedule. Supervisors routinely visit work sites to observe progress and to ensure work is being accomplished safely and in accordance with work instructions. Maintenance managers perform routine monitoring of work to assure that quality work is produced.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2.11; 3.6

#### Review of Completed Work Requests

Objective: Postmaintenance test results are documented and reviewed to ensure proper system/equipment performance before returning the system to service.

Discussion: Documentation of retests is required and postwork review of maintenance actions by the maintenance manager or the appropriate personnel before returning the system or equipment into service. Also 9 postmaintenance testing is required as part of the evaluation of completed work packages. Additional reviews are performed as required by engineering, quality assurance, safety, and other applicable groups as required under the JCS.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-4-3  
WHC-CM-4-2 WHC-CM-5-34; 2.11

#### Temporary Repairs

Objective: Procedures are in place to assure permanent corrective action is taken whenever temporary repairs have been made, before equipment/systems are allowed to remain in service.

Discussion: The SWM JCS (WHC-CM-5-34) requires that corrective action be taken when preventive maintenance failure occurs, including temporary repairs.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-6-1  
WHC-CM-5-34; 1.22, 2.11; 3.6

#### Control of Nonnuclear Facility Personnel

Objective: Nonnuclear facility contractor and subcontractor personnel who perform maintenance activities at the facility meet the same requirements expected of facility maintenance as to training and high-quality work standards.

Discussion: General policy states that all contractor personnel performing work for SWM must have the same training as Westinghouse Hanford employees, and maintenance-specific control is also required.

Improvement: None required.

References: WHC-CM-1-8 HSRM-1  
WHC-CM-5-34; 1.8; 2.11

#### 4.9 DOE ORDER SECTION 9: POSTMAINTENANCE TESTING

Postmaintenance testing should be performed to verify that components will fulfill their design function when returned to service after maintenance.

##### Postmaintenance Test Requirements

**Objective:** A postmaintenance testing program that is part of the work control system is established to control and document postmaintenance testing.

**Discussion:** Postmaintenance testing/review processes are an important part of the work package planning process (JCS), which is used by SWM, and are reviewed by the planning and cognizant engineering groups prior to release of the work package. JCS procedures require documentation of equipment retest. Appropriate testing requirements and methods are used to ensure that equipment returned to use has been repaired appropriately and will perform its intended function.

**Improvement:** None required.

**References:** WHC-CM-1-8 WHC-CM-4-3  
WHC-CM-3-5 WHC-CM-5-34: 2. 11  
WHC-CM-4-2

##### Post-Maintenance Test Program Scope

**Objective:** Program scope includes types of equipment to be tested and type of test to be performed.

**Discussion:** The DOE Order 4330.4B requires that all maintenance activities be reviewed for applicability of postmaintenance testing and to ensure that appropriate test instructions is provided. The JCS system ensures that postmaintenance testing is appropriate, and the level of testing performed is a function of the importance of the equipment and its safety-related classification. Testing aspects are also reviewed by appropriate organizations. JCS work packages specify postmaintenance testing for all rotating and pressure- and temperature-controlling equipment.

**Improvement:** None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2. 11  
WHC-CM-4-2 WHC-CM-6-1

#### Postmaintenance Test Control

Objective: The work control program addresses control of postmaintenance testing and designates organizations responsible for test control and tracking/evaluation of results.

Discussion: Work packages designate the group to perform retest. This group reviews the work package for retest requirements, ensures the system, equipment, or component has been restored for retest, and performs the retest as soon as reasonably possible. Results of successful retest are documented and the package is forwarded for closeout. If the work package fails retest, the facility representative suspends or re-releases the work package, as appropriate. In addition, QA teams perform random surveillances of postmaintenance testing to ensure quality workmanship and adherence to procedures.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-5-34; 2.11  
WHC-CM-4-2

#### Postmaintenance Test Performance, Documentation, and Acceptance

Objective: Responsibility for postmaintenance testing is assigned, and the responsible organization reviews the work performed to ensure that the postmaintenance test is appropriate. The operational organization reviews and verifies acceptance.

Discussion: Under JCS, equipment is returned to service only after completion of postmaintenance requirements, which includes postmaintenance testing. Closeout of the work package includes review and acceptance by appropriate organizations such as engineering, QA, operations, and maintenance.

Improvement: None required.

References: WHC-CM-1-8 WHC-CM-3-5  
WHC-CM-5-34: 2.11

#### 4.10 DOE ORDER SECTION 10: PROCUREMENT OF PARTS MATERIALS, AND SERVICES

Parts, materials, and services required for maintenance activities should be available when needed.

##### Procurement Policy and Procedures

- Objective:** Policies are established for the procurement of parts, material, and services. Procedures should specifically describe responsibilities of personnel involved in the procurement function. A system should be established to update spare parts needed.
- Discussion:** Procedures have been established for all procurement functions, including defining responsibilities for applicable individuals and organizations. A spare parts program is in place, and requirements/responsibilities for handling, storing, and controlling SWM maintenance materials are addressed in part in the JCS. For example, Material Request Forms are developed for materials procurement, and job-specific equipment is normally requested under JCS. This spare parts program will be continually developed as required for improvement.
- Improvement:** None required.
- References:** WHC-CM-1-8 WHC-CM-5-34; 2.11, 3.1  
WHC-CM-1-3 WHC-CM-6-1  
WHC-CM-2-1 WHC-IP-0845

##### Procurement Initiation

- Objective:** Timely procurement of parts, materials, and services for maintenance activities is enhanced through identification of technical requirements, vendor pre-selection, and updated spare parts inventories.
- Discussion:** Assurance of timely procurement relative to SWM maintenance is provided. Procurement of materials submitted as part of the JCS work control process is achieved within the designated time frame for the JCS package to be processed. The Warehouse Inventory Management System (WIMS) electronic ordering system is used to reduce Central Stores' order processing time. Additionally, vendors are evaluated relative to delivery time.



Improvement: None required.

References: WHC-CM-1-3 WHC-CM-2-1  
WHC-CM-1-8 WHC-CM-5-34; 2.13; 3.1

#### Procurement Control

Objective: Procurement controls are developed and maintained, including material inspection to ensure conformance to purchasing requirements, reliability of supplier, and QA.

Discussion: Conformance is assured through using of in-house QA, under which inspection of procured equipment/materials is performed. Central Stores, which initially receives equipment before dispersement to SWM, also is responsible for materials control/conformance evaluation, as well as evaluations of suppliers.

Improvement: None required.

References: WHC-CM-2-1 WHC-CM-5-34; 3.1  
WHC-CM-4-2

#### Services

Objective: Procedures are in place to assure timely response from vendors for required specialized services. Provisions should be made for emergency or short-notice support.

Discussion: Individual service contracts are used to deliver specific or specialized services. A program for selection and procurement of service contracts is in place and is used. A program has been put into place in SWM that enables the operation to purchase "needed now" types of material up to \$2,500 with over the counter transactions.

Improvement: None required.

References: WHC-CM-2-1 WHC-CM-6-1

#### 4.11 DOE ORDER SECTION 11: MATERIAL RECEIPT, INSPECTION, HANDLING, STORAGE, RETRIEVAL, AND ISSUANCE

All phases of receiving, inspection, handling, storing, retrieving, and issuing equipment, parts, and materials for maintenance should be covered by effectively implemented policies and procedures consistent with the QA requirements, from the time an item is received until it is installed in the facility.

##### Receipt and Inspection

**Objective:** Inspection of purchased parts, materials, and equipment, is performed prior to acceptance for storage or use. Adequate organizational responsibilities are assigned, including interfaces between design, procurement, and QA organizations.

**Discussion:** Receipt inspection is performed by Central stores, although additional Quality Assurance inspection of SWM equipment is performed to ensure acquisition of quality material. Procedures and organizational responsibilities have been developed and inspections are performed. Organizational responsibilities are included as part of the JCS.

**Improvement:** None required.

**References:** WHC-CM-2-3 WHC-CM-5-34; 2.1, 3.1  
WHC-CM-4-2

##### Handling

**Objective:** Procedures are prepared for equipment requiring special handling instructions, including manufacturer's certification. Sound handling practices should be followed when no specific procedure is required.

**Discussion:** Special requirements for equipment such as welding equipment is provided, and SWM uses any special handling as indicated by the vendor. Administrative controls relative to safety and safe handling of equipment have been developed and are implemented at SWM, and procedures are in place for inspection and safe use of hoisting and rigging equipment. Organizational responsibilities are included as part of the JCS.

**Improvement:** None required.

References: WHC-CM-2-3 DOE-RL-92-36  
WHC-CM-5-34; 3.1  
WHC-CM-6-4

#### Storage Material and Equipment

**Objective:** Material and equipment should be stored in a manner that provides maximum protection and ready availability for its intended use. A program which complies with requirements supplied by the vendor is in place providing for periodic inspections and preventive maintenance of stored material and equipment. The stores record system documentation should include current inventory status, minimum/maximum limits, location, and tracking of shelf life.

**Discussion:** Central Stores monitors the shelf life and maintains documentation of equipment/material in its possession. Walkthrough inspections of storage areas are conducted. Maintenance managers and/or appropriate personnel include periodic inspection of storage areas and materials in general housekeeping inspections. Basic segregation of equipment or materials is performed.

**Improvement:** None required. SWM Maintenance has developed additional materials/equipment storage areas and segregation practices. This includes a new environmentally controlled paint storage area and a tool crib for shop stock.

References: WHC-CM-2-3 WHC-IP-0845  
WHC-CM-5-34; 3.1

#### Retrieval and Issuance

**Objective:** An effective program is implemented for issuing parts, materials, and equipment from storage, to include applicable special handling, documentation, and traceability. A catalog for parts, material, and equipment should be developed to assist in efficient planning and execution of maintenance activities.

**Discussion:** An approved list of required spare parts has been issued, along with determination of minimum/maximum stocking levels. General procedure/policy for parts cataloging has been developed, and SWM has initiated procedure implementation to ensure that the appropriate equipment management is achieved. Further, an inventory (bar coding) system is

currently being performed to ensure that inventory is identifiable and traceable. A sitewide spare parts catalog has been developed and is used.

Improvement: None required.

References:	WHC-CM-1-8	WHC-CM-5-34; 3.1
	WHC-CM-2-2	WHC-CM-6-1
	WHC-CM-2-3	WHC-IP-0845

#### 4.12 DOE ORDER SECTION 12: CONTROL AND CALIBRATION OF MEASURING AND TEST EQUIPMENT

The program for control and calibration of measuring and test equipment (M&TE) should be consistent with the Quality Assurance requirements of DOE Order 5700.6C, *Quality Assurances* and ensure the accurate performance of facility instrumentation and equipment for testing, calibration, and repairs.

##### Identification

- Objective:** Each piece of M&TE is assigned a unique, permanently marked or attached identification number for identifying, tracing, and controlling M&TE, and a master list of all controlled M&TE should be maintained.
- Discussion:** SWM has issued a specific procedure for the identifying and inventory control of its M&TE equipment. This system includes bar coding and a computerized tracking for accurate reporting processes.
- Improvement:** None required.
- References:** WHC-CM-2-3; 3.1 WHC-IP-0845  
WHC-CM-4-2

##### Calibration

##### Calibration Standards

- Objective:** Calibration standards and recalibration must be traceable to the National Institute of Standards and Technology (NIST) or other nationally recognized standards. Calibration standards are stored and issued using specific issuance controls. Standards should be calibrated on a frequency consistent with vendor recommendations and facility experience, and calibration records for standards should be consistent with those for other M&TE.
- Discussion:** Calibration is required to follow appropriate standards, and is accomplished by using a recall system provided by Maintenance Engineering Services. Pacific Northwest Laboratory (PNL) performs calibration following DOE and Westinghouse Hanford requirements. This system has traceable paperwork for records of M&TE equipment history.

Improvement: None required.

References: WHC-CM-2-3; 3.1  
WHC-CM-4-2

WHC-IP-0845

#### Calibration Procedures

Objective: Calibration of equipment is performed by qualified technicians using approved procedures. The "ratio of accuracy" of the standard relative to the M&TE being calibrated is as high as reasonably achievable, and is consistent with national standards.

Discussion: Calibration is required and is performed by qualified technical personnel following approved procedures. Several specific calibration procedures have been issued for SWM usage to document acceptance criteria, including calibration instructions and data sheets.

Improvement: None required.

References: WHC-CM-4-8

WHC-CM-8-2

#### Calibration Frequency

Objective: Calibration frequency is determined based on the manufacturers' recommendations, M&TE usage, and M&TE historical reliability.

Discussion: Calibration is performed at the required frequencies and recalled through the PSCP system in conjunction with PNL.

Improvement: None required.

References: WHC-CM-5-34  
WHC-CM-8-2

WHC-IP-1140  
PSCP Procedures

#### Functional Checks

Objective: The desired response or acceptance criteria are clearly specified or indicated on the equipment when operational tests, functional checks, or battery checks of M&TE are performed.

Discussion: Personnel performing these checks are knowledgeable of required test responses for M&TE functional tests/checks and recalled through the JCS System. This system also provides the appropriate data sheets and procedures.

Improvement: None required.

References: WHC-CM-4-2 WHC-CM-8-2  
WHC-CM-5-34; 2.1 PSCP Procedures

#### Control

#### Storage

Objective: Calibration equipment is stored appropriately to assure equipment is protected from damage, readily retrievable, and properly maintained. Segregation of M&TE based upon calibration is performed, and equipment must be distinctively marked.

Discussion: Storage of calibration standards is provided in maintenance shops, tool crib, and locked cabinets. Standards are stored in a manner which ensures that DOE Order 4330.4B standards storage requirements are met to protect them from damage and to assure retrievability and useability. All equipment used for calibrations is bar coded and history traceability of that equipment is tracked.

Improvement: None required.

References: WHC-CM-5-34; 2.11 WHC-IP-0845  
WHC-CM-8-2; 211

#### Uncalibrated M&TE

Objective: New M&TE devices are calibrated before use to verify that they meet acceptance criteria, are functional, and are safe to use. Controls are in place for the storing and checking of uncalibrated testing equipment, and this (troubleshooting) equipment is periodically checked for operability and safety.

Discussion: Controls for storing and checking uncalibrated test equipment are in place. Uncalibrated M&TE is periodically checked against fully calibrated equipment and records documented by the JCS System.

Improvement: None required.

References: WHC-CM-5-34; 2.11 WHC-IP-0845  
WHC-CM-8-2

#### M&TE with Limited Use

Objective: M&TE devices with special uses, limitations, or restrictions are clearly marked or tagged to describe their applications and limitations.

Discussion: Calibration standards are required to be clearly marked, with limitations identified. SWM has marked calibration standards in the appropriate manner to ensure that limitations are identified.

Improvement: None required.

References: WHC-CM-5-34; 2.11 WHC-IP-0845

#### Issue and Recall

Objective: Controls for issuing equipment to qualified people, documentation as to where equipment was used, and a recall system for calibration are in place. Issued equipment should be traceable, and the recall system implemented to ensure that M&TE devices are removed from service before or at the expiration of their calibration.

Discussion: Traceability and recall procedures are required and are in place. Control of equipment is now the responsibility of the tool crib attendant. A new maintenance facility has been installed for SWM that has specific areas for the issue and recall of M&TE equipment.

Improvement: None required.

References: WHC-CM-5-34; 2.11 WHC-IP-0845  
WHC-CM-8-2



Contaminated M&TE

Objective: Equipment subject to radioactive contamination is given special protection and storage to minimize the possibility for external and internal contamination.

Discussion: SWM ensures the safety of personnel by providing special protection and storage of equipment which may have radioactive contamination. Any item used in a suspect area must undergo a full radiological survey before leaving the area, or must remain in the area.

Improvement: None required.

References: WHC-CM-4-11 WHC-IP-0845  
WHC-CM-5-34 HRSCM-1

Evaluation

Out of Calibration and Defective M&TE

Objective: M&TE equipment is evaluated when found to be out of calibration, defective, or otherwise unreliable. Calibration records are retrievable, and should be reviewed to determine whether recalibration or rework is needed.

Discussion: Maintenance and calibration histories are maintained for each piece of M&TE equipment found to be out of calibration or deficient in any manner, and an evaluation of the equipment it has been used on since its last calibration is performed promptly. Usage of specific bar coding M&TE is documented through the JCS, and QA verifies that the M&TE is calibrated and accurate for each work package. Periodic reviews of calibration trends are conducted to determine if there are measuring and test equipment reliability problems.

Improvement: None required.

References: WHC-CM-1-8 PSCP  
WHC-CM-5-34 WHC-IP-0845

Performance Trending

Objective: Performance trending is performed to identify needed corrections or changes to M&TE procedures, such as adding or

deleting M&TE devices, adjusting calibration frequencies, correcting procedures, or upgrading M&TE quality.

Discussion: M&TE usage must be controlled and evaluated to ensure proper use, which can be accomplished through performance trending. Performance trending training is an integral part of training for some personnel, and performance trending of M&TE calibration data is performed by Maintenance Engineering. This data is reviewed monthly for determining any corrective action that may be needed.

Improvement: None required.

References: WHC-CM-5-34 PSCP  
WHC-IP-1140

#### 4.13 DOE ORDER SECTION 13: MAINTENANCE TOOLS AND EQUIPMENT CONTROL

Methods should be established to provide for storage, issuance, and maintenance of an adequate and readily available supply of tools and equipment and also for the development of special tools and equipment needed in the maintenance program.

##### Storage and Issuance

**Objective:** Procedures and responsibilities for tool control (storage and issuance) are in place, including acquisition of special tools and equipment.

**Discussion:** Tool control procedures are in place in SWM, and equipment/tool tagging and bar coding is currently being performed. Procedures will be followed for control of sensitive property, including tools of \$100 value or more. SWM has issued a property management procedure for the storage and control of all maintenance tools.

**Improvement:** None required.

**References:** WHC-CM-2-3 WHC-CM-5-34; 3.1  
WHC-IP-0845

##### Tool and Equipment Maintenance

**Objective:** PM procedures are in place for maintenance tools and other support equipment. Only safe, useable tools should be available; unrepairable tools should be disposed of in a timely manner.

**Discussion:** A PM program is in place for SWM tools and equipment, which includes verification that preventive maintenance has been performed.

**Improvement:** None required.

**References:** WHC-CM-4-3 WHC-IP-0845  
WHC-CM-5-34; 2.11 PSCP

### Use of Special Tools and Equipment

**Objective:** Procedures or instructions are in place for the use of special equipment or tools, such as lifting and rigging equipment, test rigs, and mockups to ensure cost justification, effectiveness, and safety. Maintenance supervisors should review these procedures, particularly those for high-hazard or high-risk tasks.

**Discussion:** Specialized equipment is made available or acquired as required, and procedures have been developed for the utilization of special equipment such as cranes or hoists. Procedures for use of special equipment comply with all requirements set forth in DOE Order 4330.4B. Verification of preventive maintenance on lifting equipment is required/performed, and directives for development of said procedures are given.

**Improvement:** None required.

**References:** WHC-CM-5-34 SWM 2X35010  
DOE-RL-92-36

#### 4.14 DOE ORDER SECTION 14: FACILITY CONDITIONS INSPECTION

Management should conduct periodic inspections of equipment and facilities to assure excellent facility condition and housekeeping.

##### Standards

**Objective:** Managers and supervisors communicate standards relative to appropriate attitudes, work ethics, sound engineering practices, and sound economic practices to all personnel; adherence to these standards is assessed through performance of routine walk-around inspections of equipment and facilities.

**Discussion:** SWM Maintenance management performs routine inspections of maintenance facilities on a regular basis to ensure that maintenance standards are defined and are communicated to personnel through postings, in safety meetings, and one-on-one during housekeeping inspections. Hanford General Employee Training (HGET) includes policies covering Occupational Safety and Health Administration (OSHA), Employee Concerns, and Standards of Conduct. Regular housekeeping inspections are also performed, as well as periodic health and safety-related inspections (i.e., OSHA).

**Improvement:** None required.

**References:** WHC-CM-2-2 WHC-CM-5-34; 1.10  
WHC-CM-2-3

##### Training

**Objective:** Personnel involved in facility condition inspections are trained and knowledgeable of the standards expected by the facility manager, including the techniques required to perform facility condition inspections.

**Discussion:** SWM Maintenance receives training to apply knowledge of inspecting facilities for deficiencies.

**Improvement:** None required.

**References:** WHC-CM-5-34; 1.10

## Procedures

- Objective:** Administrative procedures that describe the inspection program are in place to define expected standards, provide documentation of deficiencies, provide for follow-up on corrective actions, assign program implementation responsibilities, and establish a means to measure program effectiveness.
- Discussion:** Procedure development is provided and required under Westinghouse Hanford documentation, and SWM personnel use the JCS system to document, track, and follow up on deficiencies.
- Improvement:** None required.
- References:** WHC-CM-2-3 WHC-CM-5-35; 2.11

## Scope of Inspections

- Objective:** Procedures clearly define the scope of inspections, which includes detailed walk-downs of assigned areas (including remote and limited access areas) and is to consider the ALARA concept. Key individuals should accompany managers and supervisor during inspections, and inspections must be of sufficient detail to search for deficiencies.
- Discussion:** Inspections are performed following procedures which include detailed walkdowns of maintenance areas, and deficiencies are investigated and documented. Facility condition inspections are performed under Safety Council and ALARA inspections as well as supervisors and housekeeping. The Management Oversight Program (MOP) and Senior Management Oversight Program (SMOP) involve management from other groups in the inspection process.
- Improvement:** None required.
- References:** WHC-CM-4-11 WHC-CM-5-34; 1.10

## Inspection Program Elements

- Objective:** Routine inspections should encompass an area of the appropriate size to perform a thorough inspection during the allotted time, should be appropriately scheduled, and include periodic rotation of inspectors.

Discussion: SWM personnel are given adequate time to perform required inspections and associated reports; inspectors are periodically rotated.

Improvement: None required.

References: WHC-CM-4-11 WHC-CM-5-34; 1.10

#### Reporting Deficiencies

Objective: Deficiencies are reported to the appropriate personnel, and are identified, corrected, and documented.

Discussion: Guidance for addressing deficiencies is presented, and corrective actions are performed under the JCS system. All personnel are responsible to report housekeeping and facility condition deficiencies so that responsible personnel can initiate appropriate remedies.

Improvement: None required.

References: WHC-CM-2-3 WHC-CM-5-34; 2.11

#### Deficiency Followup

Objective: Recurring problems which are not tracked in the work control system or corrective action system(s) are identified. These deficiencies must be reported, listed, monitored, and corrected as necessary, and effectiveness of the corrective action should be reviewed and evaluated.

Discussion: Because SWM Maintenance does not control any facilities, SWM Maintenance does not deal with any deficiencies/corrective actions outside of the JCS. SWM Operations does however document and track inspection deficiencies and corrective actions through the WRTS system.

Improvement: None required.

References: WHC-CM-5-34; 1.10

#### 4.15 DOE ORDER SECTION 15: MANAGEMENT INVOLVEMENT.

To ensure the safety of DOE nuclear facility operations, DOE and contractor corporate and facility managers should be sufficiently involved with facility operations to be technically informed and personally familiar with conditions at the operating facility.

##### Manager Involvement

- Objective:** Managers and supervisors perform periodic walk through inspections to facilitate face-to-face communications and feedback. Results of tours should be documented.
- Discussion:** The SMOP and MOP inspections ensure that managers perform regular maintenance storage area, housekeeping, and H&S walkthroughs to ensure that personnel are communicated with regarding maintenance inspection elements, to facilitate feedback, and to observe work activities. These inspections are documented through JCS and QUEST/WRTS.
- Improvement:** None required.
- References:** WHC-CM-5-34; 1.10

##### Performance Indicators, Goals, and Objectives Results

- Objective:** Results of maintenance performance indicators, goals and objectives, and other related information are developed, trended, and reported to provide feedback, which is then used by senior management in progress reviews.
- Discussion:** Site-wide performance indicators such as accident tracking have been developed as part of the Operations Excellence Program, and are utilized by the SWM maintenance organization. SWM-specific performance indicators, including backlog control, safety, and PM/RECALL overdue/completion have also been developed.
- Improvement:** None required.
- References:** WHC-CM-5-34                      SWM PM/RECALL



#### Feedback

- Objective:** A feedback system has been established to promote communications and participation in improvements at all levels of the maintenance organization. Lessons learned from maintenance experiences are used to improve performance.
- Discussion:** Mechanisms are in place for employees to address participate in communication and feedback programs. Written documentation for lessons learned is provided to personnel and promoted by maintenance management. Weekly meetings are held with all levels of the maintenance organization for encouragement of feedback.
- Improvement:** None required.
- References:** WHC-CM-5-34; 1.12

#### Program Reviews

- Objective:** Results of inspections, audits, reviews, investigations, and self-assessments are reviewed and evaluated by senior managers. Assessments of facility equipment and systems, the ability of craftsmen to perform high-quality maintenance, and overall effectiveness should be routinely performed and improvements made as appropriate.
- Discussion:** Generalized maintenance tracking/assessment is provided, periodic evaluation of programs such as the PM are performed, and facility-specific program evaluation is accomplished.
- Improvement:** None required.
- References:** WHC-CM-5-34; 1.11

#### Assessment of Maintenance Training

- Objective:** Management approves and periodically reviews the maintenance training program. Maintenance personnel performance is monitored to identify needed training program enhancements. Managers' recommendations and trainee feedback are used in training program changes.

Discussion: Training checklists and required reviews are performed by SWM personnel through implementation of various Westinghouse Hanford guidelines. Self assessments are an important part of SWM maintenance activities, and review of the overall training program is also performed.

Improvement: None required.

References: WHC-CM-5-34; 1.8

#### Assessment of Procurement Activities

Objective: Periodic assessments of the overall efficiency of the procurement process are conducted; data and trends are monitored to identify needed improvements in areas such as budgets, inventory levels, and reasons for emergency procurement.

Discussion: SWM Maintenance has assessments performed quarterly, including periodic assessment of overall procurement process efficiency. These assessments are conducted to ensure quality oversight, and include budget statusing, minimum-maximum inventory levels, and tracking of emergency procurements.

Improvement: None required.

References: WHC-CM-4-2 WHC-CM-1-8  
WHC-CM-5-34; 1.11

#### Assessment of Measuring and Test Equipment

Objective: The M&TE program is periodically reviewed by management to ensure safe and reliable operation of each station, including availability of M&TE equipment.

Discussion: The M&TE program is in place, and management review specific to this program is performed and documented.

Improvement: None required.

References: WHC-IP-0845 WHC-CM-1-8

#### 4.16 DOE ORDER SECTION 16: MAINTENANCE HISTORY

A maintenance history and trending program should be maintained to document data, provide historical information for maintenance planning, and support maintenance and performance trending of facility systems and components.

##### Program Development

##### Equipment Identification

**Objective:** The maintenance history program clearly defines the systems and equipment that require documentation and retention of historical data. The MEL compiles this information.

**Discussion:** Development of a maintenance history program is required; basic data required in the files is listed under JCS procedures. In the past, SWM has not had a formal maintenance history program, although maintenance data were available through the PM/PSCP programs. However, future maintenance information will be available through the use of the JCS program. The MEL for SWM has been issued with inclusion of component indexes.

**Improvement:** None required.

**References:** WHC-CM-5-34; 2.11 WHC-CM-1-8

##### Data Identification

**Objective:** The maintenance history program defines the type of data to be collected and recorded to support effective use of the information.

**Discussion:** Completed work packages under JCS include all relevant maintenance information for a given piece of equipment, specific data requirements relative to a maintenance history program have been defined, and equipment identification is ongoing. The MEL for SWM has been issued with inclusion of component indexes.

**Improvement:** None required.

**References:** WHC-CM-5-34; 2.11 WHC-CM-1-8

#### Data Collection

**Objective:** Maintenance history data collected for retention is reviewed and retained by a responsible person or organization.

**Discussion:** Data is reviewed appropriately as part of the Work Control process. A job control administrator (JCA) is assigned to track and issue maintenance history data. The MEL is retained by the cognizant engineering group for SWM.

**Improvement:** None required.

**References:** WHC-CM-5-34: 2.11 WHC-CM-1-8

#### Program Use

**Objective:** Maintenance history data are readily available to and are by maintenance planners, coordinators, supervisors, and craftsmen. Maintenance history should be periodically reviewed and problems trended; persistent or recurring problems are reported to appropriate personnel for corrective action.

**Discussion:** Establishment of appropriate data bases and document control systems is required. Currently, readily available maintenance history information is provided through the PSCP program (computerized) and PM (hard copy data). Implementation of the JCS PMS module for maintenance will allow for ready access to all information concerning a particular work order, including information that will be part of the equipment's maintenance history. The MEL and component history is part of the JCS/PMS and is available and used during work package preparation.

**Improvement:** None required.

**References:** WHC-CM-5-34; 2.11 WHC-CM-1-8

#### 4.17 DOE ORDER SECTION 17: ANALYSIS OF MAINTENANCE

Systematic analysis should be used to determine and correct root causes of unplanned occurrences related to maintenance.

##### Information Collection

- Objective:** Operator logs and records, computer records, interviews, and personnel statements are collected for all unplanned occurrences, and other information pertinent to the investigation should be identified and obtained.
- Discussion:** Conduct of Operations procedures mandate that SWM Operations, rather than SWM Maintenance, conducts occurrence reporting and root cause analysis. However, SWM Maintenance assists with the occurrence reporting process, providing information as requested.
- Improvement:** None required.
- References:** WHC-CM-1-3; MRP 5.1, 5.14 WHC-CM-5-34; 1.18, 1.22, 3.17  
WHC-CM-5-7; 1.23

##### Event Analysis

- Objective:** Systematic analysis is performed to reconstruct unplanned occurrences, including development of a detailed sequence of facts and activities and determination of causal factors (human performance and equipment performance problems).
- Discussion:** A clear, concise, and objective description of each occurrence is required. SWM Operations, rather than SWM Maintenance, performs root cause analysis when unplanned occurrences take place.
- Improvement:** None required.
- References:** WHC-CM-1-3 WHC-CM-5-34; 1.18

##### Cause Determination

- Objective:** Actual or probable causes of problems are evaluated to establish a final root cause. Correction of the root cause should be feasible, prevent recurrence of the unplanned

occurrence, and not adversely impact safety, reliability, or operational goals.

Discussion: Root cause analysis is required for occurrences with high enough PPG values. Root cause analysis is performed by members of the PRC.

Improvement: None required.

References: WHC-CM-1-3 WHC-CM-5-34; 1.18

#### Corrective Action

Objective: After determination of all causes of the unplanned occurrence, a corrective action plan is developed, executed, and tracked to completion.

Discussion: Immediate corrective actions taken are recorded in the occurrence report, along with planned corrective actions, their scheduled completion dates, the responsible individuals and organizations, and the priority/severity category assigned to the item. Documentation for execution and tracking of the corrective action plan is provided through JCS.

Improvement: None required.

References: WHC-CM-1-3 WHC-CM-5-34; 1.18, 1.19, 1.22, 2.11

#### Corrective Action Followup

Objective: Post-repair testing is performed to determine if additional maintenance work or fact finding will be required after corrective action for the unplanned occurrence has been performed. Retesting and extended monitoring of equipment is performed as necessary to ensure desired results are achieved.

Discussion: Post-maintenance testing is performed for preventive maintenance, and post-maintenance testing is also performed for corrective actions to ensure that actions taken have resolved the problems which occurred. All post-maintenance testing is documented through JCS.

Improvement: None required.

References: WHC-CM-2-5 WHC-CM-5-34; 1.22, 2.11  
WHC-CM-1-8

#### 4.18 DOE ORDER SECTION 18: MODIFICATION WORK

Facility modification work, including temporary modifications, should be accomplished under the same basic administration controls as those applied to facility maintenance activities so that there is no increase in risk to facility equipment, environment, or personnel because of the modification work.

##### Maintenance Program Interface with Modifications

- Objective:** The maintenance program includes control procedures for facility structure, system, or component modifications. Facility maintenance personnel must be cognizant of the effects of modifications prior to maintenance activities, and procedures should require that all modifications be reviewed to identify future maintenance activities, which should then be integrated into the maintenance program.
- Discussion:** The JCS specifies control procedures for facility, structure, system, and component modifications. SWM has a program in place that requires all plant modifications be reviewed prior to the work to identify future required maintenance activities for determining the level of maintenance support, procedures, etc.
- Improvement:** None required.
- References:** WHC-CM-5-34; 2.1

##### Temporary Repairs or Temporary Modifications

- Objective:** A safety review is performed prior to implementation of temporary repairs to ensure adequacy, safety, and reliability of the repair. Temporary repairs should be tracked and permanent corrective action taken as soon as practicable.
- Discussion:** The maintenance program includes procedures for tracking and performing temporary repairs, which are included in the JCS using Engineering Change Notice (ECN) controls. Reviews for safety, adequacy, and reliability of the repair are performed through the JCS.
- Improvement:** None required.
- References:** WHC-CM-5-34; 2.1, 2.11                      WHC-CM-1-8



#### 4.19 DOE ORDER SECTION 19: ADDITIONAL MAINTENANCE MANAGEMENT REQUIREMENTS

A program should be in place to prevent equipment and building damage due to cold weather at any nuclear facility that may be at risk.

##### Seasonal Facility Preservation Requirements

- Objective:** A cold weather protection program to assure continued safe facility operations is defined and-implemented using approved procedures. The program includes criteria for preparation (and suspension), periodic surveillances, and program effectiveness evaluations. Lessons learned are evaluated and appropriate program changes are made to prevent re-occurrences.
- Discussion:** A cold weather protection program for SWM has been developed, implemented, and audited. SWM used the sitewide weatherization program as a basis to develop a facility-specific program that exceeds the requirements established in the site-wide program.
- Improvement:** None required.
- References:** SW-WP-0036                      Facility-Specific 2X88001

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**5.0 DEVIATIONS REQUESTED WITH SUPPORTING RATIONALE**

No deviations from the policy requirements identified by DOE Order 4330.4B are requested at this time.

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## 6.0 IMPLEMENTATION SCHEDULE

The following schedule (Table 1) reflects when the specific improvements identified in Section 4.0 was addressed. This schedule was developed based on current levels of funding, resource availability, and staffing.

Schedule item numbers reference the appropriate section of this MIP.

Table 1. Maintenance Implementation Plan Schedule.

Activity	FY92 1234	FY93 1234	FY94 1234	FY95 1234	FY96 1234	FY97 1234
4.3 Maintenance training and qualification						
4.3.3.1 Responsibilities Add appendix to SWM Staffing and Training Plan to address maintenance training requirements.	X					
4.3.3.2 Maintenance training programs Add appendix to SWM Staffing and Training Plan to address maintenance training requirements.	X					
4.3.3.8 Management and supervisory training Add appendix to SWM Staffing and Training Plan to address maintenance training requirements.	X					
4.4 Maintenance facilities, equipment, and tools						
4.4.3.1a Shops and satellite work areas Establish permanent shop areas that are safe and efficient.			X			
4.5 Corrective and preventive maintenance						
4.5.3.1 Master equipment list Generate a master equipment list				X		
4.5.3.2c Predictive maintenance Use master equipment list to fully implement predictive maintenance program.				X		

Table 1. Maintenance Implementation Plan Schedule.

Activity	FY92 1234	FY93 1234	FY94 1234	FY95 1234	FY96 1234	FY97 1234
4.5.3.3 Maintenance action and frequency selection Use master equipment list to fully implement periodic evaluations of the maintenance program.				X		
4.12 Quality assurance: control and calibration 4.12.3.3d Issue and recall Implement more stringent controls of M&TE equipment.			X			
4.14 Facility conditions inspection 4.14.3.4 Scope of inspections Further define and document scope of inspections to include ALARA.						

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## 7.0 REFERENCES

DOE, 1994, Maintenance Management Program, DOE Order 4330.4B, U.S. Department of Energy, Washington. D.C.

RCRA, 1976, Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580.90 Stat. 2795, 42 USC 6901 et seq.

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