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Maintenance Implementation Plan for B Plant

S. E. Tritt

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Waste Management

Westinghouse
Hanford Company

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LIST OF TERMS

ALARA	as low as reasonably achievable
AMU	aqueous makeup
CSP	cleanout and stabilization program
DOE	U.S. Department of Energy
ECN	Engineering Change Notice
JCS	Job Control System
M&TE	measuring and test equipment
MEL	master equipment list
MIP	Maintenance Implementation Plan
OSR	Operational Safety Requirements
PUREX	Plutonium/Uranium Extraction (Plant)
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
SAR	safety analysis report
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
TRUEX	transuranic extraction
TSD	treatment, storage, and disposal
WESF	Waste Encapsulation Storage Facility
Westinghouse Hanford	Westinghouse Hanford Company

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MAINTENANCE IMPLEMENTATION PLAN FOR B PLANT

1.0 EXECUTIVE SUMMARY

The objective of the Maintenance Implementation Plan (MIP) is to describe how the B Plant will implement the requirements established by U.S. Department of Energy (DOE) Order 4330.4A, *Maintenance Management Program*, Chapter II, "Nuclear Facilities" (DOE 1990). The plan provides a blueprint for a disciplined approach to implementation and compliance.

Each element of the order is prioritized, categorized, and then placed into one of three phases for implementation.

Limitations have been placed on B Plant because of a decrease of scope in the mission, budget reductions, and staff reductions. These limitations are affecting and will continue to affect the implementation of DOE Order 4330.4A.

B Plant is in a transition from a high-hazard facility to a low-hazard nonnuclear facility.

In this document, the essential equipment list represents a limited master equipment list (MEL).

PHASE I

Phase I contains the elements that must be accomplished first to provide the critical infrastructure on which to build a successful program. These elements include, but are not limited to, administrative and technical policies and procedures; training requirements; and the planning, scheduling and control, and control of calibration of measuring and test equipment (M&TE). These elements and related subelements are described in detail in Section 4 of this MIP with a time-lined schedule for accomplishment in Section 6.

PHASE II

Phase II includes the elements that require the implementation of one or more of the Phase I elements and/or completion of other actions by functions such as Plant Engineering and Quality Assurance (QA). These elements are discussed in general in Section 4 of the MIP and are identified for future action on the schedule in Section 6.

PHASE III

Phase III includes the elements that require completed actions in Phase I and II, and additional actions for implementation criteria by completing actions in Phase I and II. These elements are also generally discussed in Section 4 of the MIP and are identified on the schedule in Section 6.

In addition to the elements described in Chapter II of DOE Order 4330.4A, the MIP addresses how the graded approach to maintenance will be used.

Section 3 of the plan separates facility structures, systems, and components into four separate categories: safety, process, facility systems not related to safety or the process, and other parts of the facility infrastructure. It describes the level of detail that must be applied to each of the categories, the priority that must be assigned to preventive and corrective maintenance related to these categories. It also describes the process used to determine the category assigned to structures, systems, and components.

In conclusion, the MIP provides a formal plan for implementing DOE Order 4330.4A. It is a living document that will be revised as appropriate (every two years or when a significant event drives a revision) to provide a tool for tracking and measuring progress toward implementation and compliance.

2.0 INTRODUCTION

2.1 FACILITY DESCRIPTION

The B Plant facility, shown in Figure 1, is located in the 200 East Area at the Hanford Site in south-central Washington State. It consists of two major operating areas: the B Plant Canyon Building, and the Waste Encapsulation and Storage Facility (WESF).

The B Plant was originally designed to chemically process spent nuclear fuels. Radiological containment and confinement features were incorporated in the various facilities and support systems to prevent exposure of plant personnel and the general public to excessive radiation. After this initial mission was completed, the plant was modified to provide for the separation of strontium and cesium, individually, from the fission product waste stream following plutonium and uranium recovery from irradiated reactor fuels in the Plutonium-Uranium Extraction Plant (PUREX). The recovered, purified, and concentrated strontium and cesium solutions were then transferred to the WESF for conversion to solid compounds, encapsulation, and interim storage. After strontium and cesium removal, the remaining waste was transferred from B Plant to tank farms.

B Plant is an operating facility that is required to ensure safe storage and management of the WESF cesium and strontium capsules, as well as a substantial radiological inventory remaining in the plant from previous campaigns. There are currently no production activities at B Plant, but several operating systems are required to accomplish the current B Plant mission. B Plant receives and stores various chemicals from commercial suppliers for treatment of low-level waste generated at WESF and B Plant, generation of demineralized water, and conditioning of water used in heating, ventilation, and air conditioning units.

B Plant comprises three main buildings - the Process Building (221B in Figure 1), the Service and Office Building (271B in Figure 1), and the WESF Building (225B in Figure 1) - and various support buildings, structures, and components (K-3 Filter, K-1-1 Filter, 212B, 221BB, 221BD, 221BC, 221BG, 291BD, 291B, 292B, the stack, and the railroad tunnel near 221BE in Figure 1). The Processing Building and the attached Service and Office Building, were constructed in 1943. Construction of the WESF was completed in 1974. These buildings are described briefly in the following paragraphs.

The Process Building

The Process Building is a lightly reinforced concrete structure. The processing portion of the Process Building consists of a canyon and craneway, 40 process cells, a hot pipe trench, a ventilation tunnel, and a railroad tunnel. The service and operating portion of the building consists of an operating gallery, a pipe gallery, and an electrical gallery.

The canyon is 810.5 ft long, 77 ft 2 in. high, and has a cross-sectional width of 66 ft 2 in., which is constant to a height of 59.75 ft and then increases to a maximum of 68 ft 2 in. at the rooftop. The roof slab varies in

thickness from 3 ft at midspan to 4 ft at the edges where it is supported by the exterior walls. The building is supported on a 6-ft-thick concrete slab.

The Service and Office Building

The Service and Office Building consists of a basement and three floors. It is a reinforced concrete and cement block structure 160 ft long, 45 ft wide, and 60 ft high. This building is attached to the north and center of the Process Building. All levels are serviced by a freight elevator.

The basement contains the building maintenance pipe and instrument shops, process air compressor room, filters for the building ventilation air supply, and electrical motor control centers for the building. The first floor provides space for offices, a locker room, and restrooms. Also located on the east end of the first floor are the aqueous makeup room (AMU) and loading dock for incoming chemicals and supplies. The second floor contains administrative offices, a lunch room, and the dispatcher's office, which contains a Facility Process Monitoring Control System Operator Interface Unit. The third floor contains an AMU area, including the bulk of the chemical makeup tanks, space for dry chemical storage, and a portable breathing-air compressor. Approximately at the center of the Service and Office Building adjacent to the canyon is a stairway to the roof of the Service and Office Building and the Process Building and access to the canyon.

Three personnel doors and one large equipment door to the outside are located on the ground level. Each of the four upper floors has two doors that open onto the corresponding floor levels of the Process Building. Basement doors include one personnel door at the pipe maintenance shop and one large equipment door to and from the air compressor room.

The WESF Building

The WESF Building is a two-story structure 157 ft long by 97 ft wide by 40 ft high at the outside dimensions. The building has a combined floor area approximately 20,000 ft², which includes 14,000² on the first floor and 6,000 ft² on the second floor.

The floor plan is partitioned into several areas according to the functional requirements of each area. These areas include (1) the process hot cell area, (2) the hot cell service areas, (3) the operating areas, (4) the building service areas, and (5) the storage pool area. The partitioned floor plan regulates the flow of personnel and material traffic throughout the building and limits access in those areas where potential contamination or radiation exposure is high.

Currently, the B Plant facility is used for the following:

- Storing equipment in the canyon
- Storing cesium and strontium capsules at WESF
- Managing the current radiological inventory with the objective of transferring the inventory to alternative locations

- Supporting the tank waste remediation program
- Proceeding with a cleanout and stabilization program, defined by approved plans and funding.

2.2 B PLANT MISSION

In December 1991, the Hanford Site Tank Waste Disposal Strategy recommended that B Plant be excluded from full-scale pretreatment, but continue support of the WESF capsule storage and the Transuranic Extraction (TRUEX) pilot plant mission until these functions can be transferred to a more suitable facility. Although no production activities are currently taking place at B Plant, several operating systems are required to accomplish the three-part mission, which is described below.

1. Manage current B Plant/WESF radiological inventory with the objective of transferring the inventory to alternative locations for storage or disposal. The radiological inventory consists of the following:
 - Liquid waste stored in B Plant process cells
 - Strontium fluoride and cesium chloride capsules stored in WESF pool cells
 - Contaminated high-efficiency particulate air filters
 - Contaminated process equipment within process cells and on the canyon deck
 - Contaminated portions of the facility structure.
2. Proceed with a clean-out and stabilization program, defined by approved plans and funding, with the following objectives:
 - Isolate inventory with the potential to create hazards to offsite personnel, onsite nonoccupational workers, and plant personnel
 - Configure the facilities and organizations at the most cost-effective level required to support the mission
 - Clean out the hot side areas of the Process Building to facilitate future work and to incorporate as low as reasonably achievable (ALARA) principles.
3. Support the Tank Waste Remediation program by providing facilities for process development such as the TRUEX pilot plant and bench-scale melter tests

B Plant currently operates as a treatment, storage, and disposal (TSD) facility for hazardous waste. B Plant also generates hazardous waste. Both of these operations require environmental compliance activities. To function as a TSD facility, B Plant submitted a Part A Interim Status Permit application. Interim status facilities must perform some activities to maintain environmental compliance. These activities include routine inspections, maintenance of waste analysis plan, and maintenance of a contingency (emergency) plan. Interim status must be terminated with either a Part B permit application submittal or closure plan submittal. The scheduled date for submittal of this documentation to the Washington State Department of Ecology is September 1995. Preparation of the necessary documentation is scheduled to begin in October 1993. This date was negotiated in the *Hanford Federal Facility Agreement and Consent Order* (the Tri-Party Agreement)(Ecology et al. 1991).

Because the plant generates hazardous waste, B Plant personnel are required to perform several activities to maintain environmental compliance. These activities include maintenance of the satellite accumulation areas and the less-than-90-day storage pad; completing and maintaining the necessary shipping records and manifests; and preparing environmental reports such as the Annual Dangerous Waste Report. Also associated with generator status is the requirement to characterize the hazardous waste that a facility generates. *Resource Conservation and Recovery Act of 1976* (RCRA) characterizations are becoming increasingly more expensive. Sampling requirements for generator facilities should not be overlooked.

The WESF currently operates as a generator of hazardous waste; however, it is not a TSD facility for hazardous waste. Therefore, no RCRA permitting is required for WESF at this time. If WESF begins storing or treating its low-level liquid waste or storing its mixed solid waste (functions now provide by B Plant), RCRA permitting of WESF may be necessary.

2.3 HISTORY/FUTURE SCHEDULE

- History

The Process Canyon Building was constructed in 1943 and was originally used to recover plutonium (Pu) from nuclear fuels using the bismuth phosphate (BiPO_4) process. This process was replaced by the PUREX process in the 1950's. The Process Building was reconfigured in the 1960's to separate cesium and strontium from PUREX waste byproducts before shipping to tank farms. In 1974 construction of the WESF was completed. The WESF was constructed to provide the capability to encapsulate and store cesium chloride and strontium fluoride. The WESF contains "hot" cells for encapsulation and pool cells for long-term storage of the capsules. The products from the Process Building were transferred to WESF to be encapsulated for long-term isolation and storage. This process was completed in 1985.

- Future schedule

- Reduce to a minimum or shut down the secondary containment system, liquid effluents system, solid waste handling system,

low-level waste system, canyon crane, and canyon ventilation system.

- Shut down neutralized current acid waste and cesium inventory storage system, organic inventory system, vessel ventilation system, air dilution system, and process cells equipment.
- Maintain only essential systems necessary to support WESF and a safe and stable surveillance condition at B Plant.

Because of a decrease of scope in the mission and budget and staff reductions, B Plant is maintaining Operational Safety Requirements (OSR) instruments, critical (essential/Safety Class 1, 2, 3) non-OSR instruments, and essential system equipment.

Corrective maintenance will be performed at B Plant based on the risk associated with the work activity. Safety Class 3 and 4 systems will use the streamlined Job Control System (JCS). The Cleanout and Stabilization Program (CSP) streamlines the JCS to increase productivity by the adapting the Work Authorization form with a trackable database system for Safety Class 3 and 4 systems. The Work Authorization form ensures that adequate instructional detail is provided for the work activity to be performed as desired, with the necessary review and approvals. When required, additional engineering instruction and documentation will be provided to support the work authorization form. A trackable database system will be used to document and status work activities. Work Authorization forms are QA records, which are stored for subsequent retrieval. Safety Class 1 and 2 system will use the present JCS program.

The WESF will continue to perform corrective maintenance and facility modifications. The JCS procedures and forms are used to document the required scope of the work activities. Corrective maintenance includes all work activities associated with the repair or replacement of deficient equipment. Facility modification includes all work activities associated with changing facility equipment or systems to new designs.

3.0 DOE 4330.4A REQUIREMENTS IN ADDITION TO THOSE STATED IN CHAPTER II

3.1 IDENTIFICATION OF STRUCTURES, SYSTEMS, AND COMPONENTS INCLUDED WITHIN THE MAINTENANCE PROGRAM

Structures, systems, and components (in the Process Building, the WESF Building, the Service and Office Building, and various support buildings) are identified in various facility documents (e.g., SARs, essential equipment list, and the CSP plan) and/or subsets of these documents. The level of maintenance and overview required to perform maintenance is identified by the safety designation assigned to the structure, system, or component. When no such documentation exists, Engineering will make determinations based on established parameters. Currently facility documentation of this type is less than adequate. Action is in progress to resolve these issues. The essential equipment list has been developed and will be maintained.

The existing SAR for B Plant does not reflect the current plant configuration, the current minimum process operations, or the CSP. It also contains outdated OSRs. These deficiencies do not, however, imply that the strategy and work plans of the CSP fall outside the safety envelope described by the current SAR. Minor SAR revisions will be made to address either the CSP work or resulting changes to operations, but no impacts to the program are anticipated, and no major efforts are needed to upgrade safety documentation.

Requirements (based on a graded approach) will be identified in a requirements identification document based on the existing facility-specific SAR and current mission. A facility in transition from an operational mission to a low-hazard, long-term surveillance and maintenance mission will have fewer requirements.

The support buildings are not part of this MIP, but will be a part of the Site Maintenance Plan.

3.2 SYSTEMATIC ANALYSIS DESCRIBING SYSTEMS/COMPONENTS INCLUDED WITHIN THE PREVENTIVE MAINTENANCE PROGRAM, AND DETERMINATION OF FREQUENCY OF MAINTENANCE ACTIONS

An effective preventive maintenance program is an essential part of an efficient, cost-effective maintenance program. A systematic analysis of each system and component must be performed to determine the value added by performing or not performing preventive maintenance on specific systems and components. This analysis must consider the consequence of failure, safety and environmental concerns, the cost of performing preventive maintenance rather than letting the system or component run until failure.

The frequency at which preventive maintenance is performed must also be established. Frequencies shall be established using manufacturer's data considering equipment history, engineering judgement, and safety requirements established for the specific system or component. Currently, preventive maintenance is performed on equipment determined to be safety related by Operations and Engineering. Frequencies are determined by engineering judgement. (See Section 4.4, Types of Maintenance.)

A preventive maintenance strategy is being developed that will provide written guidance for determining what equipment will receive preventive maintenance and how the frequency will be determined (see Section 4.4).

3.3 MAINTENANCE SELF ASSESSMENTS

Performance based maintenance self-assessments have been incorporated into the B Plant MIP. These self-assessments will be performed, as a minimum, every two years or as significant events occur. The assessments will measure the effectiveness of the maintenance program based on all the elements listed in Chapter II of DOE Order 4330.4A (DOE 1990). In addition, the assessments will be used to measure progress based on the results of previous assessments. These assessments will consist of a combination of activities ranging from desktop comparisons to field observations. They will be performed by B Plant management and personnel, who are trained to conduct an effective assessment. Results of each assessment will be reviewed by the department heads and division managers. Appropriate Chapter II program-element feedback action will be taken.

3.4 GRADED APPROACH TO MAINTENANCE

3.4.1 The graded approach strategy for the B Plant is focused on the timely and judicious application of maintenance resources in a manner designed to minimize and reduce risk. This strategy is developed along two parallel paths:

- One path is focused on a graded approach application of the significant issues of B Plant in comparison to the program elements of Chapter II. The process used is based on a managerial and operational weighted analysis (graded approach) of the requirements described in Chapter II. Each element of Chapter II will be assessed through the MIP process to ensure that program requirements established for B Plant meet the objectives of DOE Order 4330.4A.
- The other path is an approach directed at equipment categorization. This element of the graded approach catalogs all equipment and systems within the B Plant into four categories, which are described as follows:

Safety Class 1 - Systems, components, and structures, including portions of process systems, whose failure could result in a threat to the environment, health, and safety of the public. Activities will require the highest level of work instruction detail, craft skills, and supervision.

Safety Class 2 - Systems, components, and structures, including portions of process systems not defined as Safety Class 1, which could result in a threat to onsite worker, safety and the environment. Activities will require a moderate level of work instruction detail, craft skills, and supervision.

Safety Class 3 - Systems, components, and structures, including portions of process systems not defined as Safety Class 1 or 2, which could result in a threat to the health and safety of facility workers and radioactive, chemical, or thermal releases to the environment. Activities will require normal level of work instruction detail, craft skills, and supervision commensurate with the complexity of the work activity.

Safety Class 4 - Systems, components, and structures whose failure has no significant importance to safety, health, or environmental protection. Activities will require a minimal level of work instruction detail, craft skills, and supervision.

The B Plant formal basis for the categorization of equipment and systems is a Risk-Based Engineering Analysis for safety classification of systems. The process of equipment and system category assignment is formulated in the following four parts:

PART I:

The Part I task is to physically inventory essential WESF equipment and systems and B Plant equipment required to support WESF and the B Plant safety envelope. This process provides the data base for the equipment population involved in the graded approach analysis. Because of lack of mission, it is cost effective to maintain a B Plant limited MEL based on an essential equipment list.

PART II:

During Part II, B Plant personnel will initiate the Engineering Risk Analysis on equipment contained in the B Plant limited MEL. Currently risk analyses are available as part of the SAR. Additional risk analysis is currently being developed through the ongoing SAR upgrade process.

PART III:

Part III will be performed concurrently with the inventory and risk analysis to provide an interim graded approach to categorization until each formal risk analysis is completed. The importance of this part cannot be underplayed, because it provides the ongoing day-to-day maintenance capability while a parallel path is generating the formal documentation through the SAR upgrading process. The interim analysis is based on sound engineering principles that are overviewed by Safety (Industrial, Nuclear, and

Environmental) and QA. This interim categorization is then used as the graded approach mechanism until each individual risk analysis and assessment is completed in the SAR upgrade program. As each system or piece of equipment is formally assessed, its interim status is updated as indicated by the risk assessment.

PART IV:

Part IV is a program process whereby future B Plant equipment or system additions or modifications are assessed and added to the limited MEL before operational turnover. There are limited design media available which provide the bases for the MEL.

3.4.2 Strategy for Safety Related Items

System and equipment safety classifications and risk categories are assigned in accordance with established Westinghouse Hanford Company (Westinghouse Hanford) procedures and criteria. These classifications support a graded approach to maintenance activities that includes assignment of levels of review and approval, work control, procedural detail, documentation, oversight, and verification. The philosophy for assigning work priorities and allocating resources to plant work is for correction of discrepancies having priority over enhancements.

4.0 U.S. DEPARTMENT OF ENERGY ORDER 4330.4A CHAPTER II REQUIREMENTS

As shown in Section 1, the improvement actions specified in this section of the MIP are not designed to immediately convert the B Plant maintenance program to the level described in DOE Order 4330.4A (DOE 1990), but rather to initiate the step changes required for compliance. Using a weighted analysis (graded approach), the 18 elements of DOE Order 4330.4A, Chapter II, have been put in 1 of 3 phases of implementation. Safety, operational significance, and resource availability were among the determining factors for phase selection. Immediate across-the-board application of all portions of the order would overburden existing resources and commitments, in turn potentially jeopardizing personnel and environmental safety. The MIP provides a method for continued and sustained improvement. The application of self-assessments and corrective action activities referenced in Section 3.0 of the MIP will be used to monitor and update the plan.

4.1 MAINTENANCE ORGANIZATION AND ADMINISTRATION

This section of the MIP describes how B Plant Maintenance ensures that a high level of maintenance performance is achieved through effective implementation and control of maintenance activities.

4.1.1 Maintenance Organization Policies

- Objective:** The objective of maintenance organization policies is to develop and implement a hierarchy of policies and procedures that specifically address maintenance programs. These policies will define the relationship between facility policies and maintenance policies and implementing procedures and the roles and responsibilities of organizations and positions as they relate to the maintenance program.
- Discussion:** Currently, policies affecting B Plant Maintenance are distributed throughout numerous Westinghouse Hanford manuals. They define responsibilities between facility policies and maintenance, as well as the relationship between policies and procedures, and the roles and responsibilities of organizations. Individual positions are well defined. However, this information is not centrally located, making it difficult to retrieve.
- Improvement:** To improve performance and accessibility to these policies, B Plant will develop a cross reference for these policies to be placed in the B Plant manual and should consolidate maintenance policies into a minimum number of manuals where practical. Communicate the location of essential policies to the appropriate maintenance personnel.

4.1.2 Maintenance Strategy

Objective: The objective is to develop a maintenance strategy based on an integrated approach to maintenance, with long-range planning as the cornerstone where work scope should be well defined to develop accurate funding and staffing requirements. Maintain funding and staffing levels consistent with the identified scope of work. The strategy will describe the working relationships of interacting organizations, as well as personnel and procedural interfaces. It will also describe the responsibility, authority, and accountability of the supporting organizations.

Discussion: The overall maintenance strategy is defined in the CSP and the B Plant/WESF Conduct of Maintenance Action Plan. Annual work scope is partially developed using the strategy statements in the CSP, the Conduct of Maintenance Action Plan, and short-term program changes agreed to by the Westinghouse Hanford Program Office and the DOE Richland Field Office Program Office. Funding and staffing requirements are based on identified work scope. Approved funding and staffing are consistent with identified work scope; funding and staffing shortfalls exist. Scope must be negotiated to be consistent with available funding and staffing limits.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.1.3 Staffing Resources

Objective: The objective is to maintain a sufficient staff of qualified maintenance personnel. Maintenance management will establish criteria for selection of, training of, qualification of, and how the personnel will be used.

Discussion: Required staffing levels are determined by approved work scope. Maintenance management is responsible for selecting personnel, establishing training requirements, and establishing the qualification requirements. In addition, they define how personnel will be used. Policies and procedures that describe these processes and responsibilities must be formally documented and easily retrievable.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.1.4 Goals and Objectives

Objective: The objective of this element is to develop and maintain goals and objectives for the maintenance program that are achievable and measurable. Measure performance and effectiveness to these goals and objectives in a manner such that the information

obtained can be used for further improvement. Ensure that goals are flexible, providing for adjustment if conditions change.

Discussion: Goals and objectives have not been established and documented in the maintenance program. These goals should be realistic and achievable. The current system will permit adjustment of the expectations if conditions change in the process of improving the program.

Improvement: Develop and measure goals for the maintenance program.

4.1.5 Accountability

Objective: The accountability objective is to ensure that all maintenance personnel understand and acknowledge their personal level of accountability, and that expectations have been well communicated and are understood by all. Good and substandard performance is recognized with immediate corrective action being taken for substandard performance. Corrective action for substandard performance should be positive to foster improvement.

Discussion: Employee meetings, as well as staff and unit level meetings, are conducted routinely to communicate expectations and foster accountability at all levels. Systems are in place for the recognition of performance. Both good performance and substandard performance are recognized immediately. Personnel performance is documented in annual performance appraisals.

Improvement: Current practices meet the requirements of DOE Order 4330.4A (DOE 1990). However, maintenance must continue to reinforce expectations and level of accountability.

4.2 TRAINING AND QUALIFICATION OF MAINTENANCE PERSONNEL

This section of the MIP describes how B Plant Maintenance will establish a maintenance training and qualification program consistent with DOE Order 5480.5, *Safety of Nuclear Facilities* (DOE 1984); DOE Order 5480.18A, *Accreditation of Performance-Based Training for a Category A Reactor and Nuclear Facilities* (DOE 1991a); and DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities* (DOE 1991b), and how they are implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities. Westinghouse Corporate has communicated its expectations in this area to all Westinghouse Government-Owned-Contractor-Operated locations.

4.2.1 Responsibilities

- Objective:** The maintenance organization is responsible and accountable for determining the training needs of each individual in the maintenance organization. The training organization identifies existing programs, develops new training programs, and presents the training using in-house personnel or vendor-supplied personnel when appropriate.
- Discussion:** The training responsibilities of the maintenance and training organizations are well understood. However, adequate policies and procedures do not currently exist to provide specific guidance for the development and implementation of an effective training and qualification program.
- Improvement:** The B Plant Maintenance organization will develop and implement policies and procedures that clearly define the responsibility of the maintenance and training organizations as they relate to the identification, development, and implementation of essential training and qualification programs.

4.2.2 Maintenance Training Programs

- Objective:** Maintenance Training Programs should be developed and maintained based on systematic job analysis incorporating requirements based on established industrial guidelines.
- Discussion:** The training organization performs job analyses using a standard format. Training programs are developed using best industrial practices. Manufacturers are routinely consulted as part of program development. Currently, there are no job analyses on record for B Plant Maintenance job descriptions. Formal training programs have not been implemented based on job description.
- Improvement:** The B Plant training organization will perform a job analysis for each job description. Using the results of the job analysis, develop baseline training requirements incorporating best industrial practices. Develop and document baseline training programs and requirements based on the results of the job analysis.

4.2.3 Training Schedules and Support

- Objective:** Training shall be coordinated in a manner that permits maximum impact from the training with minimal impact on the facility. Maintenance training requirements shall be documented in formal procedures addressing specific work descriptions. There will be no exemptions from these requirements. Qualified facility instructors will be used to support facility-specific training.

Discussion: Training is scheduled and coordinated through a single facility training coordinator. The training coordinator uses site records and the site recall report to determine retraining requirements. There are no exceptions to the required training. Facility instructors provide facility-specific training, such as the facility-specific emergency plan and the facility-specific lock and tag procedure.

Improvements: The process will be improved by incorporating specific training requirements in the training recall system as identified in Section 4.2.2.

4.2.4 On-The-Job Training

Objective: Maintain an on-the-job training (OJT) program with defined objectives, a formal qualification criteria, and demonstrated competence of the person receiving training. Successful completion of OJT will be documented in the site training record system. All OJT will be provided by qualified OJT instructors, with supervisors being responsible and accountable to ensure that all employees receive required OJT.

Discussion: All formal OJT is currently performed by qualified instructors. Individual programs have defined objectives. Each program has a qualification criterion and the employee must demonstrate competence. Because of the lack of a documented program, supervisory responsibility is not always clear. While a formal process for accomplishing OJT is in place, a facility-specific program is not.

Improvement: The process can be improved by developing a formal OJT program and documenting the requirements in an implementing procedure. The procedure shall cover the following elements: instructor qualification, program objectives, qualifications and competency requirements, documentation of the training, and supervisory responsibility.

4.2.5 Qualification

Objective: The objective is to develop a program that will establish the qualifications for persons working on specific pieces of equipment. These qualifications will also apply to contractor personnel performing maintenance work.

Discussion: Currently, there are no procedures in place that identify qualification requirements for maintenance personnel assigned to perform specific work. Procedures are in place that describe minimum qualifications for individual contractor personnel.

Improvement: Develop and implement procedures that identify qualification requirements for persons assigned specific work.

4.2.6 Training in Root Cause Analysis

- Objective: The Maintenance organization will have a core group of personnel in B Plant Maintenance that will be formally trained in root-cause analysis.
- Discussion: Currently, there are no employees in B Plant Maintenance that have had formal training in root-cause analysis. Management must determine how many and who will receive the training.
- Schedule and train a core group of maintenance engineers in root-cause analysis.
- Improvement: Develop and maintain a list of persons trained in root-cause analysis.

4.2.7 Training Program Approval, Effectiveness, and Feedback

- Objective: Management reviews and approves all training programs. Through classroom and field observation, management measures the effectiveness of training programs. Management also provides feedback to the training organization and maintenance management related to the quality and effectiveness of the training program.
- Discussion: Currently training programs are approved by management. The effectiveness of the programs are measured by observing classroom and on-the-job performance. Feedback related to training is provided by management audits and formal critiques of training sessions. However, management needs to increase its emphasis in this area.
- Improvement: The requirement for management to measure the effectiveness of training programs and to provide feedback to the training organizations will be put into a formal procedure.

4.2.8 Management and Supervisory Training

- Objective: The objective is to provide a training program for management that develops management and leadership skills, as well as technical competence.
- Discussion: All managers and supervisors attend required management training when they begin managing/supervising. All managers and supervisors are scheduled to attend at least one management or leadership class per year. This is documented and tracked as part of the annual performance appraisal process. Managers and supervisors are encouraged to attend technical training classes that pertain to their area of responsibility. Attending management, leadership, or technical classes enhances career progression.

Improvement: Monitor the effectiveness of management training program through observation and through the self-assessment program.

4.3 MAINTENANCE FACILITIES, EQUIPMENT AND TOOLS

This section of the MIP describes how B Plant Maintenance ensures that maintenance facilities, equipment, and tools efficiently support facility maintenance and maintenance training.

4.3.1 Facilities

Objective: The objective of this element is to obtain and maintain adequate facilities to support the maintenance infrastructure. Shop facilities should be designed with high consideration of industrial safety and convenience to the activity they support. Appropriate environmental control systems are provided, adequate support equipment, storage, and lay-down areas are available, and controls are in place for facility use.

Discussion: B Plant has four maintenance facilities. Two of the facilities are located in the basement; two of the facilities are stand-alone buildings. The two shops in the basement were not designed to be maintenance shops. The shops are small (i.e., when craftspeople are working at their work stations, the aisle space in the instrument shop no longer meets the National Fire Protection Association (NFPA) Life Safety Code 101 of 36 in. Access to the shops is inadequate. Large (long) pipe must be hand carried downstairs to the shop area. The two basement shops reach temperatures exceeding 90 degrees in the summer because of inadequate ventilation. Satellite work area spaces are adequate for the two stand-alone shops, although a hallway in the basement of the Office and Service Building is used as a satellite work area for these two shops.

The lay-down and staging area is maintained under lock and key. The storage area consists of a tin shed in a fenced area. There are no environmental controls in the shed. Material that must be stored in environmentally controlled areas is stored at an environmentally controlled facility (about 1 mile away) until needed.

Improvements: Complete design and construction of maintenance facility.

4.3.2 Tools and Equipment Storage

Objective: Storage facilities are in appropriate proximity to shops and work areas to support maintenance efficiency. Appropriate environmental controls are in place for personnel and equipment protection. Facilities should be provided for segregation, calibration, and repair of maintenance and test equipment.

Discussion: Adequate storage (cabinets, shelves, etc.) is available within each shop area for equipment, tools, and materials required to support normal work activities. Spare-materials and hand-tools storage located in the basement is not easily accessible to all craftspeople. Environmental controls are in place where necessary for equipment and materials protection.

Improvement: Consolidate spare-material and hand-tool storage with Operations stock-material storage on the first floor of the Office and Service Building to reduce inventory costs, increase basement shop space, and make material more accessible to more people.

4.3.3 Office Equipment

Objective: Office equipment necessary to support an efficient maintenance program is available (furniture and computers and communication, calculation, reproduction, and other office equipment) and should be maintained in a reliable working condition.

Discussion: Office equipment necessary to support maintenance activities is made available to maintenance personnel to accomplish their assigned responsibilities. Necessary communications equipment is available as needed for personnel to fulfill their assigned responsibilities.

Improvements: The current program meets the requirements of DOE Order 4330.4A.

4.4 TYPES OF MAINTENANCE

This section of the MIP describes how B Plant will employ a proper balance of corrective and preventive maintenance 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.

4.4.1 A Master Equipment List

Objective: The objective of this element is to maintain a MEL that meets the needs of the operating portion of the facility as described in Section 2.0, Chapter 2.3 of the MIP.

Discussion: The facility is currently developing a limited MEL based on an existing essential equipment list. The current list is system based and addresses only those systems essential for safe operation of the facility.

Improvement: An MEL that supports current and future operational requirements will be developed and implemented. The MEL will address structures, systems, and components required to support safety and environmental needs as well as limited operation of WESF.

4.4.2 Types of Maintenance

Objective: The objective of this element is to develop and implement a maintenance program that includes corrective, preventive, and predictive maintenance, with preventive maintenance driving the corrective maintenance actions. Preventive maintenance will be routinely scheduled as part of the monthly, weekly, daily planning/scheduling process. Failures identified in the preventive maintenance program will be trended and analyzed to initiate action to prevent recurrence.

Discussion: Currently corrective maintenance activities drive maintenance actions. Preventive maintenance is only performed on OSR or safety-related equipment. Predictive maintenance is used on occasion to support preventive maintenance actions. Preventive maintenance procedures are scheduled in the plan of the month and tracked as individual work packages. Preventive maintenance procedures are tracked on the schedule through completion. Currently only recurring failures identified by the preventive maintenance system are analyzed for failure cause. Corrective maintenance is prioritized based on its relation to the facility safety envelope.

Improvement: Developing and implementing a plan that provides step changes in converting from a corrective-maintenance-driven program to a preventive maintenance program will improve the process. Incorporate predictive maintenance as a critical part of the preventive maintenance program and provide a system that analyzes problems identified in preventive maintenance procedures and causes the appropriate modifications and upgrades to the program.

4.4.3 Maintenance Action and Frequency Selection

Objective: The objective of this element is to establish a balance between preventive and corrective maintenance where preventive maintenance drives and identifies most of the corrective actions.

Other objectives include the following:

- Having a technical basis that supports the established balance
- Having a documented basis for determining what structures, systems, and components in the MEL receive preventive maintenance

- Ensuring that there is value added when selecting/determining frequency requirements for preventive maintenance.

Discussion: Currently the balance between preventive maintenance and corrective maintenance has not been considered at B Plant. Policies do not exist that provide guidance for determining what structures, systems, and components should be included in the program or the technical basis for making the determination on such factors as safety, process requirements, or high replacement cost. Preventive maintenance frequency is determined by engineering based on manufacturers recommendation, past performance, and engineering judgement.

Improvement: Revise the current preventive maintenance program in such a manner that critical structures, systems and components listed in the MEL are evaluated based on the consequence of failure. Revise existing preventive maintenance procedures such that they will reduce the amount of corrective maintenance required for specific pieces of equipment. Provide documentation that supports preventive maintenance frequencies that are different from the manufacturer's recommendations.

4.4.4 Scheduling

Objective: The objective of this element is to effectively schedule preventive maintenance in such a manner that the maximum value can be obtained from its performance. Activities shall be formally scheduled in such a manner that the frequency is maintained within acceptable tolerances. Utilize outage scheduling for corrective and preventive maintenance should the facility mission change in such a way that resources could be used to the maximum potential.

Discussion: Preventive maintenance procedures are currently put in work packages and scheduled by the plan of the month. They are tracked to completion as part of the daily schedule feedback process. Preventive maintenance scheduling lacks the focus and rigor required for an effective program. Outage scheduling is not utilized at this plant because the operational mode of the plant is not such that there would be any negligible benefit at this time.

Improvement: The process will be improved by developing and implementing a preventive maintenance scheduling program that ensures preventive maintenance procedures are individually scheduled so established frequencies are maintained.

Other improvements include developing and implementing procedures that support outage planning and using these procedures to support process schedule outages if and when they occur.

4.5 MAINTENANCE PROCEDURES

This section describes how B Plant Maintenance prepares and uses maintenance procedures and other work-related documents (e.g., drawings and instructions) to provide appropriate work direction and ensures that maintenance is done safely and efficiently.

4.5.1 Procedure Development and Writing

Objective: Procedures will be written for any component or system that has safety significance, degrades facility reliability, or is associated with personnel or equipment hazards. These procedures will be written in a standard format with the level of detail ranging from specific step-by-step instructions to general work instructions. In some instances, special formats such as checklists and flow diagrams may be used in place of standard procedures. The level of detail will be consistent with the degree of difficulty.

Discussion: Currently, there are procedures in place for work that is complex in nature or requires specific technical activities to be performed (e.g., instrument calibrations, pressure tests). Procedures are not always written for equipment that has safety significance, degrades facility reliability, or affects personnel or equipment hazards. Procedures have not been written for work that is considered repetitive. A standard format is used for writing procedures and checklists; diagrams and flow charts are included when appropriate. Detailed work instructions are included in work packages when specific procedures are not in place. Corrective maintenance is performed with selected sections from plant-specific procedures and resolution/retest documents.

Improvement: A formal program that ensures procedures are in place to provide instruction for the development and writing of maintenance procedures will be developed. Ensure that format and level of detail required are also to be included in these procedures.

4.5.2 Procedure Verification

Objective: Maintenance procedures will be reviewed to ensure proper format and technical accuracy. These reviews will be performed after the procedure has been written. Verification will be performed by persons other than the author.

Discussion: All procedures are reviewed for technical content. Verification is performed by an independent reviewer after the procedure is written. The format is not currently reviewed as part of this process.

Improvement: This procedure will be improved by developing and implementing a formal process for procedure review.

4.5.3 Procedure Validation

Objective: A validation process will be developed and implemented that ensures all procedures are validated prior to use, utilizing tabletop exercises and/or field walkdowns to support the validation process.

Discussion: Procedures are validated using tabletop exercises, walkthroughs, and or by actually performing the procedure using an approved work package to document the validation process.

Improvement: No further actions are required at this time. The current process meets the requirements identified in DOE Order 4330.4A (DOE 1990).

4.5.4 Procedure Approval

Objective: The procedure approval process shall be such that an adequate overview is performed by technical and management personnel.

Discussion: The highest degree of overview is given to safety-related procedures while lesser degrees of overview are given to non-safety related procedures according to Westinghouse Hanford procedures and desk instructions.

Improvement: The current procedure approval process meets the requirements identified in DOE Order 4330.4A.

4.5.5 Procedure Use

Objective: Maintenance procedures are available for tasks with safety significance, that affect facility reliability, or involve personnel hazards or equipment hazards. These procedures are available in a computerized filing system that provides the current version of the procedure. Procedure use is documented in work package resolution. Work package resolutions determine if the procedure is to be used as a step-by-step instruction or as general guidance. Instructions are built into the procedure describing actions required if the procedure cannot be performed as written or if an unexpected event occurs.

Discussion: The most recent revisions of procedures are available through the site computer network. Procedure use is required and documented as part of the work package resolution. Depending on the complexity of the work and or the safety considerations associated with the work, procedures may vary from step-by-step instruction to general guidance. Instructions are provided as part of the procedures that identify action required if a

procedure cannot be performed as written or if an unexpected event occurs. The current work authorization procedure needs clarification related to procedure use.

Improvement: The work authorization procedure will be reviewed to clarify when procedure use is required and whether the procedure is to be used as step-by-step instruction or general guidance.

4.5.6 Procedure Control, Periodic Review and Revision

Objective: Maintenance procedures are controlled in the master computer file to ensure that only the most recent revision of procedures are used. Periodic reviews are required to ensure that the procedures contain the most current requirements and technical data. Procedures are revised through a formal process to ensure that changes are incorporated in a timely manner.

Discussion: Procedures are issued from a controlled database. Currently procedures are only reviewed and revised if conditions change and the procedure cannot be performed as written. There are systems in place that permit temporary procedure changes.

Improvement: A process will be developed that requires the formal periodic review of procedures. This requirement will be documented as part of the procedure control process. This process will be documented in the new administrative procedures (see 4.5.1).

4.6 PLANNING, SCHEDULING AND COORDINATION OF MAINTENANCE

This section describes how B Plant will develop an effective system for planning, scheduling, and coordinating maintenance activities to ensure that maintenance is accomplished in a timely manner; improve maintenance efficiency; reduce exposure to hazardous situations (ALARA); and increase equipment availability.

4.6.1 Planning for Maintenance Activities

Objective: This element maintains a dedicated planning staff to support maintenance activities. These planners will be trained in their responsibilities associated with work package preparation and postmaintenance review.

Discussion: Dedicated planners have been assigned to B Plant. These planners have been trained in their responsibilities related to work package preparation and postwork reviews.

Improvement: The detailed planner training program meets the requirements identified in DOE Order 4330.4A.

4.6.2 Scheduling Maintenance Activities

Objective: Based on accurate planning consistent with plant priorities and the effective control of the work backlog, work is scheduled so resources are effectively used and employee exposure to hazardous situations is minimized (ALARA). Work scheduled during facility outages should be in such a manner that the maximum effort is performed within the identified time constraints.

Discussion: Procedurally, the elements required for effective scheduling and effective control of the work backlog are in place. However, implementation of these elements is inconsistent. Time limits are adhered to where detailed schedules are provided. Scheduling based on time limits for day-to-day work is less than effective. Work scheduling does address radiological exposure and exposure to other hazardous materials and conditions. The use of outage scheduling between campaigns is not used; however, if the mission were to change and outage scheduling were to be a consideration, maintenance would implement it.

Improvement: Revise the scheduling process to more effectively address plant priorities, including effective control of the work backlog.

Develop, formalize, and train schedulers in the outage scheduling process.

4.6.3 Coordination of Maintenance Activities

Objective: Maintenance activities are planned and scheduled so resources and time constraints are maximized. Ensure that support organizations are fully aware of their part/responsibilities so they are fully prepared and committed to meet work schedules.

Discussion: Plan-of-the-day/week meetings are held to identify current and future needs for resources and to establish time frames when the work is to be performed. Resources are identified on the work packages. While the required elements for effective work coordination are included in the current system, implementation has been difficult. It is fully understood by all that the schedule drives the work within the facility and that when resources are committed they must be provided. Unplanned, unscheduled absences due to training, vacation, illness, etc., continuously impact work schedules.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.6.4 Outage Planning, Scheduling and Coordination

- Objective:** Outage planning, scheduling, and coordination fall into two categories: planned outages and forced outages. Successful outage planning has two common elements: defined responsibilities for planning, scheduling, and coordination and a standard method of identifying non-outage work that will be performed during the outage.
- Discussion:** Currently, a formal outage program for maintenance work does not exist at B Plant. Outage-type planning is utilized prior to restarting selected processes. To support this process, designated planners and schedulers are assigned. All work required for startup is identified, including work identified in the backlog. This work is tracked on a separate work schedule.
- Improvement:** Develop and implement a formal process defining planned and forced outages. The process must identify planning, scheduling, and coordination responsibilities. The process must also describe the method used to determine which non-outage work will be performed during the outage.

4.7 CONTROL OF MAINTENANCE ACTIVITIES

This section of the MIP describes how B Plant will display management-directed and -delegated involvement in control of maintenance activities to ensure that maintenance practices are effective in maintaining safe and reliable facility operation.

4.7.1 Work Control Procedure

- Objective:** The objective of this element is to develop and maintain a work control process that includes corrective maintenance, modifications, in-service tests, surveillance, and preventive maintenance actions. The procedure addresses a description of the work request form, who can initiate and approve the work request, a description of the work control process, supervisory responsibility for controlling maintenance, the priority system, and special conditions that may be encountered (e.g., confined space entry, excavation).
- Description:** The current system is a combined manual and computerized process with a built-in interface (e.g., calibration recall cards and preventive recall cards). It contains all of the elements described in the objective.
- Improvement:** Current procedures meet the requirements established in DOE Order 4330.4A.

4.7.2 Work Request

- Objective: The objective of this element is to develop and maintain a work request system that identifies the work required, establishes plant acceptance, identifies priority, provides work instructions, provides instructions for retest, and documents plant approval of the work.
- Discussion: The work request system addresses pertinent elements such as equipment identification, problem identification, permits required, work resolution, retest requirements, safety, and work authorizations. Upon completion of work items such as retest and acceptance criteria, signoff approvals are addressed. However, documentation of as-found conditions and corrective actions taken are not well documented.
- Improvement: Requirements to document as-found condition and actions taken to correct the item will be implemented. Management will give more attention to this item.

4.7.3 Supervisor of Maintenance Activities

- Objective: Maintenance supervisors will ensure that maintenance is being conducted in accordance with DOE and facility policies and procedures. In addition, they will recognize good work practices as well as poor work practices. They will identify the causes of poor work practices and take immediate corrective action as required.
- Discussion: Current procedures require the assignment of a person with supervisory responsibility to each job to ensure that procedures and policies are followed. In addition, he/she is responsible to initiate corrective action when required, and to recognize good performance.
- Improvement: Current practices meet the requirements established in DOE Order 4330.4A.

4.7.4 Review of Completed Work Requests

- Objective: Supervisors will review work requests to ensure that the work has been completed as described and that all required documentation has been completed. Supervisors shall also review the as-found and as-left conditions with the craftsperson to ensure that the equipment will operate as designed and that no rework is required. If rework is required, they are responsible to take the necessary action to correct the deficiency. The Shift Operations Manager or a delegate shall review the work request to ensure that the work has been completed and the equipment can be returned to service.

when needed. Others, such as Engineering, Quality, and Safety, will perform reviews as required to analyze data collected or to ensure that all requirements have been met.

Discussion: Currently, Maintenance supervisors review completed packages for completeness and, with craft involvement, identify rework required, if any. Operations management performs postwork reviews to ensure that work was completed and that retest requirements were met. Retest requirements are addressed or verified. Organizations such as Engineering, Safety, and Quality do perform postjob work reviews and initiate action when required.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.7.5 Control of Nonnuclear Facility Contractor and Subcontractor

Personnel

Objective: Contractor and subcontractor personnel work under the same controls and standards as facility personnel. Contractor managers are held accountable for the work performed by their personnel. Facility management reviews the work of contractor and subcontractor personnel while preparing to do work at the work site, and during postmaintenance testing and acceptance.

Discussion: All contractor and subcontractor work is performed and tracked using the facility JCS. Contractor management is held responsible and accountable for work performed by their personnel. Facility management, through a liaison organization, is involved with work preparation and field work performed by subcontractor personnel. Facility management overviews postmaintenance testing and acceptance through acceptance testing and operational performance testing.

Improvement: Current practices meet the requirements identified in DOE Order 4330.4A.

4.8 POSTMAINTENANCE TESTING

This section describes how B Plant incorporates postmaintenance testing to verify that components will fulfill their design function when returned to service after maintenance.

4.8.1 Postmaintenance Test Requirements

Objective: The objective of this element is to develop and implement a program to control and document postmaintenance testing. This program is part of the facility work control system. The work

request specifies requirements, responsibility, and acceptance. In addition, it provides specific instructions, test procedures, etc. Reviews are conducted to determine test requirements, applicability to technical standards, and specifications. Tests of equipment covered by codes, specifications, and standards will be reviewed by cognizant personnel. Technical standards, codes, and specifications will be incorporated into test instructions. Technical support organizations will assist with complex tests, even if codes and standards do not apply. Operations will verify that equipment operates as designed for its specific application.

Discussion: Currently, postmaintenance test requirements are not defined by procedure. The JCS requires postmaintenance testing, but does not provide detailed instruction on how it is to be performed or provide guidance on what type test is to be performed.

Improvement: Postmaintenance test requirements will be incorporated in a procedure. The procedure must address the elements identified in DOE Order 4330.4A, Chapter II. Postmaintenance test requirements will be included in an administrative procedure.

4.8.2 Postmaintenance Test Scope

Objective: The postmaintenance testing program will require a review of all corrective maintenance to determine if retest is required and the type of retest. Retest will be developed to ensure equipment operates as designed. Postmaintenance testing is based on the type of maintenance performed and how it effects the system. The level of testing will depend on the equipment and type of maintenance performed.

Discussion: No procedures currently exist to ensure that postmaintenance testing is performed. There is no established criterion to determine test requirements or the level of testing required.

Improvement: Procedures that identify postmaintenance test requirements and the level of test required based on the type of maintenance performed and the type of equipment will be developed and implemented.

Postmaintenance test requirements will be included in administrative procedure (see Section 4.8.1).

4.8.3 Postmaintenance Control

Objective: A procedure will be developed and implemented that establishes who is responsible for coordinating, documenting, and reviewing data accumulated during the testing process.

Discussion: Currently no procedures are in place that establish responsibility for the coordination, documentation, and review of test data/results.

Improvement: Develop and implement a procedure for the control of postmaintenance testing.

Postmaintenance test requirements will be included in administrative procedure (see Section 4.8.1).

4.8.4 Postmaintenance Test Performance, Documentation, and Acceptance

Objective: The objective of this element is to develop and implement procedures that establish Operations' responsibility for accepting equipment after postmaintenance testing then documenting and signing off on that acceptance. Operations is also responsible to verify testing and ensure objective evidence of that verification is in place. Documentation of postmaintenance test data and its acceptance is retained as part of the equipment history.

Discussion: Currently, there is no formal postmaintenance test program. However, as part of the current work request close out process, Operations accepts serviceability of equipment and signs off on the work request. Operations verifies that equipment is operational. However, that verification is not performed to any specific criteria.

Improvement: Maintenance Management should ensure that the criteria for performance, documentation, and acceptance are incorporated into the postmaintenance test program. (See Section 4.8.2.)

4.9 PROCUREMENT OF PARTS, MATERIAL, AND SERVICES

Describes how B Plant will ensure that parts, material, and services required for maintenance activities will be available when needed.

4.9.1 Procurement Policy and Procedures

Objective: Procedures and policies are understood by stores and purchasing personnel and those who interface with stores and purchasing. Procurement responsibilities and specific procurement actions are included. A design change process is used to meet spare parts needs and remove outdated/obsolete materials from the stock system.

Discussion: Procedures are in place covering the procurement cycle. Personnel involved are knowledgeable of their areas of responsibility and comply with all legal and quality-control requirements.

Improvement: Consolidate existing sitewide procedures or reference them in a single document.

4.9.2 Procurement Initiation

Objective: Ensure that timely procurement of parts, materials, and services for activities is enhanced by considering effective procurement practices.

Discussion: Procurement of parts, materials, and services sometimes prevents identified maintenance repairs from being performed in a timely manner. Cross utilization of inventories is being used, though not to the extent possible.

Improvement: Review and track outstanding priority work authorizations and correct actions causing ineffective procurement. Recommend that B Plant perform an assessment to this element of DOE Order 4330.4A. Initiate action to place B Plant on the Remote Ordering System.

4.9.3 Procurement Control

Objective: Develop and maintain controls throughout the procurement process to help obtain parts, materials, and services in a timely manner.

Discussion: A lack of funding has not allowed all spares to be procured. Required spare parts are often unavailable in spare parts or the tool crib. The QA function verifies applicable material and equipment receipts to ensure material meets the procurement document requirements. Vendor surveillances are performed as necessary to ensure vendors comply to industry standards and good management practices. Procurement records are controlled to ensure that information is available on all activities associated with the procurement and receipt of material and equipment.

Improvement: Upgrade limited spare parts program so spares are available.

4.9.4 Services

Objective: Ensure that the need for specialized services from vendors is identified in time to provide for solicitation of bidders, bidding on, and awarding contracts. When possible, provisions are made for general service agreements so services can be supplied at short notice.

Discussion: Service contracts are used when possible. Individual service agreements are issued for specific needs. Service delivery depends on the complexity of the task to be performed and vendor resource availability.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.10 MATERIAL RECEIPT, INSPECTION, HANDLING, STORAGE RETRIEVAL AND ISSUANCE

This section describes how B Plant implements policies and procedures consistent with DOE Order 5700.6C, *Quality Assurance* (DOE 1991), for all phases of receiving, inspecting, handling, storing, retrieving, and issuing equipment, parts, and materials from the time an item is received until it is installed in the facility.

4.10.1 Receipt and Inspection

Objective: The receipt and inspection practices include technical and quality-control staff oversight (acceptance, nonconformance, deviation approval, safety upgrade). A method exists for accepting material that has been repaired or reworked by maintenance.

Discussion: Current procedures support all aspects of receipt inspections. Deviations are approved and documented by the appropriate organizations. Material segregation is accomplished by tagging and/or physical separation, which designates the material's status. The material or equipment is inspected based on a graded approach (that is, the assigned safety classification).

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.10.2 Handling

Objective: Procedures are prepared for items requiring special handling instructions. Hoisting equipment is certified by the manufacturer, indicating maximum loads to be handled. The facility inspection program for hoisting equipment and rigging is applied to items used in the stores operation. Only trained and qualified personnel operate cranes, forklifts, and other lifting equipment.

Discussion: Procurement documents contain special handling requirements recommended by the vendor. Engineering also may apply special handling requirements. Procedures are in place to apply administrative controls applicable to the safe handling of material or equipment, including special lifting instructions. Cranes, forklifts, and other lifting equipment are operated only by trained and qualified personnel.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.10.3 Storage Material and Equipment Objective

- Objective: Materials and equipment are stored to provide maximum protection and are available for issue. Safety-related equipment is segregated from non-safety items to prevent improper use.
- Discussion: Material and equipment are stored according to good management practices and industry standards, which ensures protection of material and equipment from adverse elements and ease of access. Material with controlled shelf life is monitored and reordered as necessary and outdated material is removed from stock and disposed of. A procedure does not exist for stored materials and equipment.
- Improvement: Develop and implement a preventive maintenance program for stored materials and equipment.

4.10.4 Retrieval and Issuance

- Objective: Receipt documents and inspections are completed satisfactorily before an item is issued. Proper documentation is maintained for traceability. Parts, materials, and equipment removed from storage are handled according to the same requirements applied at time of receipt. A stores inventory system is in place to identify available materials and equipment. The system is available to using organizations such as Planning and Engineering.
- Discussion: Procedures are in place to ensure the correct applications of material and equipment to the task. Material traceability is ensured through material marking and tagging, as appropriate, to documents available on file. Quality control is involved in the issuance process as is appropriate to the safety classification of material involved. A spare parts catalog has been developed and implemented, though it needs to be updated.
- Improvement: Update spare parts catalog.

4.11 CONTROL AND CALIBRATION OF MEASURING AND TEST EQUIPMENT

This section of the MIP describes how B Plant will implement a program for control and calibration of measuring and test equipment (M&TE) that is consistent with DOE Order 5700.6C, *Quality Assurance*, and ensure the accurate performance of facility instrumentation and equipment for testing, calibration, and repairs.

4.11.1 IDENTIFICATION

- Objective:** Ensure that all test equipment that will be used as a standard for calibration and field checking equipment (where a high degree of accuracy is required) is properly identified. This includes the use of a unique identifier for each piece of equipment. Backup records, in the form of a master list shall contain the following: a generic description of the M&TE, including the unique identifier; the accuracy range; the calibration procedure number; the calibration frequency; and the organization responsible for the M&TE.
- Discussion:** All M&TE is marked with a unique identifier. A master list of all M&TE has been developed and is maintained by the Westinghouse Hanford Standards Laboratory. The master list includes the following information: a generic description, the unique identifier, range and accuracy, calibration procedure and frequency, and the organization responsible for the M&TE.
- Improvement:** The current program meets the requirements identified in DOE Order 4330.4A.

4.11.2 Calibration

- Objective:** Ensure that the existing calibration program is consistent with the requirements of the DOE Order 4330.4A. The program consists of four basic elements. Standards used to calibrate and adjust M&TE are traceable to nationally recognized standards. Only trained and qualified persons perform calibrations to approved procedures. The frequency of calibration is based on manufacturer's recommendations, M&TE use, and M&TE historical reliability. Functional checks are performed on M&TE before and during use to ensure that basic acceptance criteria for M&TE operation are met.
- Discussion:** Calibration standards used to calibrate and adjust M&TE are traceable to nationally recognized standards. Only trained and qualified technicians perform calibrations to approved procedures. Calibration frequencies are based on manufacturer's recommendations and historical performance. Functional checks of M&TE are not performed before use.
- Improvement:** Current program meets the requirements of DOE Order 4330.4A.

4.11.3 Control

- Objective:** Reevaluate and upgrade existing procedures to ensure that adequate control of M&TE is maintained at all times. The program for controlling M&TE must provide the following elements: controlled storage, proper calibration before use, identification of restrictions and limitations, recall of M&TE from service before calibration is due. A log system that

ensures that M&TE is traceable to the discreet pieces of equipment it was used to check or calibrate, and that special protective measures are taken to ensure that M&TE does not become contaminated when used in a radioactive environment.

Discussion: All M&TE is stored in a manner that protects it from damage. All new M&TE is calibrated before use. A system to recall M&TE for calibration is in place and removes it from service before the calibration is due. The M&TE is protected from radioactive and chemical contamination. An automated calibration recall system provides reverse traceability.

Improvement: Develop and implement a bar coding system for M&TE that enhances reverse traceability. This system must be simple to use and implement.

4.11.4 Evaluation

Objective: Develop and implement a system that ensures that when a piece of M&TE is out of calibration, defective, or otherwise unreliable, it can be easily traced to the equipment it was used to check or calibrate. Procedures must be implemented that describe the action to be taken to ensure that the equipment is operating in prescribed ranges and operational parameters. Calibration records for M&TE are trended to determine if there are any reliability problems.

Discussion: The ability to trace damaged or out-of-calibration M&TE back to the equipment calibrated needs to be improved. Checks are made to determine if the M&TE was operating properly on post-calibration checks through the Standards Laboratory. The M&TE calibrations are trended to determine equipment reliability. If M&TE is unreliable, it is removed from service. Reliable instruments are then recommended to the user as a replacement unit.

Improvement: The current system meets the requirements of DOE Order 4330.4A.

4.12 MAINTENANCE TOOLS AND EQUIPMENT

This section describes how B Plant will establish methods 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.

4.12.1 Storage and Issuance

Objective: The objective of this element is to ensure that an adequate supply of hand tools, common power tools, and equipment is readily available, properly stored, and controlled.

Discussion: Common hand tools are maintained in tool boxes, storage cabinets, and on work-area tool boards. Supplemental inventories of items are maintained at the tool crib; use rate, and minimum quantity levels are monitored to ensure adequacy. Hand tools are marked with isotopic paint to prevent misappropriation. Sensitive property (power tools and equipment, etc.) is controlled by property inventory programs and issuance is controlled by recorded checkout means. The tool crib is not used to maintain the whole tool inventory.

Improvement: Obtain a large enough tool crib to maintain the tool inventory.

4.12.2 Tool and Equipment Maintenance

Objective: Tools and equipment included in the preventive maintenance program are maintained in a safe-use condition. The necessary care is provided to maintain service life.

Discussion: The condition of the tools is monitored by the user. Tools are repaired or replaced as deemed necessary. Preventive maintenance procedures for inspecting specific tools are provided and scheduled.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.12.3 Use of Special Tools and Equipment

Objective: Special tools and equipment are available and are clearly marked for their intended use. Work packages include necessary instructions for the proper use of special tools and equipment.

Discussion: Special tools are maintained at satellite shops and at the tool crib. Property management reports and tool crib inventory/control measures provide control features. Critical rigging is tagged with control numbers and test data.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.13 FACILITY CONDITION INSPECTION

This section of the MIP describes how B Plant management conducts periodic inspections of equipment and the facility to ensure excellent facility condition and housekeeping.

4.13.1 Standards

Objective: Standards are defined and communicated to the personnel responsible for the inspection and maintenance of facilities.

Discussion: Regularly scheduled tours and inspections are conducted as part of General Area, Housekeeping, Occupational Safety and Health Administration, and Operations surveillances. Senior management actively participates in tours on a regular basis through the Senior Management Overview Program.

Improvements: Facility condition standards will be communicated to all personnel and reinforced periodically via letters, meetings, and training.

4.13.2 Training

Objective: Personnel involved in facility inspections receive instructions to learn established standards and related facility policies. Methods for determining condition status are provided for consistency of inspections and condition reporting.

Discussion: Personnel involved in inspections know the plant manager's expectations. Specialists (personnel from outside the facility) are requested to assist in the tours when the inspection is focused on specific items.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.13.3 Procedures

Objective: Procedures are provided defining the facility inspection program, methods of implementation, standards of condition, and means of correcting deficiencies. Deficiencies are evaluated for changes to the facility maintenance program.

Discussion: Procedures and specific guidance for the conduct of facility inspections and correction of deficiencies are provided. Deficiencies are documented, but a work request is not initiated. Deficiencies are not always corrected in a timely manner.

Improvement: Develop and implement a requirement for initiating a work request for correcting deficiencies.

4.13.4 Scope of Inspections

Objective: Inspections include detailed walkdowns of assigned areas including remote and limited-access areas and the more obvious and available areas. Key individuals are included in the inspection teams. Discussion of techniques and concerns is encouraged. Sufficient time is allowed to search for deficiencies rather than performing a quick walkthrough. Obvious deficiencies are more closely investigated to positively identify the source or cause.

Discussion: Facility condition inspections are currently conducted as part of Safety Council inspections, manager surveillances, and routine supervisor work-site housekeeping control. In all cases inspections are probing in nature with specific intent of looking beyond the obvious.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.13.5 Inspection Program Elements

Objective: Inspection assignments are scoped to ensure adequate time for thorough inspection. Inspections are scheduled to minimize impact to ongoing facility operations.

Discussion: Current inspection schedules are established with sensitivity to inspection team availability and facility schedules. Adequate time is allocated to perform thorough inspections and to initiate reports.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.13.6 Reporting Deficiencies

Objective: Deficiencies noted during inspection are entered into the work control program for corrective action. Significant and/or safety-related deficiencies are assigned the appropriate priority and are reported to the responsible facility manager. Housekeeping deficiencies are reported to the custodial or occupying organization for attention.

Discussion: Deficiencies are documented but are not entered into the existing work control system. Severity and priority of deficiency are not assigned, based on existing administrative procedures and work is not scheduled.

Improvement: Develop and implement a requirement for initiating a work request for correcting deficiencies. Implement existing requirement for a severity/priority system.

4.13.7 Deficiency Followup

Objective: Reported deficiencies are monitored for timely completion of corrective actions. The root cause of recurring generic or long-term problems are identified. Recommendations are provided for changes to the preventive maintenance program. Inspection reports and facility conditions are periodically evaluated to determine program effectiveness.

Discussion: Tracking of reported deficiencies is sometimes accomplished by the QUEST system. Priority assignment is monitored in relation to other outstanding work requests to ensure that attention is given to the appropriate work.

Improvement: Implement the deficiency tracking requirement.

4.14 MANAGEMENT INVOLVEMENT

This section of the MIP describes how management gets involved with facility operations, develops and monitors performance indicators, maintains open lines of communication horizontally and vertically, and reviews the maintenance program's effectiveness.

4.14.1 Manager Involvement

This element describes how B Plant managers become sufficiently involved with facility operations to be technically informed and personally familiar with conditions at B Plant.

Objective: Upper level managers will tour the facility on a routine but unscheduled basis. First line supervisors are expected to spend enough time in the field to monitor work in progress.

Discussion: First-line supervisors are expected to spend a percentage of their time monitoring field work. However, time has been limited by the number of administrative duties a supervisor is expected to perform. Upper-level managers spend adequate time monitoring field work in progress. Expectations for supervisory and management involvement in field work must be communicated and tracked.

Improvement: Current program meets requirements of DOE Order 4330.4A.

4.14.2 Performance Indicators, Goals, and Objectives

Objective: Develop and maintain performance indicators that monitor trends and provide feedback on performance and progress toward stated goals and objectives. Implement a formal reporting system to disseminate information related to performance, goals, and objectives.

Discussion: Performance indicators that monitor trends and provide feedback on performance and progress toward stated goals and objectives have been developed and are reviewed for applicability. The results of performance indicators are posted where all employees can review and evaluate the results and corrective measures. Maintenance does have a formal reporting system for performance measures.

Improvement: Current program meets requirements of DOE Order 4330.4A.

4.14.3 Feedback

Objective: Maintain open lines of communication and feedback to provide information related to facility activities. Craftspeople have the opportunity to communicate their concerns, ideas, and observations to management through formal and informal means. Management communicates their interest, concerns, and observations to facility personnel.

Discussion: Communication and feedback systems currently provide information related to facility maintenance activities. Existing formal and informal communication channels provide opportunities for craftspeople and others to communicate their ideas, concerns, and observations to management. Management communicates their interest, concerns, and expectations to facility personnel. Routinely, management conducts all-employee meetings and roundtable sessions. The open door policy for management encourages parallel and upward communication.

Improvement: The current program meets the requirements established in DOE Order 4330.4A.

4.14.4 Program Reviews

Objective: Develop an effective program to review the current status/condition of the maintenance program. Tools such as inspections, audits, and self-assessments should be used for this purpose. An assessment for compliance with DOE Order 4330.4A, Chapter II, will be performed at least bi-annually. This assessment should include input from Maintenance, Operations, and other organizations that support maintenance. The program review should include, but is not limited to, facility condition and maintenance practices, maintenance training, procurement activities and practices, and M&TE calibration and control.

Discussion: Internal and external inspections, audits, reviews, and self-assessments are used to measure progress and the effectiveness of the maintenance program. Self-assessments of the maintenance program are planned at least every 2 years. Input for these assessments will be provided by organizations other than Maintenance, such as Operations. Program reviews will include all elements in DOE Order 4330.4A, Chapter II. Implemented at time of the reviews.

Improvement: Develop and implement procedures that describe the maintenance program review process.

4.15 MAINTENANCE HISTORY

This section describes how B Plant will maintain a maintenance history and trending program to document data, provide historical information for maintenance planning, and support maintenance and performance trending of facility systems and components.

4.15.1 Program Development

- Objective: A program is in place to identify systems and equipment requiring documentation and retention of historical data.
- Discussion: A Maintenance History program has been developed and is currently in the testing phase. Data specifics and equipment identification for inclusion in the program have not been developed by Level II directive. The limited MEL will be revised.
- Improvement: Implement the maintenance history module of the Job Control System (JCS). Revise limited MEL.

4.15.2 Data Collection

- Objective: Information for systems and equipment identified for maintenance history retention if forwarded to a specified organization for control. The organization reviews the data for completeness and correctness, and enters it into the equipment history program.
- Discussion: Currently, procedure data sheets and calibration job cards are the means of collecting data. On implementation of the maintenance history module, which is currently being tested, this data will be collected via the work control process.
- Improvement: Implement maintenance history module.

4.15.3 Program Use

- Objective: Maintenance history data are readily available to all organizations and are used to develop work packages and schedules. History data are periodically reviewed for developing trends.
- Discussion: Maintenance history is fragmented among JCS work packages, calibration job cards, and procedure data sheets. The new maintenance history module will be used for the program. Trending is done on a limited basis because finding equipment history is extremely tedious.
- Improvement: Implement the maintenance history module of the JCS.

4.16 ANALYSIS OF MAINTENANCE PROBLEMS

This section describes how B Plant will use systematic analysis to determine and correct root causes of unplanned occurrences related to maintenance.

4.16.1 Information Collection

Objective: All applicable logs, records, recordings, and personnel interview statements are gathered to prepare event analyses.

Discussion: When a significant equipment failure, an off-normal operating event, or a personnel accident occurs, every effort is made to preserve physical conditions, obtain first-hand observations and interviews, and obtain all associated documentation relating to the event. Event report requirements and responsibilities are well defined.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.16.2 Event Analysis

Objective: In performing an event analysis a detailed sequence of facts and activities is developed and apparent causal factors are identified and categorized.

Discussion: Event reporting is a formalized system requiring collection of all relevant data, performing root-cause analysis, tracking deficiencies, and correcting all deficiencies. Root-cause analysis is required and performed only for emergencies, unusual occurrences, and off-normal events; not for recurring maintenance problems that are leading to an event or occurrence (for example, Safety Class 1 equipment).

Improvement: Change requirements so facilities can perform root-cause analysis for documented, recurring maintenance problems on a case-by-case basis (based on the safety class of the equipment).

4.16.3 Cause Determination

Objective: Actual or probable causes of a problem are evaluated by one or more techniques to establish a final root-cause. Appropriate documentation is developed to aid in the analysis, to record analysis performed, and to document corrective-action recommendations.

Discussion: Event reporting is a formalized system requiring collection of all relevant data, performing root-cause analysis, tracking deficiencies, and correction of all deficiencies.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.16.4 Corrective Action

Objective: Corrective action plans are developed, initiated, executed, and tracked to completion. Plans address all applicable activities such as repairs, preventive maintenance procedures, personnel training, etc.

Discussion: Corrective action plans are a requirement of the event reporting process and all actions are tracked to completion through the QUEST database.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.16.5 Corrective Action Followup

Objective: Corrective action followup activities include specific post-repair testing and continued monitoring of equipment. The continued monitoring is performed as to ensure that corrective actions taken do resolve the problem.

Discussion: Postmaintenance testing requirements are defined and included in corrective-action work packages. Monitoring of equipment continues at the previous level unless specific associated changes are directed.

Improvement: The current program meets the requirements of DOE Order 4330.4A.

4.16.6 Generic Followup

Objective: After problems with one piece of equipment are determined and corrected, generic corrective actions are taken to incorporate this knowledge into the maintenance program.

Discussion: No formal program exists, but actions are taken based on lessons learned and formal event report reviews. Problem areas are categorized and action plans are developed to prevent recurrence.

Improvement: Implement the maintenance history module of the JCS. Implement a requirement to analyze generic-corrective-action followup after maintenance history module development.

4.17 MODIFICATION WORK

This section describes how B Plant will account for modification work. This should be accomplished under the same basic administrative controls as those applied to facility maintenance activities so that risk to facility equipment, environment, or personnel is not increased because of modification work.

4.17.1 Maintenance Program Interface with Modifications

- Objective: Modifications are performed in accordance with requirements and limitations of applicable procedures, codes, standards, specifications, etc. Facility maintenance personnel are cognizant of reviews and modifications.
- Discussion: Strict control for work-package content and processing is maintained. All modifications (permanent and temporary) are documented and processed in accordance with Engineering Document/Design Control Procedures. Facility maintenance personnel are only aware of the modifications that plant maintenance makes.
- Improvement: Include plant maintenance in all Engineering Change Notice (ECN) reviews, all project reviews, and all JCS document reviews for modifications.

4.17.2 Temporary Repairs or Temporary Modifications

- Objective: Temporary repairs or modifications are reviewed in accordance with the facility temporary modification program before implementation. Temporary repairs or modifications are tracked after completion for consideration of permanent repairs.
- Discussion: Temporary repairs or modifications are performed under the work control system using the ECN controls. There is not tracking log.
- Improvement: Include plant maintenance in the temporary repair/modification process. Develop and implement a temporary repair/modification log.

4.18 SEASONAL FACILITY PRESERVATION REQUIREMENTS

This section describes the actions taken by B Plant to ensure that structures, systems, and components are adequately protected from the effects of freezing conditions.

4.18.1 Cold Weather/Freeze Protection Plan

- Objective:** Develop a plan of action that will adequately protect facility structures, systems, and components from the detrimental effects that result from freeze ups.
- Discussion:** Site-wide policies and procedures are in place that describe the responsibility of the facility operator to identify structures, systems, and components that have the potential of being damaged as the result of freezing. They also describe Maintenance's responsibility to prevent freeze ups. Equipment identification and acceptance criteria are not specific enough in the procedure and checklist.
- Improvement:** Revise the plant procedure and checklist to be more specific, including equipment identification and acceptance criteria.

4.18.2 Actions Required

- Objective:** Adequately address the actions required by Operations and Maintenance to prevent damage from freeze ups.
- Discussion:** The existing site-wide procedure describes the actions that must be taken by Operations and Maintenance to prevent freeze ups. These procedures address when the plan must be implemented to prevent premature freeze ups and the additional requirements that need to be put in place when weather gets colder than normal for this geographic location. The plant-specific procedure and checklist needs detailed information.
- Improvement:** Revise the plant procedure and checklist to be more specific, including equipment identification and acceptance criteria.

4.18.3 Surveillance

- Objective:** The operations surveillance and the preventive maintenance program will ensure that systems protected from freeze up are routinely checked to see that protective systems are operating properly and to identify areas that may require additional protection.
- Discussion:** Current procedures require routine surveillance of areas that could be affected by freezing weather. When cold weather occurs, surveillance requirements include additional freeze protection and increased surveillance. Operations and Maintenance surveillance activities ensure compliance and measure the effectiveness of actions taken to prevent facility freeze up.
- Improvement:** Current procedures meet the requirements identified in DOE Order 4330.4A.

5.0 DEVIATIONS

There are no deviations requested.

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6.0 IMPLEMENTATION SCHEDULE

The following implementation schedule (Table 1) addresses actions related to 18 elements identified in Chapter II of DOE Order 4330.4A. The elements have been prioritized and categorized using an implementation phase designation.

Phase I elements and subelements are critical to the infrastructure of the program, will be addressed as indicated on the schedule, and is consistent with the CSP.

Phase II and III elements are long-term issues that require the completion of one or more of the Phase I elements. These elements are identified on this schedule for information and tracking purposes. Estimated completion dates have not been assigned at this time.

Table 1. U.S. Department of Energy Order 4330.4A Implementation Schedule.

Element Subelement	Title	Phase number	FY93				FY94			
			1 Qtr	2 Qtr	3 Qtr	4 Qtr	1 Qtr	2 Qtr	3 Qtr	4 Qtr
4.1	Maintenance organization and Administration	1								
4.1.1	Maintenance organization policies					9-30-93				
4.1.2	Maintenance strategy									
4.1.3	Staffing resources									
4.1.4	Goals and objectives					9-30-93				
4.2	Training and qualification of maintenance personnel	1								
4.2.1	Responsibilities					9-30-93				
4.2.2	Maintenance training programs									
4.2.3	Training schedules and support									
4.2.4	On-the-job training									
4.2.5	Qualifications									
4.2.6	Training in root-cause analysis									
4.2.7	Training program approval, effectiveness, and feedback									
4.2.8	Management and supervisory training									
4.3	Maintenance facilities, equipment, and tools	2								
4.3.1	Facilities									
4.3.2	Tool and equipment storage									
4.4	Types of maintenance	2								
4.4.1	master equipment list									
4.4.2	Types of maintenance									
4.4.3	Maintenance action and frequency selection									
4.4.4	Scheduling									
4.5	Maintenance programs	1								
4.5.1	Procedure development and writing									
4.5.2	Procedure verification									
4.5.5	Procedure use									

Table 1. U.S. Department of Energy Order 4330.4A Implementation Schedule.

Element Subelement	Title	Phase number	FY93				FY94			
			1 Qtr	2 Qtr	3 Qtr	4 Qtr	1 Qtr	2 Qtr	3 Qtr	4 Qtr
4.5.6	Procedure control, periodic review, and revision									
4.6	Planning scheduling and coordination of maintenance	1								
4.6.2	Scheduling maintenance activities								6-30-94	
4.6.3	Coordination of maintenance activities									
4.6.4	Outage planning, scheduling, and coordination									12-31-94
4.7	Control of maintenance activities	1								
4.7.2	Work request				9-30-93					
4.7.4	Review of completed work request									
4.8	Postmaintenance testing	1								
4.8.1	Postmaintenance test requirements									
4.8.2	Postmaintenance test scope									
4.8.3	Postmaintenance test control									
4.8.4	Postmaintenance test performance, documentation, and acceptance									
4.9	Procurement of parts, materials, and services	3								
4.9.1	Procurement policy and procedure									
4.9.2	Procurement initiation									
4.10	Material receipt, inspection, handling, storage, retrieval, and issuance	2								
4.10.3	Storage of material and equipment									
4.10.4	Retrieval and issuance									
4.11	Control and calibration of M&TE	1								
4.11.2	Calibration									
4.11.3	Control						12-31-93			

Table 1. U.S. Department of Energy Order 4330.4A Implementation Schedule.

Element Subelement	Title	Phase number	FY93				FY94			
			1 Qtr	2 Qtr	3 Qtr	4 Qtr	1 Qtr	2 Qtr	3 Qtr	4 Qtr
4.11.4	Evaluation									
4.12	Maintenance tools and equipment	2								
4.12.1	Storage and issuance									
4.13	Facility condition inspection	2								
4.13.2	Training									
4.13.3	Procedures									
4.13.6	Reporting deficiencies									
4.13.7	Deficiency followup									
4.14	Management involvement	1								
4.14.1	Manager involvement									
4.14.2	Performance indicators, goals, and objectives									
4.14.4	Program reviews							3-31-94		
4.15	Maintenance history	3								
4.15.1	Program development									
4.15.2	Data collection									
4.15.3	Program use									
4.16	Analysis of maintenance problems	3								
4.16.2	Event analysis									
4.16.6	Generic followup									
4.17	Modification work	2								
4.17.1	Maintenance program interface with modifications									
4.17.2	Temporary repairs or temporary modifications									
4.18	Seasonal facility preservation requirements (evaluate effectiveness of programs)	1								
4.18.1	Cold weather/freeze protection plan					8-31-93				
4.18.2	Actions required					8-31-93				

FY = fiscal year

7.0 REFERENCES

- DOE, 1984, *Safety of Nuclear Facilities*, DOE Order 5480.5, U.S. Department of Energy, Washington, D.C.
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