U.S. Department of Energy

Washington, D.C.

ORDER

DOE 5480.19

7-9-90

Change 1: 5-18-92

SUBJECT: CONDUCT OF OPERATIONS REQUIREMENTS FOR DOE FACILITIES

1. PURPOSE. To provide requirements and guidelines for Departmental Elements to use in developing directives, plans, and/or procedures relating to the conduct of operations at DOE facilities. The implementation of these requirements and guidelines should result in improved quality and uniformity of operations.

2. SCOPE. The provisions of this Order apply to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

3. DEFINITIONS.

   a. DOE Facility Representative. For each major facility or group of lesser facilities, an individual assigned responsibility by the Head of the Field Element for monitoring the performance of the facility and its operations. This individual shall be the primary point of contact with the contractor and will be responsible to the appropriate DOE Program Office and field elements for implementing the requirements of this Order.

   b. Program Manager. The DOE Headquarters (HQ) individual, designated by and under the direction of a Program Secretarial Officer, who is directly involved in the operation of facilities under his or her cognizance and with signature authority to provide technical direction through DOE field elements to contractors for these facilities.

4. POLICY. It is the policy of the Department that the conduct of operations at DOE facilities be managed with a consistent and auditable set of requirements, standards, and responsibilities and that, consistent with the requirements of this Order:

   a. Operations at DOE facilities be managed, organized, and conducted in a manner to assure an acceptable level of safety;

   b. Operators at at facilities have procedures in place to control the conduct of their operations;

   c. Line organizations review existing and planned programs important to safe and reliable facility operations; and

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Office of Nuclear Energy

d. Line organizations assess the effectiveness of corporate directives, plans, or procedures at facilities under their cognizance.

5. REQUIREMENTS.

a. Each DOE contractor shall use this Order and Attachment 1 in the review and development of existing and proposed directives, plans, or procedures relating to the conduct of operations at D0E facilities.

b. A graded approach shall be used in the application of the guidelines provided in Attachment 1 to assure that the depth of detail required and the magnitude of resources expended for operations are commensurate with each facility's programmatic importance and potential environmental, safety, and/or health impact.

c. Conformance with the requirements of this Order shall be documented. However, it is not necessary to develop a separate manua1 or plan. As a minimum, a document (e.g., a matrix) shall be prepared in coordination with the Head of the Field Element and the cognizant Program Secretarial Officer(s) that:

(1) Indicates whether a specific guideline applies to a facility;

(2) Indicates where and how each of the guidelines (Attachment 1) of this Order are applied within the contractor's existing policies and procedures; and

(3) Identifies any deviations or exemptions from the guidelines.

This document shall, as a minimum, be approved by the Head of the Field Element.

6. RESPONSIBILITIES AND AUTHORITIES.

a. Program Secretarial Officers (PSOs) shall:

(1) Provide direct ion to field elements for the conduct of operations for facilities under their cognizance.

(2) Ensure the preparation, review, and approval of contractor documentation implementing the requirements of this Order for programs under their cognizance; and

(3) Ensure that Program Managers oversee the conduct of operations at those facilities under their cognizance, in accordance with the requirements of this Order.

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b. Assistant Secretary for Nuclear Energy (NE-1) shall:

(1) Develop, promulgate, and maintain policies necessary to implement and sustain effective DOE-wide conduct of operations of facilities and associated equipment/systems;

(2) Develop, promulgate, and maintain guidance materials and conduct training and workshops, as necessary, for line management to implement the above policies and procedures; and

(3) Monitor appraisal reports relative to conduct of operations at DOE facilities to assess implementation of this Order to identify needed requirements,

(4) Provide interpretation to the requirements of this Order upon request.

c. Assistant Secretary for Environment, Safety and Health (EH -1). acting as the independent element responsible for environment: occupational safety, and health oversight of line management for the Department, shall monitor and audit all aspects of the implementation of this Order related to the EH functional areas of responsibility.

d. Director of Nuclear Safety (NS-1), acting as the independent element responsible for nuclear safety oversight of line management for the Department, shall monitor and audit all aspects of the implementation of this Order related to nuclear safety.

e. Heads of Field Elements shall:

(1) Ensure that adequate contractor plans, procedures, and programs are in place and assess the effectiveness of their implementation at sites under their jurisdiction, consistent with the provisions of this Order;

(2) Ensure that DOE Facility Representatives are assigned responsibility for a major facility or group of lesser facilities, and oversee the day-to-day conduct of operations at these facilities in accordance with the requirements of this Order and the direction received from the Program Manager; and

(3) Approve documental ion prepared by the contractor to demonstrate conformance to the guidelines in Attachment 1.

f. Director, Naval Nuclear Prorulsion Program. Executive Order 12344, statutorily prescribed by Public Law (P.L.) 98-525 (42 United States Code 7158, Note) establishes the responsibilities and authority of the Director, Naval Nuclear Propulsion Program (who is also the Deputy Assistant Secretary for Naval Reactors within the

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Department) for all facilities and activities which comprise the Program, a joint Navy-DOE organization. These executive and legislative actions establish the responsibilities of the Director as including the safety of reactors and associated naval nuclear propulsion plants, the control of radiation and radioactivity associated with naval nuclear propulsion plants, and the o crating practices and procedures applicable to naval nuclear propulsion plants. Accordingly, the provisions of this Order do not apply to the Naval Nuclear Propulsion Program. The Director shall establish the conduct of operations requirements implemented within the program.

g. Heads of Power Administration. In accordance with Section 302 of the Department of Energyorganization Act (Public Law 95-91), the Secretary operates and maintains the Power Marketing Administration (PMA) electric power transmission systems by and through the PMA Administrators. The PMAs have in place operations management programs, which are geared to the special needs of utillty operations, are responsive to coordinated multiutility system requirements, and are in conformance with prudent utility practice. In view of the unique nature of the Administrators' obligations to meet their statutory and public utility responsibilities for the safety, security, and reliability of electric power transmission and of their legal and contractual obligation, the Administrators shall determine the appropriate operations management program for their facilities, which will include consideration of appropriate parts of the criteria set forth by this Order.

BY ORDER OF THE SECRETARY OF ENERGY:

DONALD W. PEARMAN, JR.
Acting Director
Administration and Human
Resource Management

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GUIDELINES FOR THE CONDUCT OF OPERATIONS AT DOE FACILITIES

TABLE OF CONTENTS

GENERAL INTRODUCTION

The guidance contained in this attachment for the Conduct of Operations at DOE facilities is based on well-developed industrial operations practices. The guidelines are written to be flexible, so that they encompass the range from large, permanent DOE test or production facilities to small research or testing facilities. These guidelines form a compendium of good practices and describe key elements of programs that support operations at DOE facilities. Their implementation should result in a high level of performance and therefore contribute to safe and reliable operation.

Experience has shown that the better operating facilities have well-defined, effectively administered policies and programs to govern the activities of the operating organization, including the areas described by these guidelines. These guidelines have, therefore, been prepared to assist facilities in the review and development of programs important to operations. Not all activities in the operations area are addressed. Some areas, such as the technical aspects of specific equipment operation, are not included because they involve facility-specific situations requiring unique direction. However, use of these guidelines should support or complement performance in the areas not addressed.

These guidelines have been written to assist facilities in meeting operations performance and safety objectives. It is intended that they be used to review existing or planned programs or facilities and in developing programs where none presently exist. It is expected that facilities may use different approaches or methods than those defined in the guidelines, but facilities are expected to meet the intent of these guidelines. Some explanation of the intent of the guidelines is provided in the introduction and discussions section for each chapter, and the specific guidelines that follow reflect generally accepted methods for conducting operational activities. Deviation from any particular guideline would not in itself indicate a problem in operation. However, differences between the guidelines and actual practices should be reviewed to determine if a facility practice should be changed. A change in facility practice would be appropriate if a performance weakness is determined to exist. It is recognized that these guidelines cross into areas covered by multiple DOE Orders (e.g., DOE 5480.4 or DOE 5500), which need to be used on an equal basis. During the development of this guideline, no specific guidance was found which conflicts with other DOE Orders. If a user finds any conflicts, the matter should be resolved by the Program Manager, or field office and identified to NE-73.

These guidelines are also intended to be useful to Program Managers and field offices responsible for oversight of facility operations. In particular, these guidelines could be used to assess the effectiveness and adequacy of policies and actions in the areas addressed. Groups reviewing facility performance could use this document as a reference to support some aspects of their activities. It is therefore incumbent upon Program Managers, field offices, and facility management to review their operations, and determine and document specific facility conformance with the guidelines.

Each chapter of these guidelines is organized into three sections. The Introduction briefly describes the objective to be achieved and describes, where needed, the relationship of the chapter to other chapters. This is followed by a Discussion section that concisely describes the actions needed to accomplish the objectives and includes a brief explanation of why these actions are necessary or important. The final section, the guidelines themselves, provides specific guidance for meeting the chapter objectives. In some cases, example situations accompany the guidelines. Such examples should not be construed as the only method for meeting the intent of the guidelines.

CHAPTER I

OPERATIONS ORGANIZATION ADMINISTRATION

A. INTRODUCTION

The organization and administration of operations should ensure that a high level of performance in DOE facility operations is achieved through effective implementation and control of operations activities. Operations activities should recognize that environment, safety, and productivity are compatible goals. DOE facility policies should describe the philosophy of standards of excellence under which the facility is operated and clear lines of responsibility for normal and emergency conditions are established. Effective implementation and control of operating activities are primarily achieved by establishing written standards in operations, periodically monitoring and assessing performance, and holding personnel accountable for their performance. This chapter discusses the policies, resources, monitoring, and accountability needed in operations.

B. DISCUSSION

A high level of performance in DOE operations is accomplished by establishment of high operating standards by management, by communicating operating standards to the working level, by providing sufficient resources to the operations department, by ensuring personnel are well trained, by closely monitoring performance in operations, and by holding workers and their supervisors accountable for their performance in conducting activities.

Senior management establishes operating standards, considering input from the working level when appropriate. The working level will more eagerly support the standards when they have had input into the development of those standards. The standards should define operating objectives, establish expected performance levels, and clearly define responsibility in plant operations. Standards for operating activities should also be integrated into operations department procedures and programs. Operating standards should also be communicated to the working level by training workers in operating practices and by supervisory monitoring and guidance of work involving plant operations. Sufficient staff, equipment, and funding should be allocated to permit the operations department can effectively perform its functions. Performance in operations should be

closely monitored by facility management, and operating reports and goals should be used so that the performance of the operations department can be effectively measured. Operations personnel should be held accountable for their performance through supervisory counseling, performance appraisals and, when necessary, disciplinary measures. Remedial training should be provided when appropriate.

C. GUIDELINES

I. Operations Policies

Procedures or other definitive documentation should specify policies that are to be applied for operations. These policies should specify goals and the means to achieve those goals. These documents should also provide for the types of controls necessary to implement policies as discussed in this and other chapters of the guidelines. Operations procedures should support facility and DOE guidance for operations. Responsibilities for implementing these policies, including the responsibility of shift personnel, if applicable, should be clearly defined. Operations personnel should clearly understand their authority, responsibility, accountability, and interfaces with other groups. Physical security should be in accordance with DOE 5630.11.

2. Resources

The operations supervisor for DOE facilities should be provided with sufficient resources in materials and personnel to accomplish assigned tasks without requiring excessive overtime by the operations staff. These resources should include technical personnel needed to support the operations. A long-range staffing plan that anticipates personnel losses should be developed and implemented.

3. Monitoring of Operating Perfomance

As described in Chapter VI, operating problems should be documented and evaluated. Based on assessments of these problems, corrective actions should be taken to improve the performance of the operations department performance. Additionally, frequent direct observation of operations activities by supervisors and managers is essential to performance of monitoring operations.

Safety, Environment, and Operating goals should be used as a management tool for involving cognizant groups or individuals in improving operating performance and for measuring operating effectiveness. Operations goals in areas such-as the following should be established:

- minimizing the unavailability of safety systems;
- minimizing personnel errors;
- As-Low-As Reasonably-Achievable (ALARA);
- minimizing lost facility capability;
- minimizing the number of unscheduled facility shutdowns per year;
- timely completion of scheduled surveillance;
- minimizing the amount of overtime;
- achieving and maintaining complete staffing and training of shift positions;
- minimizing waste; and
- minimizing the number of lighted annunciators.

Goals should be auditable, measurable, realistic, and challenging. Meeting goals should require a definite set of actions or an action plan. The action plan should be developed with input from personnel involved in conducting operations, reviewed by the operations supervisor at DOE facilities, and approved by management. The progress toward completing the action plan and achieving goals should be monitored periodically. If results show a significant variance from the desired progress in achieving goals, management should review the action plan to ensure that it is adequate and is being executed. An audit of performance relative to operating goals should be provided to facility management and DOE. This summary should include an explanation of performance and actions planned to improve future performance.

Operating and safety goals should be set and used as motivators for improvement, not as ends in themselves. The purpose is not simply to meet a numerical goal; rather, the purpose is to improve and monitor operating performance. Meaningless goals (i.e., goals that are easy to meet with little action) should not be used.

Inspections, audits, reviews, investigations, and self-assessments are a part of the checks. and balances needed in an operating program. Line managers and supervisors should perform routine observations of personnel performing operating activities. Deficiencies identified should be documented, trended, and corrected. Also, other groups, such as quality assurance personnel, should periodically review and assess operation performance. These reviews can assist line managers and supervisors in identifying and correcting problems.

4. Accountability

Workers and their supervisors should be held accountable for operating performance. Personnel involved in significant or frequent violations of operating practices should be counseled, retrained, and disciplined, as appropriate. Supervisor performance appraisals and promotions should include an assessment of operating performance.

5. Management Training

Formalized supervisory and management training should be incorporated into training programs. This is especially important to the first-line supervisors on shift and should aid them in managing shift activities.

6. Planning for Safety

Facility guidance should exist which describes safety preplanning requirements for all operational activities. The guidance should explain the role of safety analysis reviews, job safety analyses, and the handling of safety matters. All operations personnel should understand the safety planning requirements.

CHAPTER II

SHIFT ROUTINES AND OPERATING PRACTICES

A. INTRODUCTION

Standards for the professional conduct of operations personnel should be established and followed so that operator performance meets the expectations of DOE and facility management. The guidelines of this chapter describe watchstanding practices that apply to all operating personnel. Additional guidelines are delineated in Chapter III, Control Area Activities. Chapter IV, Communications, describes some communication practices applicable to all operations personnel. This chapter describes some important aspects of routine shift activities and watchstanding practices.

B. DISCUSSION

Professional conduct and good watchstanding practices result in appropriate attention to facility conditions.

Effective equipment monitoring is necessary to detect abnormal conditions or adverse trends so that appropriate action can be taken before equipment malfunction occurs. Notifying supervisors promptly of unusual or unexpected situations helps to ensure that proper attention is given to changing and/or off-normal conditions. Equipment status and the authority to operate equipment should be understood by all operations personnel so that activities can be controlled and coordinated. Operations personnel should follow proper industrial safety, radiological protection (inapplicable) and quality assurance practices. These items are key elements that should be included in an effective operator watchstanding program. A desire to conduct assigned tasks expeditiously should not interfere with good watchstanding practices.

It is the responsibility of the on-shift operating crew to safely operate the DOE facility through adherence to operating procedures and technical specification or operational safety requirements and sound operating practices. The authority for operations should be vested in the on-duty shift supervisor and transferred only through formal turnover to a qualified relief.

The on-duty shift supervisor should maintain authority and responsibility for all facility operations. If a special test, evolution, or abnormal condition arises, facility personnel should be aware that the responsibility and authority to determine corresponding operating conditions, system alignments, or equipment manipulations rests fully with- the on-duty shift supervisor (or cognizant manager). The shift supervisor (or cognizant manager) should not permit any individual to bypass or overrule his/her operational judgment without bringing the matter to the attention of higher line operational authority.

c. GUIDELINES

1. Status Practices

The operator responsible for the facility should be promptly notified of all changes in facility status, abnormalities, or difficulties encountered in performing assigned tasks. Similarly, the operator should notify the shift supervisor (or cognizant manager for research and test facilities) of any unexpected situations.

2. Safety Practices

Operations personnel should adhere to the requirements of the facility industrial safety program. Proper hearing, eye, head, foot, and respiratory protection should be worn in designated areas to reduce the potential for injury. Similarly, ladders or other approved means should be used to access equipment located in the overhead when permanent steps or catwalks are not available, thus minimizing the potential for accidents. Operators should not routinely climb or walk on facility components and insulation, because this could result in personnel injury or damage to equipment. Operators should exercise appropriate precautions when entering or working in or around energized panels or equipment. For example, operators should ensure that electrical panel closures are securely fastened prior to making the breakers operable to energize equipment. This reduces the potential for personnel injury if a fault causes breaker arcing during operation.

3. Operator Inspection Tours

Operator tours should be of sufficient detail to ensure that the status of equipment is known. Each operator should conduct a thorough tour of all areas within his/her responsibility, making appropriate equipment inspections at designated times at least once per shift. However, the operations supervisor may designate specific rooms to be inspected less frequently because of adverse radiological or equivalent personnel safety conditions, or more frequently if problems have been encountered. In these cases, the operations supervisor (or cognizant manager for research test facilities) should specify an alternate inspection schedule. Plant security concerns should not override operator safety assessment duties. A tour normally should be made early in the shift, before the operator attends to other duties, so that he/she can become familiar with the condition and status of equipment for which he/she is responsible. During the tour, equipment should be inspected to ensure that it is operating properly or, in the case of standby equipment, that it is fully operable. In addition, the following-activities should be conducted in conjunction with the tour:

a. The status of equipment (i.e., operating, standby, work in progress, or out-of-service) should be determined so that the operator will be best able to respond to problems he/she may face during his/her shift.

b. Components, such as electrical panels, alarm panels, auto-start standby equipment, and breakers should be inspected for abnormal or unusual conditions. Unexpected conditions such as equipment vibrations, unusual noises or smells, or excessive temperatures should be reported to the control room so that supervisors will be aware of the conditions and be able to direct repairs, troubleshooting, or additional operator action, as necessary.

c. Equipment panel alarm light bulbs and annunciators should be periodically checked to ensure satisfactory operation of visual and audible abnormal condition indicators.

d. Each operator should inspect all areas for which he/she is responsible and note any deficiencies that may be present. These deficiencies may include steam, oil, or water leaks; fire and safety hazards or radiological problems; seismic concerns such as open electrical panels and mobile objects; clogged floor drains; housekeeping or cleanliness problems; and building deficiencies such as inoperative lighting, roof leaks, or doors that do not close properly.

Operators should take appropriate action to correct or report deficiencies noted during tours. Equipment deficiencies should also be documented in accordance with the facility maintenance work request system.

4. Round/Tour Inspection Sheets

Round inspection sheets are an effective method for providing operators with guidance on the extent to which equipment and areas should be inspected during routine tours. The recording of key equipment parameters during tours provides a record of equipment performance and can be used to reconstruct events leading up to unusual occurrences or system malfunctions. This record permits short-term trending by operators so that undesirable trends and equipment problems can be identified and corrected. Round inspection sheets also facilitate operator turnover of equipment status and are an effective aid in the training and qualification of new operators.

Round inspection sheets should be developed and approved by the operations supervisor (or cognizant managers for test and research facilities). They should include areas located within the particular shift position and important parameters for equipment. Where appropriate, equipment parameters should

include maximum/minimum values or expected operating ranges to enable operators to recognize abnormal readings quickly. Safety limits derived from Technical Specifications or Operational Safety Requirements should be highlighted. Equipment should be listed on round sheets in the same order that it would be encountered during a normal tour of the operating station, and the round sheets should include a narrative section.

Operators should use the narrative section to document major evolutions, causes of abnormal conditions, and actions taken to correct abnormal conditions. A narrative log book may be substituted for the narrative section on the-round sheet. Data should be recorded on round sheets at the times specified by the operations supervisor. When round sheet data is not obtained within one hour of the specified time, the actual time the data was obtained should be noted on the round sheet.

Parameters exceeding the specified maximum/minimum values should be circled or otherwise highlighted on the round sheet and promptly reported to the control room and/or the cognizant operations manager. The causes of abnormal indications should be promptly investigated with supervisors becoming involved as appropriate. The round sheet data should be reviewed by a supervisor each shift to identify trends or abnormal readings and to verify that data has been properly recorded.

Operator rounds should be periodically monitored by supervisory personnel to ensure that comprehensive tours continue to be conducted, including, as necessary, periodic inspections of equipment and areas not listed on the round sheets.

5. Personnel Protection

Operations personnel should be appropriately qualified to follow good personnel protection practices to maintain personnel exposure as low as reasonably achievable (ALARA) to radiation (DOE 5480.11), chemicals, electromagnetic fields, toxic materials, or other personnel hazards. In particular, operations personnel should observe the following requirements:

a. Operators should adhere to all posted personnel protection requirements and observe proper practices and precautions while in controlled areas.

b. Operators should correctly utilize appropriate monitoring instruments when required.

c. Operators should be cognizant of their own exposure levels and take appropriate action to minimize exposures.

d. Operators should be knowledgeable of the proper use of radiation work permits, safe work permits, or inhalation limits, where applicable.

e. Operators should promptly report protection deficiencies and hazards to the control personnel and/or appropriate protection personnel. In addition, operators should take appropriate immediate actions to reduce or correct the hazards.

f. Appropriate protection personnel should be informed prior to evolutions or activities that have a potential to significantly change conditions in the facility.

Operations supervisory personnel should periodically review exposure trends of operating personnel under their supervision. Emphasis should be placed on determining the adverse factors that contribute to personnel exposures and minimizing those factors to keep exposures as low as reasonably achievable.

6. Response to Indications

Operators should believe instrument readings and treat them as accurate unless proven otherwise. Ignoring an unusual reading because the operator believes an instrument is faulty can cause abnormal conditions to be undetected. In general, operators should check other indications, if possible, when unexpected readings are observed. Prompt action should be taken to investigate the cause of abnormal or unexpected indications so that prompt corrective action can occur. When malfunctioning or inaccurate instruments are discovered, they should be appropriately identified to prevent subsequent confusion and instrument and control personnel should be notified to effect repairs. In situations of operator doubt, operators should be instructed to achieve facility, personnel, and environmental safety above facility production.

7. Resetting Protective Devices

When protective devices trip (e.g., circuit breakers, fuses, reactor protection channels where multichannel logic exists), an attempt should be made to understand the cause of the trip before the device is reset. Normally, before action is taken, an operator should ensure no abnormal condition exists that would preclude reset. However, because the consequences of inappropriately resetting protective devices vary considerably, good judgment and specific guidance are necessary in this area. The operations management should provide the appropriate guidance so that tripped protective devices will be properly addressed.

Facility trips and unplanned forced shutdown require a thorough investigation in accordance with the guidance of Chapter VI.

8. Load Changes

The shift supervisor, the control room lead operator, or the cognizant manager for a test and research facility should approve all power or process rate changes because these persons are held accountable for safe operation. Additionally, they will probably be the persons most knowledgeable of problems that occur as a result of load changes. However, the operator could decrease load or rate without approval, if necessary, to respond to a facility emergency situation in accordance with the facility's emergency procedures.

9. Authority to Operate Equipment

The overall operation of the facility should be directed by the operations supervisor for a large DOE facility and by the cognizant manager for a test and research facility. Operations management should ensure that only trained and qualified personnel operate plant equipment. In general, the operator and the operations supervisor should be aware of all activities affecting equipment. The operations supervisor should specify those general activities that may normally be performed without informing the supervisor and should amplify these specifications as appropriate. Examples of such activities are pumping certain sumps (plant equipment operators) and the routine minor adjusting of controls necessary for maintaining stable process conditions. However, nonroutine operation of controls should not be made without specific approval of the shift supervisor. In addition, during emergencies, operators may take necessary immediate actions required to ensure personnel, plant, and environmental safety without obtaining prior approval; however, appropriate supervisors should be promptly informed of these actions. Operators should be instructed that plant safety should be achieved over facility production for off normal and emergency facility conditions.

10. Shift Operating Bases

The operating base is the facility area where an operator returns when he is not performing in-plant duties. An operating base should be established for each shift position. Each operating base should be equipped with appropriate office equipment for the operator to maintain necessary procedures and references and to conduct administrative duties, and necessary communication equipment should be available at the operating base. Shift turnovers should be conducted within those facility areas assigned to the operations department and typically at the operating base. The operating bases should be located at a convenient place within the area of responsibility for that shift position.

11. Potentially Distractive Written Material and Devices

Written material that does not relate to operation and entertainment devices (such as radios, televisions, tape players, and computer games) should be prohibited from use by on-duty operations personnel in order to minimize distractions from their responsibilities. Written material and entertainment devices should not be brought to work stations. However, operators may read training bulletins, technical manuals, or operating experience information or review other written, audible, or visual materials that relate to operator duties. Judgment should be used to ensure the operators' primary duties are not compromised. The operations supervisor (or equivalent) should provide guidance to the shift crews for the use of potentially distractive materials and devices.

CHAPTER III

CONTROL AREA ACTIVITIES FOR DOE FACILITIES

A. INTRODUCTION

Control area activities should be conducted in a manner that achieves safe and reliable facility operations. Other shift activities are discussed in Chapter II, Shift Routines and Operating Practices. This chapter addresses the important elements of control area activities that are necessary to support safe and efficient facility operation.

B. DISCUSSION

The control area or control room is the most critical facility operating base and the coordination point for all important facility activities. Therefore, activities in the control area or control room must be businesslike, and a professional atmosphere conducive to safe and efficient operation must be maintained. In addition, control area operators should not be overburdened with administrative responsibilities, and control area access should be limited so that operators will not be distracted from properly monitoring facility parameters.

C. GUIDELINES

1. Control Area Access

Control area access should be limited to those persons on official business only. The “at-the-controls” area of the control room should be clearly identified, and its boundary should be understood by all persons who are granted access to the control room. Access to the “at-the-controls” area should be restricted to persons who need to be in the area. Entry into this area should be granted by designated individuals, and persons who might need to enter this area should know who can grant access.

2. Professional Behavior

Professional behavior should be displayed in the control area at all times. Only activities essential to supporting operation and activities authorized by management should be conducted in the control area. Potentially distracting activities (such as radio listening, game playing, and horseplay) should be prohibited. Non- job-related discussions should be minimized so as not to interfere with conduct of the shift or monitoring of key parameters.

3. Monitoring the Main Control Panels

Operators should be alert and attentive to control panel indications and alarms. Control panel indications should be monitored frequently, and prompt action should be taken to determine the cause of and correct abnormalities. Emphasis should be placed on closely monitoring and trending to detect problem situations early. Operator response to alarms should be timely, and actions should be taken to address and correct the alarm causes. All reasonable action should be taken to clear alarming conditions. The number of evolutions affecting control panel indications that are performed concurrently should be limited so that the operators' ability to detect and respond to abnormal conditions will not be compromised. If computer or automated systems are in place, there should be an appropriate backup to those systems.

4. Control Operator Ancillary Duties

Duties assigned to operators should not interfere with their ability to monitor facility parameters. Activities such as preparation of tagging orders, reviews of operating procedures, required reading, and review of maintenance work activities should not comprise a major portion of these operators' shift responsibilities. The administrative workload of operators responsible for monitoring and operating the control board should be minimized, If one operator is involved in administrative tasks, other operators should assume responsibility to monitor the unit. Some administrative activities are better performed away from the "at-the-controls" area by an operator who is not responsible for operating the main control panel.

5. Operation of Control Area Equipment

Only persons specifically authorized by the administrative procedures of the operations department should operate control area equipment. When trainees operate this equipment, they should be supervised and controlled by the operator who normally would perform the operations.

CHAPTER IV

COMMUNICATIONS

A. INTRODUCTION

Communications should be highly reliable in providing accurate transmission of information within the facility. This chapter describes the important aspects of a plant program for audible communications.

B. DISCUSSION

Audible communications are used to transmit operating and emergency information within the facility. Oral (face-to-face), telephone, radio, public address (page) announcements, sound-powered phones, and special sounds (horns and bells) are examples of audible communications.

Since accurate communications are essential for the safe and efficient operation of facilities, guidance in the use of the various forms of audible communication is necessary. This includes repeating back instructions to ensure the accurate transmission and receipt of verbal instructions. Standardized terminology and the use of a phonetic alphabet are other means of ensuring that verbal communications are understood.

Many facilities use horns, sirens, bells, and the public address system to alert personnel to abnormal or emergency conditions. These communications must be controlled to ensure that they do not detract from normal operations and are available in an emergency.

C. GUIDELINES

1. Emergency Communications Systems

Methods should be implemented to ensure all facility personnel are promptly alerted to facility emergencies. When personnel are working in areas where the public address system or emergency signals cannot be heard, alternate methods for alerting these persons should be utilized. Flashing lights, personal pagers that vibrate and can be felt, and persons dedicated to notifications are examples-of alternate methods that might be effective.

Emergency communications systems should be periodically tested to ensure that they are functional. Control areas should have the capability of overriding other users of the public address system for emergency announcements.

2. Public Address System

Use of the facility public address system (page) should be administratively controlled to ensure it retains its effectiveness in contacting plant personnel. Excessive use of the public address system for paging of personnel and unnecessary announcements should be avoided because excessive use can reduce the impact of important announcements and can be distracting. Facility telephones and other point-to-point communications channels should be used in lieu of the public address system whenever practical. Consideration should be given to dedicating certain paging system channels to specific groups or functions, (e.g., a dedicated channel for routine operations or a dedicated channel used only for emergencies).

3. Contacting Operators

Methods should be implemented to ensure that control areas can quickly contact on-shift operators or supervisors. Examples cited above in item 1, Emergency Communications Systems, for communication in high-noise areas may be effective in accomplishing this function. However, to avoid operator confusion, distinction should be made between a routine and emergency notifications.

4. Radios

Portable radios can be an effective means of providing mobile point-to-point communications and may be used for this purpose. However, radio usage should not be allowed in areas where electronic interference with plant equipment may result. Areas where radio use is prohibited should be delineated. Instructions regarding frequencies (channels) and postings should be provided. Consideration should be given to dedicating certain radio channels to specific groups or functions (e.g., a dedicated channel for security or a dedicated channel employed integrated surveillance tests).

5. Abbreviations and Acronyms

Only abbreviations and acronyms obtained from an approved list should be used in facility communications. Both written and spoken terms should be prescribed in the list. For example, residual heat removal service water might be written “RHRSW” and spoken “RHR service water.”

6. Oral Instructions and Informational Communications

Oral instructions should be clear and concise. In all communications, the sender and intended receiver should be readily identifiable. Instructions involving the operation of equipment should be repeated by the receiver to the extent necessary for the sender to ensure the instructions are correctly understood.

CHAPTER V

CONTROL OF ON-SHIFT TRAINING

A. INTRODUCTION

Facility operation by personnel under instruction should be carefully supervised and controlled to avoid mistakes in operations by unqualified personnel and to use trainees' time effectively On-shift training should be conducted so that the trainee satisfactorily completes all of the required training objectives and receives maximum learning benefit from this experience. The guidelines of this chapter relate to control of training activities by operations personnel. Other aspects of training are covered by other DOE Orders.

B. DISCUSSION

On-shift training is that portion of an operator qualification program where the trainee receives training within the job environment and with as much hands-on experience as possible. This period of instruction is normally controlled by the operations organization personnel because the operation of equipment is usually involved. Operations-administered controls are appropriate for the following aspects of the training activities:

- On-shift training should adhere to established training programs so that instructional uniformity will be maintained.
- On-shift instructors/evaluators should be qualified for the activities they perform to ensure both correct operation and quality training.
- Trainees should be supervised by qualified operators so that unqualified personnel do not make mistakes that could affect safety.
- Policies that direct how trainees may be used to support operations work activities should be developed. These policies should ensure that trainee personnel are effectively and appropriately used and that they are aware of all operating limits and hazards.
- The operations supervisor (or equivalent) should approve the training program so that it will best meet operations needs.
- On-shift training should be appropriately documented.

C. GUIDELINES

1. Adherence to Training Programs

On-shift training should be conducted in accordance with training programs that specifically identify items the trainee must accomplish on shift. The knowledge requirements for each item should be defined as well as what the trainee must do (perform, simulate, observe, or discuss). Both the instructor and the trainee should understand what is required for each training item.

2. On-shift Instructor Qualification

On-shift training should be conducted by qualified operators. This may require the successful completion of appropriate instructor training requirements for on-shift training. However, operator-qualified training department personnel may also be used. The on-shift instructors should be specifically selected, taking into account communication skills, technical knowledge, and ability to provide trainees with hands-on experience. In many cases, the trainees will actually be operating equipment; this requires special instructor techniques in order to prevent misoperation or damage of equipment.

3. Qualified Operator Supervision and Control of Trainees

Whenever trainees operate equipment, a qualified operator serving as an on-shift instructor should observe the trainee in order to ensure the trainee does not make an error that could adversely impact the facility. Until the trainee has demonstrated reasonable proficiency in an operation, he/she should discuss the procedure steps, cautions, and notes with the instructor. Trainees should also demonstrate actions to be performed by pointing to the control switch, valve, breaker, etc., that will be manipulated.

On-shift instructors should not become complacent with trainees. Just because a trainee has performed a task once does not mean he is aware of all problems that could occur. The instructor should always monitor the trainee closely and remain in a position to intervene or assume control, if necessary.

When trainees record equipment parameters on official round sheets (as opposed to practice round sheets) or logs, the on-shift instructor should verify that the recorded information is correct. In addition, the trainee and on-shift instructor should discuss any out-of-specification readings and the consequences of allowing such trend to continue.

4. Operator Qualification Program Approval

The operator qualification program should be approved by the operations supervisor, and changes to the program should be coordinated with the training department. For operating positions requiring certification, qualifications should be based on one-to-one instruction at that station.

5. Training Documentation

Completion of the operator qualification program should be formally documented. Classroom requirements and written exam results should be documented by training department instructors. On-shift training and system checkouts should be documented by on-shift instructors.

6. Suspension of Training

Trainee operation of equipment should be immediately suspended during unanticipated or abnormal events, accident conditions, or whenever the operations personnel or on-shift instructor believes suspension is necessary to ensure safe and reliable facility operation. During abnormal or accident conditions, trainees should provide assistance at the discretion of the qualified operator.

7. Maximum Number of Trainees

The maximum number of trainees allowed to simultaneously participate in any particular training evolution needs to be considered. Consideration should be given to training effectiveness and to the potential for adverse effects on the facility. A maximum limit for the trainee-to-instructor ratio will ensure that the trainee is provided with the most effective instruction and will ensure that the instructor is not distracted by having too many trainees at once. Shift supervisors should ensure that established limits are observed.

CHAPTER VI

INVESTIGATION OF ABNORMAL EVENTS

A. INTRODUCTION

A program for the investigation of abnormal events should ensure that facility events are thoroughly investigated to assess the impact of the event, to determine the root cause of the event, to ascertain whether the event is reportable to DOE in accordance with DOE 5000.3A, OCCURRENCE REPORTING AND PROCESSING OF OPERATIONS INFORMATION OF 5/30/90 and to identify corrective actions to prevent recurrence of the event. The program should include the investigation of "near miss" situations, thus reducing the probability of a similar situation recurring as an actual facility event. Abnormal events are not unique to the operating organization. Therefore, the guidelines of this chapter may have applicability in other areas besides operations. Required notifications associated with abnomal events are addressed in Chapter VII and in DOE 5000.3A. This chapter covers important aspects of the abnormal event investigation program.

B. DISCUSSION

An established and thorough review process should ensure that all significant aspects of an abnormal event are identified, investigated, and resolved. In addition, the investigation of "near miss" situations can identify detrimental conditions that, if left uncorrected, can impact safety and operations.

A comprehensive review program should identify those types of events that require investigation, assign responsibility for conducting the investigation, list necessary qualifications for those conducting investigations, list the necessary information that must reexamined, outline the steps for performing an investigation, and establish guidelines for assigning and completing corrective action.

It is helpful to define which circumstances should result in an abnormal event investigation. The criteria should be available to first- line supervisors so that, following an event, the investigation process can begin in a timely manner. The list of events or criteria requiring an event investigation should be based on DOE requirements. The requirements include such considerations as personnel safety, facility safety and reliability, and DOE requirements.

A manager should have overall responsibility for the event investigation process. However, the manager may delegate specific investigative tasks to other personnel as appropriate.

Investigator qualifications should be established to ensure competency in technical aspects of operation and investigative techniques. The credibility of the investigation process will depend heavily on the credibility of the event investigators.

The process of perfoming an abnomal event investigative should be established to ensure the thoroughness of each investigation and to ensure consistency between investigations. The program should describe the information collected, investigative techniques utilized, and the final reporting format. Two important products of the event investigation are the identification of the root cause and assignment of corrective action to prevent recurrence.

The abnormal event investigation program is needed to thoroughly investigate abnormal events, verify the proper operation of equipment, identify the root cause of events, ensure all necessary notifications are completed, comply with DOE requirements, and ensure appropriate corrective action steps are established to minimize the chance of the event recurring. Operations personnel should recognize this need as well as their obligation to assist in performing thorough investigations.

c. GUIDELINES

1. Events Requiring Investigation

Events that occur in the facility and adversely affect operations, personnel safety, or DOE requirements (DOE 5000.3A) should receive a thorough investigation. The criteria for when to perform an event investigation should be clearly established. Specific events requiring investigation should be listed for supervisory use, along with criteria for use in deciding what “near miss” situations should receive review. The following conditions and situations should require an investigation:

a. Design limits are violated (Tech Specs, OSR, SAR, or other limits).

b. Facility system performance is unusual, abnormal or unexplained.

c. Facility safety conditions are abnormal or unexplained.

d. Safety or system features are improperly positioned.

e. Reportability to DOE or other agencies (e.g., EPA) is appropriate.

f. An unplanned shutdown or significant loss of operation occurs.

g. A procedural violation or personnel error occurs that caused or could have caused serious personnel injury or equipment damage or could have affected facility safety.

h. Equipment failure occurs that could affect facility capability or safety.

i. Radiological or toxic material limits are exceeded or radioactive or toxic material is lost/released.

j. Actual or attempted sabotage is suspected.

k. Chemistry or process parameters are out of specification or indicate unexplained trends.

l. A department head or the facility safety review committee deems an investigation is appropriate.

m. Loss of Special Nuclear Material.

n. Repetitive problems occur.

The above list is not intended to be all-inclusive. At the discretion of the operations supervisor (or other appropriate department head), other specific events should receive a formal investigation.

"Near miss" situations should also receive a formal review at the discretion of the responsible supervisor. It is important to review "near miss" situations to uncover aspects of the situation that, if not identified and corrected, can cause recurrence of the event, possibly with more serious consequences. A "near miss" situation is one which an inappropriate action occurs (or a necessary action is omitted) but is detected and corrected before an adverse effect on personnel or equipment results.

2. Investigation Responsibility

The operations supervisor or another manager should be responsible for event investigations. He/she may delegate specific investigations or portions of investigations to other personnel. For example, the initial review following a reactor trip might be conducted by the shift supervisor. Based on the results of the shift supervisor investigation, the need for further review will be established. Examples of specific tasks of an investigation that may be delegated include gathering necessary records, conducting interviews, recommending restart following a reactor trip, and determining the long-term corrective action to prevent recurrence. However, the overall responsibility for the consistency and thoroughness of event investigations should be the responsibility of the appropriate manager.

3. Investigator Qualification

The credibility of the investigative process is highly dependent upon the knowledge and experience of the individuals performing the investigation. It is important that individuals performing an investigation be technically knowledgeable and well respected by the facility staff. Additionally, investigators should not have a bias or a vested interest in the results of the investigation. Investigators should detrained in facility systems and operations and other major disciplines appropriate for the event under investigation. Additionally, investigators should be trained in techniques for conducting an investigation. This can include training in areas such a root-cause determination, diagnostics for plant events, interviewing techniques, and factors affecting human performance.

4. Information to be Gathered

Sufficient data must be collected to allow the event investigators to perform a reconstruction and analysis of the event. An individual should be assigned responsibility for collecting the required information and assembling the information for review. It is important to collect the necessary information as soon as possible after the event. This will minimize the possibility of losing information or that observers of the event will be unavailable. Information should be gathered in the following areas:

a. Initial facility conditions.

b. Statements of operators and personnel involved in the event (this should be permanently recorded).

c. Pertinent computer printouts (post-trip log sequence of events) and strip charts.

d. Pertinent documentation (such as operator logs, radiation work permits, chemistry logs, and radiological surveys) as required to establish conditions prior to and during the event.

As listed above, statements of operators and facility personnel involved in the event should be obtained. This item is particularly useful because personnel observing or participating in an event can provide insights into the facility response during the event and into actions leading up to the event that would be not available from strip charts or other hard-copy data. Methods for collecting this information can vary; however, the event investigation-containing revelant information should be permanently recorded for future reference.

When collecting hard copy (such as strip charts), it is important to annotate the data with its source, chart speed (if applicable), and a time mark to aid in coordinating the data during the reconstruction of the event. The collection of data should not interfere with the continued operation of the facility. Temporary interference should occur only if necessary to understand the event.

5. Event Investigation

Upon completion of the data collection, a structured review of the abnormal event should occur. The format of the investigation will depend upon the significance of the event. Each event investigation should include the following steps, with emphasis placed on each individual step depending upon the severity or potential consequences of the event.

a. Event Reconstruction

The abnormal event should be reconstructed using the collected information. When applicable, this is best accomplished using the sequence of events recorder printout as a basis.

If the sequence of events printout is not available (or not applicable) or if the abnormal event was not of sufficient magnitude or nature to impact the sequence of events recorder, then a chronological listing of events should be developed. It is desirable to include the personnel involved in the event in the reconstruction process.

b. Event Analysis and Evaluation

Once the facts of the event have been established, the event should be analyzed to determine the response of equipment and involved personnel. During the analysis, emphasis should be placed on determining the proper response of systems, comparison of actual and expected response, adequacy of procedures, and factors affecting human performance. When available, the event should be compared with previous event investigations of similar events or transients. During the analysis, a safety evaluation should be performed to ascertain the proper response of equipment and to identify detrimental effects on facility equipment. If the event was a process shutdown, the acceptability of restart may be determined at this time. In some instances, however, steps 5c and 5d below may also be required prior to restart. Supervisors need to be sure no further corrective action is required prior to restart.

c. Root-Cause Determination

The root cause of the event should be determined. The root cause can be defined as those causal factors that, if corrected, would preclude a recurrence of the event.

d. Corrective Action Determination

Appropriate corrective action should be established for each event investigation, and specific personnel should be assigned responsibilities for the corrective action. Corrective action can take the form of procedure changes, training, design modifications, and changes to administrative controls. The final approval for corrective action should be made by the facility manager.

6. Investigative Report

An investigative report should be prepared in a timeframe determined by the responsible authority. The report should include a description of the event (including pertinent conditions), a discussion of the impact of the event, root cause, the lessons learned, and the proposed corrective action(s). The report should include positive aspects of the event (such as particularly effective personnel responses). The investigative report should be approved by the facility manager and reviewed by appropriate supervisors, managers, and the safety review committee.

It is important that the lessons learned from an event investigation be shared with all appropriate personnel who could benefit from the lessons learned. For example, a problem with an operations procedure might also exist in another department's procedures.

7. Event Training

In-house events should be evaluated by the operations supervisor to determine if the event should be included in the training program for operations personnel. In some cases, due to the severity or possible safety consequences of some events, it is appropriate to train shift operations personnel on the event immediately. A mechanism should exist-so that appropriate shift personnel could be immediately trained on an event when they next report for work.

8. Event Trending

Patterns of deficiencies such as operator errors or inadequate procedures should be trended. A periodic summary report of events, causes, and trends should be submitted to department heads, the facility manager, and appropriate managers. Department heads should ensure training programs include appropriate material from the summary report.

9. Sabotage

Acts of known or suspected sabotage are a special case of event investigations. If an act of sabotage is discovered or suspected, it is important to begin an investigation immediately and to accomplish the following:

a. Determine the condition of the affected system(s) and ensure the operability of all safety-related systems;

b. Decide if continued operation is justified or if systems are available to support safe facility shutdown; and

c. Minimize the impact of discovered acts of sabotage and deter future acts of sabotage.

CHAPTER VII

NOTIFICATIONS

A. INTRODUCTION

Timely notification of appropriate DOE personnel and other agencies, when required, should be employed to ensure that the facility is responsive to public health and safety concerns. This chapter provides guidelines to ensure uniformity, efficiency, and thoroughness of these notifications to support fulfillment of DOE requirements that are consistent with DOE 5000.3A.

B. DISCUSSION

For events that require notification of DOE personnel (and when appropriate, state and local officials), it is essential that information be gathered and transferred in a systematic, controlled method. Procedures that define responsibilities and provide for adequate documentation should be used to control the process and ensure that the notification procedure is effective.

c. GUIDELINES

1. Notification Procedures

Procedures should be developed to address appropriate notifications and should include the following elements:

a. Specific responsibilities for notifications;

b. Identification of events and conditions requiring notifications;

c. Identification of primary and alternate personnel to be notified for various situations;

d. Establishment of time requirements for notifications that are consistent with the facility emergency plan; and

e. Definition of recordkeeping requirements that documents the reason for notifications, the time of notifications, and the person notified.

2. Notification Responsibility

The operations supervisor should ensure that all appropriate personnel receive notification when required. The actual notification of specific individuals or agencies may be accomplished by other individuals.

3. Names and Phone Numbers

Names of primary and alternate contacts and current phone numbers and page codes should be readily available to the person assigned to make the notifications.

4. Documentation

All notifications should be documented. Fill-in-the-blank forms for different types of situations might be useful as a checklist and for providing necessary documentation. In any case, a formal record of notifications should be maintained.

5. Communication Equipment

Adequate communication equipment should be maintained in the main control area to meet the objectives of this chapter.

CHAPTER VIII

CONTROL OF EQUIPMENT AND SYSTEMS STATUS

A. INTRODUCTION

Good operating discipline should ensure that facility configuration is maintained in accordance with design requirements and that the operating shift knows the status of equipment and systems. Specific applications of equipment control are addressed in Chapter IX, Lockout/Tagout; Chapter X, Independent Verification; Chapter XI, Logkeeping; and Chapter XII, Operations Turnover. This chapter provides an overall perspective on control of equipment and system status.

B. DISCUSSION

It is imperative that equipment and systems in a DOE facility be properly controlled. Not only must the operating shift be aware of how equipment and systems will function for operational purposes, but in order to satisfy the design bases and the operational limits, the proper component, equipment, and system configurations must be established and maintained.

DOE facilities are required to establish administrative control programs to handle configuration changes resulting from maintenance, modifications, and testing activities. Typically, changes in equipment and system configuration are to be communicated from shift to shift through the shift turnover process or through an equivalent method of controlling status. Turnover checklists and equipment status boards are often used as aids for compilng and transmitting status information efficiently and accurately.

Control over equipment and system status should reestablished in accordance with a formal guidance to ensure that proper configuration is maintained. This guidance should include instructions for system alignments, locking of components, verification of technical specification compliance prior to plant operating-mode changes, authorization prior to removing or restoring equipment to service, and identification and documentation of equipment deficiencies.

c. GUIDELINES

1. Status Change Authorization and Reporting

The operations supervisor is responsible for maintaining proper configuration and should authorize status changes to major equipment and systems. Since the supervisor is typically the senior operating person on shift, he/she is tasked with maintaining a broad overview of facility operations. His/her perspective of status must necessarily be the focal point of shift operations.

Authorization of status changes to equipment and systems of lesser importance may be delegated by the operations supervisor to other cognizant shift positions. For example, radwaste operations may be assigned to a radwaste operator or to a foreman who authorizes changes in operating alignments or equipment configurations. The shift supervisor should be advised periodically of changes in status of equipment and systems so assigned.

Since the operators must be aware of equipment and system status, the supervisor should ensure that all changes in status are communicated to these persons. Typically, the control area operator is in the line-of-information flow to and from the supervisor.

Changes in the status of facility equipment and systems should be reported to the governing stations (e.g., control area) or to the individual (or his relief) who authorized the change. Typically, changes in status of safety-related equipment and systems should be authorized by the supervisor and reported to the control area.

2. Equipment and System Alignment

Prior to first placing the equipment or system into operation, individual components-for facility equipment and system should be properly aligned or checked for proper alignment. An initial alignment of valves, switches, and breakers establishes a baseline configuration against which further operations may be measured. Once the equipment or system is properly aligned and is operating in accordance with operating procedures, frequent complete alignments of all individual- components may not be necessary. Alignment checklists should be used to guide the operator in establishing the correct component positions. The alignment checklists should include provisions for equipment nomenclature that matches the nomenclature placed on the component, a location for individual documentation of the check of each component, the required alignment position for each component, and a location for annotating deviations from the required alignment. The supervisor should review and approve completed alignment checklists.

The need for a complete alignment of equipment and systems should be based on the level of control that has been maintained over the status of the components. Typical situations that may require equipment and systems to be aligned include startup from cold shutdown, major outages, and mode changes. In addition, safety-related equipment and systems should be functionally tested in accordance with surveillance requirements in the technical specifications/operational safety requirements following maintenance and before the equipment or system is considered capable of performing its design function.

Records of equipment and system alignments should be retained for reference by the operating shift. Administrative controls that analyze and document deviations from the reference alignment should be established. Administrative control programs (e.g., tagout/lockout, temporary modification, etc.) are addressed in other chapters of these guidelines.

3. Equipment Locking and Tagging

Locks and Tags should be used on those components that require special administrative control for safety or other reasons. Locks and Tags provide some security that a component will be operated only by authorized facility personnel performing required evolutions in a controlled fashion. Additionaly, Locks and Tags should alert the operator of the importance of the component and remind him/her that special controls over repositioning are to be maintained. In this respect, all personnel should receive training regarding their responsibilities concerning the manipulation of locked or tagged controls. More details about requirements for Lockout and Tagout are found in Chapter IX.

4. Operational Limits Compliance

Administrative controls should be established to document compliance with requirements of operational limits (limiting conditions for operation). The operations supervisor should be cognizant of action taken to comply with operational limit requirements and should ensure that the actions taken are appropriate and correct or that they mitigate any adverse consequences to the facility. Logs, status sheets, turnover checklists, or other appropriate documentation should reflect the entry conditions and actions that are taken in response to operational limits requirements. Appropriate operating personnel should be apprised of limiting conditions for operations and actions for which they may be responsible. Responsible personnel should periodically review the limiting conditions for operation and action statements in effect to ensure that the required actions are met.

5. Equipment Deficiency Identification and Documentation

Equipment deficiencies should be noted by facility operating personnel and identified in the work control system for correction. Methods that identify deficient equipment to operating personnel should be established. Some facilities can use unique deficiency tags to identify equipment problems. Others may use logs, status sheets, shift turnover sheets, or caution tags to ensure deficiencies are communicated to personnel responsible for monitoring and operating the equipment.

6. Work Authorization and Documentation

The operations supervisor or his/her designee should authorize all shift activities (including Maintenance) on equipment that is important to safety, that affects operations, or that changes control indications or alarms. This authorization should be in writing on the document controlling the work. Documentation of the status of work in progress should be available in the control area for review by operating personnel. These activities could include such things as maintenance, test, fuel movement, radiography, and others.

7. Equipment Post-Maintenance Testing and Return to Service

Equipment should be tested following maintenance to demonstrate that it is capable of performing its intended function. The testing should include performance of all functions that may have been affected by the maintenance. The testing should also verify that the maintenance performed served to correct the original problem and that no new problems were introduced. Any testing following maintenance should be specified on the maintenance work order or accompanying documentation (e.g., maintenance procedure). The operations supervisor should ensure that testing appropriately proves equipment operability.

8. Alarm Status

The status of control panel and/or local panel alarms should be readily available to appropriate operating personnel. Information that should be available includes alarms that are totally disabled, alarms with individual inputs disabled, alarms with temporarily changed setpoints, alarms that are normally lighted during power operation, and multiple input alarms that do not reflash when more than one input is activated.

Appropriate actions should be taken to monitor equipment parameters for abnormal conditions that would be masked by deficient or non-reflashing alarms. Color coding of alarm windows or the use of deficiency stickers may be useful in enhancing operator awareness of these status considerations.

9. Temporary Modification Control

Administrative control systems should be established for installation of temporary modifications such as electrical jumpers, lifted leads, pulled circuit boards, disabled annunciators/alarms, mechanical jumpers/bypasses, temporary setpoint changes, installed or removed block flanges, disabled relief or safety valves, installed or removed filters or strainers, plugged floor drains, and temporary pipe supports. Prior to modification, these controls should provide for communicating the installation of temporary modifications to the design authority to allow for technical oversight and an evaluation of the impact on current design activities, and approval of the design modification. These control systems should make provisions for safety reviews, installation approval, independent verification of correct installation and removal, documentation of the modification, update of operating procedures and documents, training, marking of installed modifications, and periodic audits of outstanding modifications.

10. Distribution and Control of Equipment and System Documents.

A system should be established to ensure that the operations personnel receive and utilize the latest revisions of engineering drawings and specifications. Operations personnel should be made aware of all changes to these documents. The document distribution should include all operations related activities such as procedures review groups, maintenance groups, facility safety analysis groups, and testing groups.

CHAPTER IX

LOCKOUTS AND TAGOUTS

A. INTRODUCTION

The purpose of this chapter is to provide a method for equipment status control through component Tagging or Locking which should protect personnel from injury, protect equipment from damage, maintain operability of plant systems, and maintain the integrity of the physical boundaries of plant systems. If there is a potential for equipment damage or injury during equipment operation, servicing, maintenance, or modification activities due to inadvertent activation of equipment, a facility Lockout/Tagout program should be established and used. The Lockout/Tagout program should provide for independent verification of the removal from service and the restoration to service of safety-related and other facility equipment. This chapter describes the important elements of a Lockout/Tagout Program and is intended to meet the requirements of 29 CFR 1910.

B. DISCUSSION

A Tagout program includes the placement of a Tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-operating device and the equipment being controlled many not be operated until the Tagout device is removed. Similarly, a Lockout program includes the placement of a Lockout device (e.g., a lock, or hasp with a lock in place) on an energy-isolating device in accordance with an established procedure ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the Lockout device is removed. An effective Lockout/Tagout program should be developed by each facility and should include detailed administrative procedures, training of personnel, and uniquely identifiable tags. The program should also exercise appropriate control over Lockout/Tagout preparation, approval, placement, and removal; provide for adequate documentation; and be consistent with the requirements of 29 CFR 1910.

C. GUIDELINES

1. Lockout/Tagout Use

Locks and Tags should be placed on controls when for safety or other special administrative reasons controls must be established. Lockout is the application of a lock on a control to render the control inoperative. Locks may be built into the switch or be external locks (e.g. padlocks) that may be affixed and or removed when necessary. Keys and/or combinations for Locks are controlled. Other devices (such as writing a control inoperable, placing control defeating devices, etc.) may also constitute a lesser degree of Lockout. Tagout is the application of a danger or warning device on the control, which

indicates that the control is not to be used except under conditions indicated by the tag. Tags should be placed on the control that is tagged out, or as close as possible to indicate clearly the condition.

2. Lockout and Tagout Implementation

a. If a device (e.g., for energy or toxic material isolation) has the capability of being locked out, it should be locked out.

b. If the isolating device cannot be locked out, it should be tagged out.

c. New equipment design and major modifications to existing equipment should be designed to provide the capability of being locked out.

d. The following administrative guidance is an example that could be established to outline acceptable controls over locked components:

(1) A list of components that are required to be locked should be established and approved by the operations supervisor or appropriate manager. The list should be separate from the standard alignment checklists.

(2) Criteria for locking of additional components and necessary authorizations should be provided.

(3) When key operated locks are used, access to the keys should be restricted to authorized personnel. Keys should be readily available to appropriate personnel.

(4) Specific techniques for verifying the position of locked components should be established. A hands-on physical check of critical equipment or the observation of a reliable position indicator should be used whenever possible.

(5) When locked components must be unlocked or placed in a position other than the normal locked position, the deviation should be authorized and documented.

(6) Periodic checks of locked components should be performed to ensure that locking devices are properly attached and that the component is in the required position.

3. Protective Materials and Hardware

a. Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware should be provided for isolating, securing, or blocking machines or equipment from energy sources.

b. Lockout and Tagout devices should be singularly identified (i.e., should be the only devices used for controlling energy and should not used for other purposes) and should meet the following requirements:

(1) Durable

- Should be capable of withstanding the environment to which they are exposed for the maximum period of time for exposure is expected,

- Should be constructed to minimize deterioration of the tag or the message when exposed to weather conditions,

- Should not deteriorate when used in corrosive environments where acid and/or alkali chemicals are handled and/or stored.

(2) Standardized

Lockout and Tagout devices should be standardized within the facility in at least one of the following criteria: color, shape, or size. In addition, Tagout devices should utilize standardize print and format.

(3) Substantial

Lockout devices should be substantial enough to prevent removal, without the use of excessive force or unusual techniques, such as the use of bolt cutters or other metal cutting tools.

When used as the sole means of preventing operation of an energy isolating device, Tagout devices, including their means of attachment shall, in addition to other requirements for their use, be of **a** non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

Tagout device attachment means should be of a non-reusable type, attachable by hand, self locking, and non-releasable.

(4) Identifiable

Tagout/Lockout devices should indicate the identity of the personnel and the organization applying the device.

(5) Warning

Tagout devices should warn against hazardous conditions if the machine or equipment is energized and should include a legend such as the following Do Not Start, Do Not Open; Do Not Close; Do Not Energize; Do Not Operate.

4. Lockout/Tagout Program

A Lockout/Tagout program should be established consisting of procedures to control potentially hazardous energy and materials and personnel training. This program should ensure that potentially hazardous energy or toxic material sources are isolated and rendered inoperative during servicing or maintenance or in any case where unexpected energizing, startup, or release of stored energy or toxic material can cause injury.

5. Procedures for Lockout/Tagout

Procedures should be developed, documented, validated, and utilized for control of potentially hazardous energy or material. Procedures should clearly and specifically state the scope, purpose, authorization, rules, and techniques of the Lockout/Tagout program.

a. Procedures should include, but not be limited to, the following:

(1) Specific statement of intent of use;

(2) Specific procedural steps for isolating, blocking and securing machines or equipment for hazardous energy or material;

(3) Specific procedural steps for the placement, removal, and transfer of the Lockout/Tagout device(s); and

(4) Specific requirements to test machines and to determine and verify the effectiveness of Lockout, Tagout or other control measures.

b. It is not necessary to document the required procedure for a particular machine or equipment, when all of the following elements exist.

(1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shutdown which could endanger personnel.

(2) The machine or equipment has a single energy source which can be readily identified and isolated.

(3) The isolation and locking out of that energy source will completely de-energize and de-activate the machine or equipment.

(4) The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.

(5) A single lockout device will achieve a locked out condition.

(6) The lockout device is under the exclusive control of the authorized personnel performing servicing of maintenance.

(7) The servicing or maintenance does not create hazards to other personnel.

(8) The employer, in utilizing the exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

c. Documentation of Lockout/Tagout

Lockout/Tagout placement, activation and removal should be recorded including any information relevant to their occurrence. This record should be maintained by the shift supervisor or appropriate manager to ensure accuracy and completeness. The Lockout/Tagout record should be reviewed periodically by operations and maintenance personnel as guidance.

6. Application of Lockout/Tagout

The established procedure for the application of energy control (implementing Lockout/Tagout) should cover the elements and actions in the following sequence:

a. Preparation for Shutdown

Before a machine is turned off, personnel should be informed of the type and magnitude of the energy, the hazards and the methods of control.

b. Machine or Equipment Shutdown

The equipment should be shutdown using the procedures required by this chapter. An orderly shutdown should be utilized to avoid any added hazard.

c. Equipment Isolation

All Lockout/Tagout devices needed for control are physically located and operated in such a manner as to isolate the equipment from the energy source.

Lockout or Tagout devices should be affixed to each isolation device by qualified personnel in a manner that will hold the devices in a "safe" or “off” position or clearly indicate that operation of the device is prohibited.

e. Stored Energy

Upon application of Lockout or Tagout devices, all potentially hazardous stored or residual energy should be relieved, disconnected, restrained, or otherwise rendered safe. If stored energy might re-accumulate to a hazardous level, vertfication of isolation should be continued until the servicing or maintenance is completed.

f. Verification of Installation

Prior to starting work on equipment that has been locked or tagged out, personnel should verify that isolation and de-energization have been accomplished.

g. Release from Lockout/Tagout

Before Lockout or Tagout devices are removed and energy restored to the equipment, procedures should be followed and actions taken by personnel to ensure the following:

(1) Equipment/workspace. The machine or equipment is operationally intact. The area has been inspected to

ensure that nonessential items have been removed. The individual authorizing tag removal should specify the final component position and, when appropriate, the sequence in which components should be positioned. In addition, the need to check the positioning of other components that were not locked or tagged, but are related to the operation of the Lockout/Tagout component, should be determined at this time and appropriate instructions should be developed. These checks should be done when necessary, to ensure that components within the Locked/Tagout boundaries are correctly aligned to support operation.

(2) Personnel. The workspace should be checked to ensure that all personnel have been positioned safely or removed from the area. Before Lockout/Tagout devices are removed and equipment energized, affected personnel should be notified that equipment will be energized.

(3) Lockout/Tagout Device Removal. Each Lockout/Tagout device should be removed from each energy-isolating device by the person who applied the device. He/she should reposition the components in the sequence specified and check the positioning as deemed necessary. The removal of Locks or Tags should be documented. Tags should be returned to the operations supervisor or authorizing manager. The supervisor/manager should be satisfied that all tags and safety devices associated with this Lockout/Tagout are removed and are accountable.

When the person who applied the Lockout/Tagout device is not available to remove it, that device may be removed under the direction of the appropriate supervisor/manager, provided that specific procedures and training for such removal have been developed and incorporated into the facility program. The supervisor should demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized personnel who applied it. The specific procedure should include the following elements:

- Verification by the supervisor/manager that the person who applied the device is not available.
- Assurance that all reasonable efforts are made to inform him/her that the device has been removed.
- Ensuring that all relevant personnel have this knowledge before he/she resumes work at the facility.

7. Testing or Positioning of Equipment or Components

Temporary removal of Lockout/Tagout devices should be discouraged. However, situations in which Lockout/Tagout devices must be temporarily removed and the equipment energized, the following sequence of operations should be followed:

1. Clear the equipment of tools and materials.

2. Remove personnel from the equipment area.

3. Remove the Lockout/Tagout device as procedures indicate.

4. Energize and proceed with testing or positioning.

5. De-energized all systems and reapply the lockout/tagout.

8. Periodic Inspections

Periodic inspections should be conducted by authorized personnel, supervisor, or appropriate manager, to determine whether procedures are being followed and to correct any deviations or inadequacies observed. Inspections should include a review of the responsibilities of personnel and supervisors. The supervisor or appropriate manager should certify that the periodic inspections have been performed, documenting the equipment and procedures involved, dates of inspection, personnel participating in the inspections, and personnel performing the inspections.

9. Caution Tags

Caution tags should not be used for personnel protection (i.e., caution tags should not be used where it is appropriate to use a Lockout or Tagout devise). Administration of caution tags could, however, be accomplished as part of the Lockout/Tagout program or it could be covered separately. The use of caution tags should be restricted to those situations in which a component or system is functional, but when some precaution or item(s) of information is necessary prior to operation. In addition, the program should include the following elements:

a. Caution tags should be uniquely identifiable and different in appearance from other station tags. The following information should be included on the tags as an aid in administer the program:

(1) caution tag number;

(2) component name and number;

(3) effective date;

(4) precaution or information applicable to the particular; situation and/or component or system; and

(5) signature of authorizing individual and organization.

b. Situations that require special operator or maintenance precautions or amplifying information should be brought to the attention of the shift supervisor or appropriate manager. The supervisor or manager should ensure that issuing a caution tag is necessary and that the tag is not being used in place of more appropriate administrative action (such as a temporary procedure change, placing an operator aide, use of the work control system, or issuance of a safety Lockout or Tagout). The supervisor review should also ensure that any instruction contained in the caution tag does not deviate from established facility procedures, technical specifications, or OSR's.

c. A record of all active caution tags and associated amplifying information should be available to the appropriate personnel. This record and associated tags should be reviewed periodically by qualified personnel. This review should verify the continued need and applicability for each caution tag and ensure that the caution tag index accurately reflects all active caution tags. This review should be documented. Any caution tags remaining in an active status for extended periods (e.g., longer than three months, as appropriate) should be brought to the attention of the operations supervisor or manager. The operations supervisor or manager should determine what action is needed to resolve the continued use of the caution tag.

d. Caution Tag Placement

Caution tags should be placed in such a way that they do not interfere with or obscure indications, switches, or other control devices but are readily apparent to an individual prior to the operation of the tagged device. Placement of caution tags should be documented.

10. Training and Communication

a. Training should be provided and docmentedto ensure that the purpose and function of the Lockout/Tagout program is understood by all personnel and that they have the knowledge and skills required for safe application, use, and removal of Lockouts and Tagouts. Training should include the following:

(1) Recognition of applicable hazardous energy sources, type and magnitude of energy or materials involved and methods to isolate and control.

(2) Personnel involved should be instructed in the purpose and use of the Lockout/Tagout procedures.

(3) All personnel who may enter the area should be trained to recognize the Lockout/Tagout and to understand the procedure and prohibition relating to attempts to restart or re-energize machines or equipment.

b. When Tagout systems are used, personnel should detrained in the limitations of tags:

(1) Tags are essentially warning devices and do not provide physical restraint on those devices as are provided by a lock.

(2) When a Tag is attached, it is not to be removed without authorization of the person responsible for it, it should not be bypassed, ignored, or otherwise defeated.

(3) Tags must be legible and understandable by all personnel.

(4) Tags and their means of attachment should be able to withstand the environmental conditions encountered in the workplace.

(5) Tags may evoke a false sense of security and their meaning needs to be understood.

(6) Tags must be securely attached so they cannot be inadvertently or accidentally detached during use.

c. When Lockout systems are used, personnel should be trained in the limitations of Locks, especially concerning the following:

(1) Operation of the facility may be hindered (this is significant when local component operations are necessary, such as remote shutdown or remote control).

(2) Locks and chains installed on small instrument line isolation valves can contribute to seismic loading and may not have been considered during safety analysis.

d. Retraining

Retraining should be provided for all authorized or affected personnel whenever there is a change in job, procedures, machines, equipment or processes that present new hazards or periodic inspection determines it is needed.

11. Lockout or Tagout Implementation

Lockout or Tagout should only be accomplished by authorized, qualified personnel.

12. Notification of Personnel

A supervisor or appropriate manager should notify affected personnel of the application and removal of Lockout/Tagout devices. Notification should be given before the devices are applied and after they are removed.

13. Outside Contractors

Whenever outside servicing personnel are to be engaged in ativities covered by the scope of the Lockout/Tagout program, the facility and the outside contractor should inform each other of their respective Lockout/Tagout procedures and should ensure that their personnel are aware of the changes.

14. Group Lockouts or Tagouts

When servicing or maintenance is performed by a crew, craft, department, or other group, they should utilize a procedure that will provide for equivalent safety provided by the personal Lockout or Tagout device.

15. Shift or Personnel Changes

Specific procedures should be utilized during shift of personnel changes to ensure the continuity of Lockout or Tagout protection, including provision for the orderly transfer of Lockout or Tagout devices between personnel or shifts.

CHAPTER X

INDEPENDENT VERIFICATION

A. INTRODUCTION

An independent verification program should provide a high degree of reliability in ensuring the correct facility operation and the correct position of components such as valves, switches, and circuit breakers. This chapter describes the important aspects of an independent verification program. Other equipment status control programs are addressed in Chapter VIII, Control of Equipment and System Status, and some applications of independent verification are addressed in Chapter IX, Tagouts. Additionally, appropriate investigations for component mispositioning events are discussed in Chapter VI, Investigation of Abnormal Events.

B. DISCUSSION

Independent verification is the act of checking that a given operation conforms to established operational criteria, as well as checking a component position independently of activities related to establishing the component's position. A comprehensive independent verification program will identify components to be included in the program, define when independent verification is required, and prescribe the methods of perfoming independent verification. Similarly, independent auditing of operations should confirm that established operational requirements are met.

Because the possibility of mispositioning may be quite remote, or because the effect of a mispositioning may not be significant to safe and reliable operation, not all components require independent verification. Therefore, it is important to identify those components that must be independently verified. Designating systems or components that require independent verification ensures the program will be consistently applied.

Definition of when independent verification is required will also help ensure consistent application of the program. The criteria should ensure that independent verification is perfomed in all cases where a reasonable potential exists for component mispositioning.

Independent verification recognizes the human element of component operation; that is, any operator, no matter how proficient, can make a mistake. This concept should be stressed in an independent verification program so that the operators' confidence in the ability of their peers will not cause a relaxation of attentiveness with respect to verification tasks. Operators should understand the importance of the independent verification program and address this task with a high level of personal integrity and discipline.

C. GUIDELINES

1. Components Requiring Independent Verification

Components that are critical to ensure safe and reliable operation should receive an independent verification of their position when circumstances warrant. These components should be identified explicitly in facility procedures or other official documents so that unnecessary interpretation of requirements will be minimized. In addttion, this will result in uniform practices by operations personnel. Because mispositioning of certain components that are not safety related can lead to facility shutdowns, challenges to safety-related equipment, or other undesirable effects on facility safety and reliability, independent verification should not be limitedto safety-related system components. Each facility should use an accepted safety analysis method (e.g., fault-tree analysis, Probability Risk Analysis) and/or expert opinion to determine its own facility specific list of systems and components, which should receive independent verification in accordance with the following guidelines:

a. Safety-Related Systems

All components in systems that have safety-related functions should be considered for independent verification. However, if the following criteria have been met, some components might not need independent verification:

(1) Mispositioning would not affect system performance.

For example, if an engineering analysis has shown that mispositioned vent or drain valves do not affect system performance, they might not require independent verification.

(2) The mispositioning would be known immediately to an operator.

For example, resetting a steam-supply trip valve might not require independent verification if an annunciator alarm in the control room were available to alert operators to an improperly reset valve. However, such annunciator alarms should be independent from the valve position lights associated with main control board valve operation switches. Valve position lights alone should not warrant exemption from independent verification requirements, because these lights might not alert operators to a mispositioned valve. Mispositionings have occurred when main control board indication was available.

(3) Significant radiation exposure would be received by the person(s) performing the independent verification.

In this case, alternate means for independent verification that do not involve radiation exposure, such as observing process parameters (Section C.3), should be considered.

Variances from independent verification requirements in accordance with the above criteria should be approved by the operations supervisor.

b. Systems Not Related to Safety

Independent verifications should be performed for certain components that are not related to safety which, if mispositioned, could lead to unplanned shutdowns, challenges to safety systems, or (through interfaces with safety-related systems) cause radioactive or toxic material release. For example, component positions necessary to support the operation of important facility equipment, such as redundant generator stator cooling water pumps or turbine control oil (EHC) pumps, should be independently verified in order to prevent unnecessary process shutdowns. Also, certain valve positions in liquid or gaseous radioactive waste systems should be independently verified if a mispositioning could lead to an unintended radioactive or toxic material release.

2. Occasions Requiring Independent Verification

Components should receive independent verification when the equipment they serve must be available and when a reasonable possibility exists that the components might have been mispositioned. The following guidelines describe situations where independent verification would be appropriate:

a. Returning Equipment to Service Following Maintenance or Testing.

Independent verifications should be performed to ensure that systems are properly aligned when equipment is returned to service. After maintenance activities, it is appropriate to verify independently the positions of components that have been tagged to establish an isolation boundary for the work. Also, additional components that could have been mispositioned during maintenance should be selected for verification on a case-by-case basis by the individual authorizing equipment for return to service.

Such additional items requiring verification would include any component(s) that had been worked on and might also include Instrument stop valves, bypass valves, switches, and isolation valves located within the work boundary.

Failure to properly restore systems following surveillance testing has resulted in mispositionings. Selected components should therefore be independently verified during or after surveillance tests. Surveillance tests are normally performed in strict adherence to detailed procedures that specifically address each operating component. Components not addressed by the test procedure would not be likely to be mispositioned as a result of tests, and independent verification would be necessary only for components that had been positioned during tests.

b. Removing Equipment From Service

To ensure that only the specific items of equipment intended to be removed from service are affected by Tagouts, independent verifications should be performed when equipment is removed from service. For example, when tagging out a pump, a verification that the redundant pump was not inadvertent y affected should be performed. This might be done by checking for correct alignment of components on the redundant equipment, or this might be done by verifying that all Tags were placed on the correct components.

c. System Lineups

During extended shutdowns, it is often impractical to completely restore systems to their normal operating alignment immediately after maintenance is completed. Therefore, most facilities delay restoration of systems not needed for shutdown activities until shortly before startup. At that time, all systems whose status is questionable are checked. When system lineups are performed, the considerations of Section C1, Components Requiring Independent Verifications, should be applied to determine the need for independent verification.

d. Periodic Checks During Facility Operation

In order to verify that all associated equipment is fully functional, DOE facilities should perform routine, periodic verifications of certain critical components during normal operations. Since this check is independent from any activity that might have caused a component to be mispositioned, it can be considered an independent verification; a second check normally would not be necessary. However, if a mispositioning were discovered

while the periodic check was being performed, the component position would then be corrected after review and/or approval by a qualified supervisor; an independent verification of this action would be appropriate.

3. Verification Techniques

Operators should be trained in the appropriate techniques for verifying the positions of all facility components. In addition, a reference document should be provided explaining what an operator should do when verifying a component position. Because of the large variety of components in use in DOE facilities, it is not feasible to provide specific instructions for verification of individual component positions without facility-specific knowledge. Each facility should use its most experienced personnel to develop these instructions, using applicable manufacturer's recommendations where available. The instructions should describe the techniques for verifying manual valves, motor- and air-operated valves, solenoid-operated valves, circuit breakers, blank flanges, removable links and fuses, and the availability of control power. These instructions will help to ensure that operators use approved methods when verifying component positions and will help provide uniformity in operator performance. The following general guidelines apply to component verification techniques:

a. Independence

Independent verifications should be conducted in a manner such that each check constitutes an actual identification of the component and a determination of both its required and actual positions. To be independent, the integrity of the checks must be maintained by minimizing interaction between the personnel operating components and those performing the independent verifications. It is not always possible to determine if an operator has completely shut or opened a valve by merely observing the action; mistakes in component identification or requirement determination might not be caught without both individuals' reading the labels and procedures.

b. Remote Position Indicators

Some equipment failures have caused valve position indicating lights on the main control board to be incorrect, and some of these failures were undetected for a significant length of time. Since the failure may be in the sensor or transmission, independent verification should be performed locally unless ALARA or other overriding factors preclude. In this case, independent verification may be done at a remote position indicator.

c. Process Parameters

In some situations, a component's position can be determined by observing such process parameters as pressure, flow, or voltage. The observation of process parameters, combined with a physical check of a component's position, can constitute an independent verification. However, care must be exercised when using process parameters because alternate flow paths or other factors could cause there to be misleading indicators of component position. For example, voltage on a bus would prove that a particular supply breaker was shut only when there was no alternate power supply. Additionally, flow and pressure do not necessarily indicate that a valve is fully open. For the above reasons, process parameters normally should not be used as the only indication of a component's position. Facility procedures should specify where and when process parameters are acceptable indicators of component position.

d. Throttled Valves

Verifying throttled valves by shutting and reopening the valve by a prescribed number of turns should be avoided because this practice has the potential to create valve mispositionings. Instead, position indicators, scribe marks, or other officially recognized and designated indicators should be used to determine throttled valve positions. When shutting and reopening a throttled valve are necessary to determine its position, having a verifier observe a valve operator's actions would be preferable to having both persons independently shut and reopen the valve. This would cause the verification to be partially nonindependent, a situation preferred in this case because, when a valve is operated to check its position, the action effectively nullifies any previous check.

e . Surveillance Testing

In some cases, surveillance testings may be substituted for normal verification techniques. A notable example would be a full-flow test to prove the correct positioning of flow controlling P-valves. However, surveillance tests frequently will not serve to verify the position of all components that are important to subsequent system's operation. For example, running a pump in recirculation would not prove that all main flow-path valves were properly positioned or that support functions such as external cooling or backup lube oil pumps are aligned properly.

Surveillance testing therefore should not be used as independent verification, unless it can be shown that the test conclusively proves the position of the components in question. The applicability of surveillance testing to satisfy independent verification requirements should be approved beforehand by the operations supervisor.

f. Operations Self-Appraisal and Verification

Programmatic operations appraisals should be independently conducted and/or verified to ensure that environment, safety, and health considerations, and operations functions (such as training) are being conducted in accordance with established operational criteria.

CHAPTER XI

L0GKEEPING

A. INTRODUCTION

The operations records should contain a narrative log of the facility's status and of all events as required to provide an accurate history of facility operations. As used in this context, logs are defined as a narrative sequence of events or functions performed at a specific shift position, as opposed to the operator round sheets that are discussed in Chapter II, Shift Routines and Operating Practices. This chapter describes the features needed in the operation logs to ensure they are properly maintained.

B. DISCUSSION

Operation logs should be established for all key shift positions in order to record fully the data necessary to provide an accurate history of facility operation. Events should be recorded in a timely fashion in order to ensure the accuracy of the entry. The scope, type, and data required by management is properly entered into the logs. This includes documentation of actions taken, activities completed, transfer of information among operators, and data necessary for event reconstruction.

A review schedule for the operating logs should be established to ensure they are adequately maintained and that operations personnel are aware of the information contained in the logs. Administrative controls should be established to ensure that all operating logs are readily available for a sufficient period of time to allow for the transfer of information among the operators.

C. GUIDELINES

1. Establishment of Operating Logs

Narrative logs should be established at all key shift positions. As a minimn, a narrative log should be maintained by the operations supervisor or the control area operator. For those shift positions that are manned on a part-time basis (e.g., radwaste operator, makeup plant, etc.) a log should be established to ensure that pertinent information is passed from operator to operator. A narrative section should be provided on round sheets when a narrative log is not used for a particular shift position.

2. Timeliness of Recordings

Information should be promptly recorded in the logs. Delaying the recording of activities or events often leads to incomplete or inaccurate entries.

3. Information to be Recorded

The operations supervisor should provide written guidance to define thoroughly the type and scope of entries for each log and the format for making entries. The following information should be recorded in at least one station log, although any one log might not contain all these items:

a. Facility mode or condition than es (e.g., shutdown, operations, run, startup, refueling, etc.);

b. Criticalities and appropriate critical data (for DOE reactors);

c. Abnormal facility configurations;

d. Status changes to safety-related and other major facility equipment;

e. Occurrence of any reportable events;

f. Initiation and completion of surveillance tests;

g. Entering and exiting operational limit actions;

h. Security incidents;

i. Out-of-specification chemistry or process results; and

j. Shift reliefs.

To aid in event reconstruction, as much significant information as possible should be logged during emergencies and abnormal or unexpected events. However, logkeeping should not take precedence over controlling and monitoring the facility.

4. Legibility

Log entries should be made in a manner such that they can be easily read and understood. Additionally, the log entries should be readily reproducible with standard photocopy machines. For these reasons, black, waterproof ink is recommended.

5. Corrections

A standardized method for correcting any erroneous entries should be established. The method chosen should not obscure the incorrect entry. Log entries should not be erased or covered up. Corrections can be made by placing a single line through the incorrect entry and writing the correct entry in a nearby space. All corrections should be initialed and dated.

6. Log Review

Control area logs should be reviewed periodically by the operations supervisor and logs kept by operators outside the control area should be reviewed by the control area operator or an appropriate supervisor. These reviews should ensure that entries are accurate and adequate.

7. Care and Keeping of Logs

Management should provide written guidance on the disposition of completed logs. This guidance should address the following:

a. Making the logs available for operators who return after periods of absence from their regular duties;

b. Storing the completed logs to ensure preservation for the expected life of the facility; and

c. Retrieving stored logs should this become necessary.

CHAPTER XII

OPERATIONS TURNOVER

A. INTRODUCTION

Operations shift turnovers should provide oncoming operators with an accurate picture of the overall facility status. This chapter complements the guidelines of Chapter II, Shift Routines and Operating Practices, and Chapter III, Control Area Activities, and describes the important aspects of a good shift turnover.

B. DISCUSSION

Shift turnover is a critical part of DOE facility operation. Personnel should not assume operational duties unless they are physically and mentally fit to do so and until they and the offgoing personnel have a high degree of confidence that an appropriate information transfer has taken place.

Oncoming personnel should conduct a comprehensive review of appropriate written (logs, records) and visual (equipment, control boards) information before responsibility for the shift position is transferred. Oncoming personnel could arrive early or offgoing personnel could stay late so that adequate review time is available.

Shift turnovers should be guided by a checklist and should include a thorough review of appropriate documents describing important aspects of facility status and should include an inspection of appropriate facility instrumentation. These reviews should then be complemented by a discussion between the offgoing and oncoming operators.

C. GUIDELINES

1. Turnover Checklists

As a minimum, supervisory positions should have a turnover checklist to be used in the turnover process.

a. Equipment Operator Checklists Equipment operator checklists, or other formal documents, should provide for noting major components status (e.g., operating pumps, trains in service, etc.), abnormal lineups, valid alarms on all pertinent local control panels, and surveillances or evolutions planned or in progress. Provisions should also be made for documenting that a review of round sheets and narrative logs has been performed by the oncoming operator.

b. Operator Checklists

Operator checklists or other documents reviewed at shift change should provide for recording vital information about the following facility status. Examples may include:

(1) Facility power level, test status, or equivalent;

(2) Key temperatures limit status;

(3) Key pressures limit status;

(4) Important tank levels;

(5) Safety equipment status;

(6) Operational limits in effect;

{7) Other important parameters;

(8) Required chemistry or process sample times;

(9) Maintenance, surveillances, tests, or evolutions (in progress or planned);

(10) Problems experienced with equipment and major equipment out of service;

(11) When specific planned actions are required;

(12) Changes in radiological or hazardous materials conditions; and

(13) Temporary procedure changes in effect.

Operator checklists may require documenting reviews of certain facility status documents. These may include the operator's own operating (narrative) log, the Tagout (clearance) log, the temporary modification and jumper logs, the out-of-service annunciator log, the operational limit action log, the shift order books, and required reading since the last shift. Each operator turnover checklist should be provided with enough space for the offgoing operator to list other important information his relief should have.

c. Operations Supervisory Checklists

Operations supervisory checklists or other documents reviewed at shift change should provide vital information about facility status. Examples may include:

(1) Facility status;

(2) Evolutions (completed, in progress, or planned);

(3) Controlled key status;

(4) Abnormal lineups or conditions;

(5) Changes in radiological or hazardous substance conditions;

(6) Surveillance tests planned or in progress;

(7) Maintenance planned or in progress; and

(8) Waste management status.

Operations supervisory checklists should require documenting review of certain status documents. These can include the supervisor's own narrative log, the status log, the equipment status checklist, the emergency safeguards equipment list, shift order books, and required reading since the last shift.

2. Document Review

Oncoming operators and supervisors should review documents specified on their checklists prior to assuming responsibility for their shift position. Document review should be as intensive as necessary for the oncoming personnel to understand important history, present status, and planned events. Normally, narrative log entries for the previous 24-hour period or since his/her last shift should be reviewed. Status logs should be reviewed so that the operator and supervisors are familiar with all currently active entries, with an emphasis on what has changed since he/she last had the shift.

3. Control Panel Walkdown

Walkdowns of appropriate control panels should be conducted by each shift watchstander. The purpose of a panel walkdown is to determine plant status through observation of system lineups, switch positions, lighted annunciators, chart recorders, and status lights.

Oncoming operations supervisors should walk down the main control panels before, during, or shortly after shift turnover. Oncoming and offgoing control area operators should walk down their unit's main control panel together. Equipment operators should review all pertinent local control panels, (e.g., fuel supplies, lubrication levels, makeup water treatment, and ventilation) during their tour early in the shift.

4. Discussion and Exchange of Responsibility

At a time when facility conditions are stable, the offgoing supervisor or operator should explain all tiems noted on the turnover checklist, and the oncoming operator or supervisor should ask any pertinent questions.

When all operations personnel are satisfied that the oncoming crew is fully cognizant of the plant conditions, the oncoming operators and supervisors should state that he/she is assuming responsibility for the shift position with an entry into the log.

S. Shift Crew Briefing

Crew briefing should be conducted by the operations supervisor as required and may be conducted after he has accepted responsibility for the shift. The briefing should include a review of the status, problems with equipment, and evolutions in progress or planned during the shift. In addition to shift operators, personnel from support groups (e.g., contractors, vendors, and test groups) should also attend briefings when their activities can directly affect operations. This practice results in better understanding of shift priorities and objectives among operations and support personnel.

6. Reliefs Occurring During the Shift

Reliefs occurring during the shift (e.g., exchange of control supervisory function) should have a turnover to ensure that the oncoming person is at least as knowledgeable of the conditions as he would have been had a complete shift turnover process been conducted. For example, control panel walkdowns and log reviews may or may not be necessary, depending on the oncoming person's familiarity with the current conditions.

CHAPTER XIII

OPERATIONS ASPECTS OF FACILITY CHEMISTRY AND UNIQUE PROCESSES

A. INTRODUCTION

Operational monitoring of facility chemistry or unique recess data and parameters should ensure that parameters are properly maintained. Maintenance of proper processes will promote maximum component life. Monitoring will identify problems such as air inleakage, failed fuel, or resin depletion before components or safety are adversely affected. A close coordination between the operations and chemistry or process departments is necessary for this to be effective. This chapter describes the important aspects of operations involvement in chemistry and unique processes.

B. DISCUSSION

In order to enhance proper process control of systems, operations personnel must have an understanding of all facility processes and must effectively coordinate operations activities with the respective technical process support departments.

Operators should understand the responsibilities associated with their positions (both in process monitoring and control and in interface with the technical process department). So that they can identify early signs of process-related problems. Operators should also understand how equipment and operational problems affect process conditions. A good working relationship between the operations and technics process departments should be established so the facility staff can effectively control facility processes.

c. GUIDELINES

1. Operator Responsibilities

The operations supervisor should define each operator’s specific responsibilities with respect to process control. In general, operators should monitor chemistry or process parameters using control room instruments and other instruments related to equipment under operations control. Operators should be able to recognize out-of-specification conditions or adverse trends and be familiar with corrective actions associated with chemistry or process problems. Operators should consult and be advised by chemistry or technical process department personnel. By monitoring key parameters and taking appropriate action promptly, long-term adverse effects of chemistry or process problems can be avoided or minimized.

2. Operator Knowledge

Operators should be knowledgeable about aspects of facility processes and safety that affect operation and should be able to analyze off-normal situations and take appropriate action to correct the causes(s) of problems. Examples of the types of concepts and processes with which operations personnel should be familiar include the following:

a. Concepts of pH, conductivity, cation conductivity, and dissolved oxygen and the effect these parameters have on the facility.

b. The radiochemical indications of failed fuel (for DOE reactors).

c. How demineralizers work and how to determine if they are performing inefficiently.

d. The purpose and hazards associated with facility storage and use of such chemicals as boron, acids, caustics, chromates, hydrazine, ammonia, solvents containing chlorinated hydrocarbons, and chemicals containing organics.

e. Chemical and radiochemical parameters, including calculations associated with technical specifications/operational safety requirements.

f. Chemistry parameters monitored in the control room or on local panels under the responsibility of facility equipment operators.

g. Properties and hazards of such gases as hydrogen, nitrogen, carbon dioxide, chlorine, and halon.

h. Corrosion problems, including stress corrosion, intergranular cracking, and amonia attack of copper alloys.

i. The chemical constraints, process equipment, and controls associated with the radioactive or toxic waste systems.

j. Operation of such water pretreatment equipment as clarifiers or charcoal filters (if such equipment is operated or monitored by operations personnel).

k. Knowledge of operating limits and characteristics of off-normal and unique processes.

l. Knowledge of appropriate response and recovery from off-normal or hazardous conditions.

The operations supervisor should ensure that these and other topics are appropriately addressed in training programs.

3. Operator Response to Process Problems

Each operator should be capable of correctly interpreting the chemistry or process parameters that he is responsible for and be able to provide appropriate, timely, corrective action when required. High air inleakage and poor quality makeup water are examples of conditions that could require operator identification and response.

4. Communication Between Operations and Process Personnel

If possible, operators should inform appropriate process personnel prior to commencing evolutions that could potentially affect facility processes or require action from support technicians. Operators should receive reports from the process department on key day-to-day process results and problems. When process-related problems occur, operations and process-personnel should work closely to provide prompt corrective action.

CHAPTER XIV

REQUIRED READING

A. INTRODUCTION

Proper use of a required reading file by operations personnel should ensure that appropriate individuals are made aware of important information that is related to job assignments. This chapter describes an effective required-reading program.

B. DISCUSSION

It is usually not necessary for a document to be read by all personnel; however, it is essential that a method be provided to ensure that each individual receives the information important to his/her position. The method should designate which documents should be read by whom and by when. Personnel should be required to understand assigned material. When reading material is not understood, appropriate questions should be directed to supervisors.

C. GUIDELINES

1. File Index

A list of the types of documents to be included in the required-reading file should be maintained. The list should include the following documents:

a. Procedure changes;

b. Equipment design changes;

c. Related industry and in-house operating experience information; and

d. Other information necessary to keep operations department personnel aware of current facility activities.

Reading material should be screened to ensure that only appropriate material is placed in the file.

2. Reading Assignments

A method should be in place to designate which documents need to be read by the individuals filling each position, and the reading file should be readily available to those individuals.

3. Required Dates for Completion of Reading

A required completion date should be designated for reading each document. This date would be determined based on the nature of the material. Personnel should complete their reading assignments by the required date. Certain documents may be designated for “immediate reading.” These should be read before assuming responsibility for a shift position.

4. Documentation

Completion of reading should be documented, and the documentation should be retained.

5. Review

The reading file should be periodically reviewed to ensure that all department personnel complete readings by the required dates. Material that has been read by all appropriate personnel should be removed from the active file. A "dead” file may be maintained as a reference.

CHAPTER XV

TIMELY ORDERS TO OPERATORS

A. INTRODUCTION

A means for operations management to communicate short-term information and administrative instructions to operations personnel should exist. Other means of disseminating guidance to operators are addressed in Chapter XVI, Operations Procedures, and Chapter XVII, Operator Aid Postings. This chapter describes the key features of an effective operator orders program.

B. DISCUSSION

The changing needs and requirements of DOE facility operations necessitate that a program be implemented to disseminate information to operations personnel in a timely manner. To ensure that this information remains current, periodic reviews to remove outdated information should be included in the program.

C. GUIDELINES

1. Content and Format

Information such as special operations, administrative directions, special data-collection requirements, plotting process parameters, and other similar short-term matters can be included in operator orders. Examples of orders could include instructions on the need for and performance of specific evolutions or tests; it could also include work priorities, announcements of policy information, and administrative information. Orders should be clearly written, dated, and maintained in the control room. Information and policies intended as permanent should be incorporated into appropriate administrative procedures. The operator orders program should not be used to change operating procedures, because the changes noted in the operator orders might be missed by a procedure user. Additionally, operator orders may not receive the approval appropriate for a procedural change. Therefore, information intended to supplement operating procedures should be promptly incorporated into the appropriate procedure by a procedure change or revision (see Chapter XVI).

2. Issuing, Segregating, and Reviewing Orders

Operator orders should be issued by the operations supervisor or his/her designee whenever necessary to communicate instructions to the shift personnel. Operator orders should be segrated into daily and long-term orders in order to facilitate review by shift personnel. Daily orders that are postponed or prolonged should have daily review or updates. Reviews of long-term orders may not be required on a daily basis but should be made periodically and when changes occur. Appropriate operations personnel should review the orders early in the shift and document their review by initialing the log or notebook.

3. Removal of Orders

Orders that are no longer applicable or are outdated should be promptly removed or cancelled. The operations supervisor should periodically review the operator orders to ensure that only applicable and current orders remain effective.

CHAPTER XVI

OPERATIONS PROCEDURES

A. INTRODUCTION

Operations procedures are written to provide specific direction for operating systems and equipment during normal and postulated abnormal and emergency conditions.

Operations procedures should provide appropriate direction to ensure that the facility is operated within its design bases and should be effectively used to support safe operation of the facility. Other methods of disseminating operational information are addressed in Chapter XI, Operator Orders, and Chapter XVII, Operator Aid Postings. This chapter describes the important aspects of operations procedure development and use.

B. DISCUSSION

Procedures are a key factor affecting operator performance. Appropriate attention should be given to writing, reviewing, and monitoring operations procedures to ensure the content is technically correct and the wording and format are clear and concise in accordance with NUREG-0899. Although a complete description of a system or process is not needed, operations procedures should be sufficiently detailed to perform the required functions without direct supervision. Consistency in procedure format, content, and wording is essential to achieve a uniformly high standard of operator performance. Operators should not be expected to compensate for shortcomings in such procedures as poor format or confusing, inaccurate, or incomplete information. Instead, procedures should be written in such away that they can be easily used without making mistakes.

During the course of operations, technical and operational requirements change and better ways of doing things develop. To ensure that procedures in use provide the best possible instructions for the activity involved, periodic review and feedback of information are essential.

The facility policy on use of procedures should be clearly understood by all operators. Properly controlled and readily available procedures promote use and ensure that operational activities will be conducted in the manner intended.

C. GUIDELINES

1. Procedure Development

To ensure consistency among operations procedures, the methods for developing new procedures, including procedure formats, should be clearly defined. Administrative procedures and/or writers' guides should direct the development and review process for procedures.

Procedures should be developed for all anticipated operations, evolutions, tests, and abnormal or emergency situations. Annunciator/alarm response procedures that guide the operator in verifying abnormal conditions or changes in plant status and provide the appropriate corrective action should redeveloped for all alarm panels. All procedures should provide administrative and technical direction to conduct the intent of the procedure effectively. The extent of detail in a procedure should depend on the complexity of the task, the experience and training of the user(s), the frequency of performance, and the significance of the consequences of error.

Procedure preparation, verification, and validation should receive high-level attention. Qualifications for procedure writers should be considered, including operating organization and experience. Review, verification, and validation should be formalized for written and software procedures.

2. Procedure Content

To provide uniformity in operations procedures, the content of procedures should conform to prescribed guidelines. The procedure aspects described below should be followed when developing operations procedures:

a. The scope and applicability of individual procedures should be readily apparent. Procedures with single-unit applicability should be distinctively identified to avoid confusion with sister-unit procedures. In addition, to enhance rapid retrieval, emergency procedures should be distinguishable from other procedures. Color coding could be used for these purposes.

b. Procedures should incorporate appropriate information from applicable source documents, such as the facility design documents, safety analysis documents, and vendor technical manuals.

c. Prerequisites and initial conditions should be detailed. Careful consideration should be given to the location of this information within the procedure in order to help ensure that the intent of the procedure is understood. In addition, any hoses, tools, or other temporary testing

equipment should be verified operable, calibrated, or inspected and in good condition where possible, before implementing any test procedure, to ensure that they function as expected during the test. These verifications should be identified in the prerequisite section, with completion sign-offs required. "Hold" points (requiring independent verification and/or approval) should be clearly delineated.

d. Definitions used in the procedure should be explained.

e. Procedures should be easily understood, and actions should be clearly stated.

f. Procedures should contain only one action per step.

g. Procedures should contain sufficient but not excessive detail.
The skill level, experience, and training of the users should be considered.

h. Warnings, notes, and cautions should be easily identifiable and should not contain action statements. The probability of missing an action step increases when it is included in a warning, note, or caution.

i. Warnings and cautions should precede the step to which they apply. Warnings, notes, and cautions should appear on the same page as the step to which they apply. This ensures that operators are alerted to necessary information before performing a procedural step.

j. Procedures should be technically and administratively accurate (i.e., the instructions and information should be correct; referenced documents should be correctly identified; and necessary instructions should represent to guide the user when transferring between procedures).

k. Individual sign-offs should be provided for selected critical steps. One sign-off should not be applied to more than one action.

l. Limits and/or tolerances for operating parameters should be specified and should be consistent with the readable accuracy of instrumentation. Operators should not be required to perform mental arithmetic to determine if a specified parameter is acceptable.

m. Acceptance criteria for surveillance or test procedures should be easily discerned, including tolerances and units. if calculations are needed to compare data to acceptance criteria, the calculations should be clearly explained.

n. Sequence of procedural steps should conform to the normal or expected operational sequence. Training on this sequence, reinforced with procedures that show the same sequence, will serve to improve operator performance by development of patterns of action that are more easily remembered.

o. Procedures should be developed with consideration for the human-factor aspects of their intended use. For example, references to components should exactly match drawing and label-plate identifiers, units should be the same as those marked on applicable instrumentation, and charts and graphs should be easily read and interpreted. Important factors (such as operating limits, warnings, cautions, etc.) should be highlighted.

p. Emergency operating procedures should provide guidance in responding to single and multiple casualties.

q. Portions or steps of other procedures that are used or referred to when performing a procedure should be specifically identified within the procedure so that operators will not be confused when transferring between procedures.

r. Component or system shutdown and restoration requirements following shutdown or a surveillance or test activity should be specific and controlled by the procedure.

3. Procedure Changes and Revisions

Procedure changes and revisions are necessary to ensure that procedures reflect current operating practices and requirements. The review and approval process for each procedure change or revision should be documented. For the purpose of these guldelines, a “procedure change” refers to an on-the-spot change (whether for permanent or for one-time-only use). Procedure changes do not involve retyping or reissuing a procedure. "Procedure revisions" constitute a new, retyped edition of the procedure. Procedure changes and revisions should conform to the following practices:

a. Procedure changes intended for use more than one time should be documented in a location readily available for operator reference. To avoid the possibility of error, these changes should also be referenced in procedure copies used by operators.

b. Appropriate procedure changes and revisions should be initiated when procedure inadequacies or errors are noted.

c. Procedure revisions should be initiated when a change has been outstanding for an extended period (e.g., greater than 6 months) or when a procedure has been affected by several changes (e.g., more than five). All currently effective procedure changes should normally be incorporated when the procedure is revised.

d. Procedure revisions should be implemented concurrently with modifications. Procedure updates required by temporary modifications should be handled as procedure "change" and implemented concurrently with the temporary modification installation.

e. Important information regarding changed or revised procedures should be communicated to appropriate operations personnel via the required reading system (Chapter XIV), a pre-shift briefing, or a similar method.

f. Documentation of the reason for key procedure steps should be maintained and reviewed when implementing changes or revisions that alter these steps. This practice is important to ensure that the reason for any step is not overlooked.

g. The review process should involve verification and validation of the procedure using walkthroughs or similar methods.

4. Procedure Approval

Operating procedures should be approved by the operations supervisor. In addition, procedures that affect safety-related equipment and emergency procedures should be reviewed by the facility safety review committee or by another appropriate review mechanism. Procedure revisions should receive the same depth of review and level of approval as the initial versions. New and revised procedures should be approved prior to use.

Changes in Operations procedure that do not affect the intent of operations procedure should be approved by two individuals; one should be a qualified operator, and the other should be a member of facility management. For this purpose, management could be interpreted to mean the operations supervisor or a more senior individual within the operating organization. Within 2 weeks, these procedure changes should be concurred with by the individuals who would normally approve a revision or the initial version of the procedure. Changes that alter the intent of a procedure should receive the same approval as a newer revised procedure.

5. Procedure Review

New and revised operations procedures should be reviewed prior to issuance and at periodic intervals to ensure that the information and instructions are technically accurate and that appropriate human-factor considerations have been included. The frequency of subsequent reviews should be specified; it may vary with the type and complexity of the activity involved and with time as a given plant reaches operational maturity. Applicable procedures should be reviewed after an unusual incident (such as an accident, an unexpected transient, significant operator error, or equipment malfunction). During reviews, procedures should be compared to source documents to verify their accuracy. In additton, new procedures should be validated by walk-throughs in the facility or by operation on a facility-specific simulator to ensure workability.

6. Procedure Availability

A controlled copy of all operations procedures should be maintained in the control area for operator reference, and selected controlled procedures should be maintained at other appropriate locations. For example, controlled procedures for facility shutdown from outside the control area should be maintained at the remote shutdown location(s). It may be desirable to have procedures for routine evolutions available at local work stations.

Working copies of controlled procedures should be available for use during evolutions. However, since these documents have only a limited lifespan, working copies should be controlled and a system should be in place to ensure that outdated procedures are not used by mistake and that working copies are replaced according to approved procedures. For example, uncontrolled working copies could be verified by comparison to a controlled copy prior to use.

Controlled annunciator response procedure information should be easily accessible to the operators responsible for responding to alarms. Some facilities can provide annunciator response procedures at local control panels. If this is not done, annunciator response procedures should be provided at an alternate location convenient to the equipment operator.

7. Procedure Use

Facility operation should be conducted in accordance with applicable procedures that reflect the facility design basis. The requirements for use of procedures should be clearly defined and understood by all operators. If procedures are deficient, a procedure change should be initiated. In exception

to this policy, operators may take whatever action is necessary during emergency conditions to place the facility in a safe condition, and to protect equipment, personnel, and public safety without first initiating a procedure change.

Operators should have procedures with them and follow them in a step-by-step manner when the procedures contain sign-offs for the various activities. In addition, procedures should be referenced during infrequent or unusual evolutions when the operator is not intimately familiar with the procedure requirements or when errors could cause significant adverse impact to the facility. Operators need not reference emergency procedures during the performance of immediate actions since these actions, are committed to memory; however, the emergency procedure immediate action instructions should be reviewed after the actions are performed, thus, verifying, that all required actions have been taken.

CHAPTER XVII

OPERATOR AID POSTINGS

A. INTRODUCTION

Facility operator aids (information posted for personnel use) should provide information useful to operators in performing their duties. An operator aid program should be established to ensure that operator aids that are posted are current, correct, and useful. This chapter describes the important aspects of an operator aid program.

B. DISCUSSION

Operator aids provide an important function in the safe operation of the facility. Operator aids may come in many forms: copies of procedures (portion or pages thereof), system drawings, handwritten notes, information tags, curves, and graphs. It is important to make sure that these types of postings reflect the most current information available and that they do not supersede or conflict with any other controlled procedure or information.

C . GUIDELINES

1. Operator Aid Development

Any facility employee could develop an operator aid; however, it should be approved prior to posting. Operator aids (system drawings, maintenance procedures, etc.) may often be posted by individuals other than operations personnel; therefore, all facility personnel should be informed of the importance of controlling posted information and the procedure to be followed when posting information.

2. Approval

The operations supervisor, or a higher authority, should approve all operator aids. The person approving an operator aid should ensure that the aid is necessary and correct. Operator aids that alter procedures should not be approved. Instead, appropriate procedures should be changed to incorporate the necessary information.

3. Posting

Operator aids should not be posted in such a way as to obscure instruments or controls. The aids should be located in close proximity to the area of their expected use. The operator aids should, when possible, be protected (laminated) and should be securely fastened to the equipment to which they refer.

4. Use of Operator Aids

Operator aids should be viewed as a convenience to the individual using them, not a requirement. In most cases, operator aids remind users of information that might otherwise be overlooked and provide guidance that is not procedural in nature. Operator aids may supplement approved procedures, but they should not be used in lieu of approved procedures.

5. Documentation

A listing of all approved operator aids should be maintained along with a copy of each aid posted in the facility. This list should be used during periodic reviews of operator aids in order to help ensure that the posted aids remain current, and to provide a reference copy should an operator aid be missing during the review. The list should be kept in the control area, the operations supervisor's office, or other appropriate location. References from which operator aids were derived, control numbers (including revision), and dates of approval should be provided.

6. Review

The posted operator aids should be reviewed periodically to ensure they are still correct and necessary. In addition, an operator should audit the control area listing to ensure that only currently posted aids are recorded on the listing. Operator aids no longer posted should be removed from the listing, and missing aids should be replaced.

Some operator aids are graphs, curves, or other portions of approved procedures. To help ensure that these types of operator aids are the most current versions, they should be updated when the "parent" procedure is revised. One way to accomplish this is to notify appropriate document control personnel of those operator aids that are derived from procedures. When a revision is made to one of these procedures, document control would notify the control room to check the affected operator aid and see if changes are necessary.

During routine facility inspections, operations personnel should review operator aids to ensure that they are approved. Unapproved postings should be submitted for approval or removed. It is important for all personnel to understand that the use of an out-of-date operator aid could be just as detrimental as the use of an out-of-date procedure.

CHAPTER XVIII

EQUIPMENT AND PIPING LABELING

A. INTRODUCTION

A well-established and maintained equipment labeling pro ram should help ensure that facility personnel are able to positively identify equipment they operate. In addition, equipment labeling is required by Operational Safety and Health Administration (OSHA) regulations. This chapter describes the important aspects of a labeling program.

B. DISCUSSION

A good labeling program, understood and maintained by operating and maintenance personnel, will enhance training effectiveness and will help reduce operator and maintenance errors resulting from incorrect identification of equipment. Personnel radiation exposure or exposure to hazardous materials will also be reduced if operators spend less time identifying components.

The labeling program should continue throughout the life of the facility. Because equipment labels will be continually misplaced or damaged, an ongoing labeling program should exist to allow personnel to identify components needing labels, to identify a person or persons responsible for making new labels, and to ensure that new labels are correct and placed on the proper equipment. In addition to equipment, doors to rooms should be labeled so that personnel can identify the room and, if applicable, the equipment inside.

C. GUIDELINES

1. Components Requiring Labeling

The following components should be labeled:

a. Valves;

b. Major equipment (e.g., tanks, pumps, and compressors);

c. Switches;

d. Circuit breakers (4.16KV, 480V, 120VAC/DC, etc.);

e. Fuse blocks or fuse locations;

f. Instruments and gauges;

g. Busses and motor control centers;

h. Cabinets (including internal components such as relays, terminals, etc.);

i. Room doors;

j. Emergency equipment (such as fire alarm stations, sound powered phone headsets, etc.); and

k. Fire protection systems.

2. Label Information

Information on labels should be consistent with the information found in facility procedures, valve lineup sheets, and piping and instrument diagrams. Abbreviations and nomenclature used should be standardized and should be understood by facility personnel. Labels should be permanent, securely attached, and have distinguishable, easy-to-read information. Each component label should list a unique component number. The accompanying component noun name or description and power supply, if applicable, should also be provided. Labels may be color coded for unit, system, and/or train designation. If color coding is used, the colors should be applied consistently and have only one meaning per color or combination.

Piping should be labeled to indicate the fluid contained and the normal flow direction. OSHA color coding for pipes could be used, and pipes containing potentially radioactive fluids, toxic fluids, or explosive gases should be uniquely marked.

Labels should be made from materials that are compatible with their particular application. For example, chloride-free labels should be used on stainless steel piping, and temperature-tolerant labels should be used on hot components. Adhesives used for label attachment should also be verified for compatibility.

3. Label Placement

Labels should be placed on or as near as practicable to the equipment to be labeled. The label should be oriented in a manner that is easy to read and so that the correct component is easy to identify.

For example, labels for switches, indications, and breakers on control or power panels should be placed closer to the identified component than any other component so that the label clearly identifies the correct component. Label placement should not interfere with equipment operation or obscure indicators.

4. Replacing Labels

a. Identifying Lost or Damaged Labels

Procedures should be established to ensure that misplaced or damaged labels are replaced. Since labels are often missing after maintenance, the post-maintenance test could require a check to ensure that the appropriate labels are attached. Another method that could be used to check for labels is to add another column to valve lineup sheets that would require the operator to verify that labels are present, readable, and undamaged. Operators should also look for missing or damaged labels during their normal tours and during other routine activities. They should become especially observant for situations where a black marking pen has been used for labeling (and then sometimes crossed out and re-labeled) and should replace these informal labels with the proper labels.

b. Providing New Labels

A method should exist to help ensure the prompt identification and correction of labeling deficiencies. A number of ways can be suggested to accomplish this: operators could make labels on their own, or operators could fill out forms and forward them to a central facility to have labels made. In either case, a temporary label should be attached to the component until the replacement label can be made. The replacement label should be approved by the operations supervisor (or higher authority). In most cases the presence of labeling machines on-site promotes re-labeling.

The attachment of temporary and/or replacement labels to correct components should be verified. The new label should meet the guidelines for label information as addressed in paragraph C2 of this chapter.