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DOE-STD-1036-93
June 1993
CHANGE NOTICE NO. 1
December 1998

DOE STANDARD

GUIDE TO GOOD PRACTICES FOR INDEPENDENT VERIFICATION

U.S. Department of Energy
Washington, D.C. 20585

AREA MISC

Guide to Good Practices for Independent Verification

Page / Section	**Change**
p. 11 / Section 4.1.2	The reference to DOE-STD-1030-92, *Guide to Good Practices for Lockouts and Tagouts,* was updated to DOE-STD-1030-96 with the same title.
p. 14 / Section 4.2.1	The reference to DOE-STD-1030-92, *Guide to Good Practices for Lockouts and Tagouts,* was updated to DOE-STD-1030-96 with the same title.
p. 16 / Section 4.2.2	The reference to DOE Order 4330.4A, *Maintenance Management Program,* was updated to DOE Order 4330.4B with the same title.
p. 24 / Section 4.3.7	The reference to DOE-STD-1030-92, *Guide to Good Practices for Lockouts and Tagouts,* was updated to DOE-STD-1030-96 with the same title.
p. 27 / Supplemental Resources	The reference to DOE Order 4330.4A, *Maintenance Management Program,* was updated to DOE Order 4330.4B with the same title. The reference to DOE-STD-1030-92, *Guide to Good Practices for Lockouts and Tagouts,* was updated to DOE-STD-1030-96 with the same title.
Concluding Material	The Preparing Activity was updated from NE-73 to EH-31.

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FOREWORD

The purpose of this Guide to Good Practices is to provide Department of Energy (DOE) contractors with information that can be used to validate and/or modify existing programs relative to Conduct of Operations. This Guide to Good Practices is part of a series of guides designed to enhance the guidelines set forth in DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities."

KEYWORDS

Concurrent Dual Verification

Lockout/Tagout

Operations Supervisor

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

ACRONYMS

EPA	Environmental Protection Agency
ES&H	Environmental, Safety, and Health
OSHA	Occupational Safety and Health Administration

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DEFINITIONS

Concurrent Dual Verification	A method of checking an operation, an act of positioning, or a calculation, in which the verifier independently observes and/or confirms the operation or calculation.
Danger Tags	Tags used to identify equipment or controls that MUST NOT be operated or removed.
Independent Verification	The act of checking, by a separate qualified person, that a given operation, or the position of a component, conforms to established criteria.
Lockout/Tagout	A general term for all methods of ensuring the protection of personnel and equipment by installing tagout devices, with or without lockout devices.
Operations Supervisor	The individual having authority and responsibility for operational control of a facility, process, experiment, or other project.

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GUIDE TO GOOD PRACTICES FOR INDEPENDENT VERIFICATION

1. INTRODUCTION

This Guide to Good Practices is written to enhance understanding of, and provide direction for, Independent Verification, Chapter X of Department of Energy (DOE) Order 5480.19, "Conduct of Operations Requirements for DOE Facilities." The practices in this guide should be considered when planning or reviewing independent verification activities. Contractors are advised to adopt procedures that meet the intent of DOE Order 5480.19.

"Independent Verification" is an element of an effective Conduct of Operations program. The complexity and array of activities performed in DOE facilities dictate the necessity for coordinated independent verification activities to promote safe and efficient operations.

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2. OBJECTIVE

The objective and criteria are derived from DOE Order 5480.19. They are intended to aid each facility in meeting the intent of the order.

Independent verification activities are implemented by appropriate policies and procedures to ensure correct operation of facility equipment, and aid in the control of equipment and system status.

Criteria:

a. Components critical to safe, reliable operation of the facility are identified as to their requirements for independent verification.

b. Occasions requiring independent verification are identified through appropriate policies and procedures.

c. Independent verification techniques are identified consistent with facility equipment and operational requirements.

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3. DISCUSSION

Independent verification compensates for the human element in facility operation. It recognizes that any operator, no matter how proficient, can make a mistake. However, the chance that two operators will independently make the same mistake is unlikely. Therefore, independent verification provides an extra measure of safety and reliability to facility operations. Industry experience shows that verifying, or double-checking, important operating parameters and component alignments reduces the occurrence of unintended operational events (shutdowns, environmental violations, etc.).

Independent verification is an activity designed to enhance the reliability of facility operations and safety functions, and to aid in the control of equipment and system status. Its intent is similar to the quality assurance and engineering checks that are performed during design and installation of facility systems. However, independent verification is an ongoing process performed by operations personnel during operations. Independent verification activities are built on the two concepts portrayed through their name: verification and independence.

Verification is the act of checking that an operation, the status of equipment, a calculation, or the position of a component conforms to established criteria. Verification only checks for conformance with the criteria; it does not alter the status of equipment or the position of components. The criteria used for verification are normally contained in operating procedures or alignment checklists. All persons performing verification must receive specific training and qualification on the systems they will verify, and on techniques for verifying component position or status.

Independence means that the person performing the verification will not be influenced by observation of, or involvement in, the activity that establishes the component position or status. For most operating activities, independence can best be achieved by separating the operation and the verification by time and distance. For example:

If a verifier watches an operator read from a procedure, check the component label, operate the component, and then mark the item off in the procedure, it would be natural for the verifier to assume that the operation was performed correctly. However, the operator could have misread the procedure, misread the label, incorrectly identified the equipment, or performed the wrong operation. If the verifier is not present during the operation (separated by distance) and performs the verification at a later time, then the verification will not be affected by the operator's actions. If the verifier walks through the procedure, personally checking the label information and verifying the position of the components, any mistake made by the operator is likely to be detected.

For some operating activities, separating the operation and the verification by time and distance may not be possible. For example, verifying the position of a throttle valve or other control may require observation of the positioning activity. Verification for the installation or removal of jumpers may require checking the intended action before it is performed, because incorrect performance could cause a shutdown of critical equipment or actuation of a safety system. For these types of operating activities, the operator and verifier should independently identify the component and then concur on the action to be performed. The verifier should observe that the operation is performed correctly. This method is termed "concurrent dual verification."

Independent verification will be most effective if it is incorporated into existing operating activities. Each facility's operating guidelines should identify the specific systems, structures, and components that require independent verification. Within those systems, structures, and components, the guidelines should identify the occasions when independent verification should be performed. Facility procedures should provide instructions for the independent verification techniques appropriate to specific systems and components. These instructions are necessary to ensure that verification is performed consistently, and that verification activities do not change the component status or upset the process. Independent verification requirements should be addressed in pre-job briefings, to identify the personnel involved and to clarify the methods that will be used. Facility training programs should include subjects related to independent verification, such as development of a questioning attitude, self-checking techniques, and methods to avoid undue influences while acting as the performer or verifier.

Separate from the requirement for independent verification of specific operations activities, the concepts of independent verification can be applied to other functions or activities that can affect operations. For example, independent appraisals of operating procedures and training should be performed to verify that environmental, safety, and health considerations have been addressed in accordance with operational requirements. Personnel should apply the principles of independent verification to all operating systems in their work areas, not just those having safety functions. System parameters should be checked against each other and against expectations. When problems are identified, individuals should notify supervision and initiate corrective action in accordance with applicable procedures. This process helps ensure that problems are identified early and corrected before they cause larger problems.

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4. GOOD PRACTICES

Each facility should provide written guidelines for implementing independent verification. Central to these guidelines are two related, but independent, criteria for independent verification. First, independent verification is clearly important for certain systems and components, but is not necessary for all facility equipment. Therefore, the facility guidelines should identify the systems, structures, and components requiring independent verification. Section 4.1 provides guidance for designating which of these should receive independent verification.

Second, for those systems, structures, or components that have been designated as requiring independent verification, there are many routine operating activities performed that require independent verification. Section 4.2 provides guidance to help determine what situations involving the designated systems, structures, and components should be identified as occasions for independent verification.

The methods or techniques used to perform independent verification must be capable of verifying compliance with the operational criteria, without changing the position or status of the equipment. Therefore, the facility's guidelines should also specify how independent verifications should be performed. Examples of techniques that may be applied for independent verification are given in Section 4.3.

4.1 Systems/Components Requiring Independent Verification

Independent verification should be performed on systems, structures, and components that impact the safety and reliability of facility operations. Facilities should identify components requiring independent verification on the basis of safety analysis and evaluation of the effects that may be caused by mispositioning. Independent verification should be performed on systems, structures, and components that perform functions in the following categories:

- Related to nuclear safety (for reactors and non-reactor nuclear facilities)
- Essential for preserving environmental, safety, or health controls
- Critical to performance of the facility's designated mission.

4.1.1 Nuclear Safety Functions

Independent verification should be considered for all systems, structures, and components performing nuclear safety functions. Facilities that handle or process radioactive materials must determine which facility components require independent verification, based on the reliance placed on the component for preventing or mitigating releases of, or exposures to, radioactive materials. The following are examples of components and systems that may have a nuclear safety function:

- Components that monitor radiation or radioactive materials (e.g., area radiation monitor, criticality alert monitor, airborne activity monitor)
- Components that prevent unintentional release of radioactive materials (e.g., hold-up tanks, vent valves, drain valves)
- Components that are essential for proper response to an emergency (e.g., deluge systems, automatic barriers, safety injection systems).

4.1.2 Environmental, Safety, and Health (ES&H) Functions

All facilities (not just nuclear facilities) contain systems, structures, and components that perform safety functions and/or prevent unintentional releases of hazardous or toxic materials into the environment. Systems, structures, and components performing these functions should be considered for independent verification. The following are examples of components and systems that may have an ES&H function:

- Fire protection systems (e.g., fire detection systems, fire-fighting water supply and storage, halon and carbon dioxide (CO_2) storage systems)

- Ventilation systems (e.g., toxic fume hoods, glove boxes, breathing air supplies)

- Emergency power systems (e.g., uninterruptible power supplies (UPS), emergency generators, load shedding or transfer switches)

- Components preventing uncontrolled release of toxic or radioactive materials into the environment (e.g., isolation valves, monitoring systems, hold-up tanks).

In addition to components of designated safety or environmental protection systems, certain components in virtually any system may perform a safety function when used as part of a lockout/tagout. Such components include circuit breakers and valves used to isolate energy or hazardous materials from a work area, grounds installed prior to service on electrical equipment, telltale bleed lines for verifying hazardous material isolations, etc. The facility's lockout/tagout program should address the use of these components in protecting personnel and equipment, and the verification required in connection with that use. A more complete discussion of the requirements for personnel protection during service or maintenance is found in DOE Order 5480.19, Chapter IX, "Lockouts and Tagouts," and in DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*.

4.1.3 Mission-Critical Functions

Independent verification is more than just an adjunct to the facility safety or environmental control programs; it is a tool that can be used to enhance the reliability of facility operations. Applying independent verification to production-related systems and components helps reduce unscheduled shutdowns and other unplanned reductions in the facility output. Systems, structures, and components that are critical to the performance of the facility's mission should be considered for independent verification.

In addition to the systems, structures, and components that fill nuclear safety, ES&H, and mission critical functions, independent verification should also be considered for systems or components that could challenge a safety system or mission critical system. For example, testing or changing the alignment of certain components in a non-safety, non-critical system may cause spurious actuation of a safety system or a transient upset in a mission-critical system.

4.1.4 Components Excluded from Independent Verification Requirements

In some systems where independent verification is required, specific components may be excluded from the requirement if certain conditions are met. Independent verification may not be required for a particular component if:

- Mispositioning the component would not affect system performance (i.e., the system could perform its intended function even if the particular component were mispositioned). For example, a cooling system may be able to perform its intended function even though an air vent or water drain valve in a heat exchanger is not properly positioned. In this case, the vent or drain valve may not require independent verification.

- Mispositioning the component would be known immediately to an operator (i.e., a reliable indicator of component position or an alarm would alert an operator if the component position is not correct). The presence of position indicating lights for a valve is not considered sufficient justification for excluding the valve from independent verification requirements. However, the lights may be used along with other process parameters to verify the valve position.

- Significant exposure to radiation or hazardous material would be received by the person(s) performing the independent verification. In this case, an alternative method for verification should be found, such as observing process parameters or reliable remote indication.

Any components exempted from independent verification requirements through the criteria listed above should be approved by the operations supervisor.

4.2 Situations Requiring Independent Verification

Independent verification should be performed whenever there is a reasonable chance that the proper function of any system, structure, or component identified in Section 4.1 is jeopardized. For example: whenever components of a system are manipulated, there is a chance that the resulting alignment is not correct; or, when operations are performed on similar, nearby systems, there is a chance of inadvertently manipulating a component in the wrong system. Independent verification of these activities would prevent further undesirable consequences.

This is not meant to imply that every operation in the facility should be independently verified. The consequences of alignment errors in certain equipment systems (those not meeting the criteria of Section 4.1) may not justify the expenditure of resources and effort involved in independent verification. Facilities should evaluate their operations to determine when independent verification should be performed, then document the determinations in appropriate guidelines or procedures. The following subsections discuss four specific situations when independent verification should be performed on the systems, structures, and components designated in Section 4.1.

4.2.1 Removing Equipment from Service

When nuclear safety, ES&H, or mission critical equipment is removed from service, the critical or safety functions the equipment had performed must often be transferred to other equipment or systems remaining in service. Independent verification should be performed to ensure that the critical or safety function is not inadvertently disabled. For example, consider a safety system containing two redundant pumps that discharge into a common header. One of the pumps must be removed from service for maintenance in accordance with lockout/tagout procedures.

- Independent verification should be performed to ensure that the remaining pump is properly aligned for service and has not been inadvertently isolated.

- Independent verification should always be performed after installation of a lockout/tagout to ensure that adequate protection for workers is provided, as described in DOE Order 5480.19, Chapter IX, "Lockouts and Tagouts," and in DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*.

4.2.2 Placing Equipment in Service

Whenever nuclear safety, ES&H, or mission critical equipment is placed in service, or returned to service following maintenance, testing, or an extended shutdown, independent verification should be performed. Listed below are some of the reasons for performing independent verification when placing equipment in service.

- When equipment has been out of service for maintenance, the position of components within the lockout/tagout boundary could have been changed during maintenance.

- Components that have been involved in a test may have been left in the test position and not reconfigured for operation.

- During extended shutdowns, it is often impractical to maintain equipment in its normal operating configuration.

- Startup activities may involve overlapping procedures for the lineup or testing of multiple interfacing systems, possibly resulting in uncertainty as to whether the final position of components is correct.

Independent verification at the time equipment is returned to service is not the same as, nor intended to take the place of, post-maintenance testing. Post-maintenance testing is normally required for all facility equipment, whereas independent verification normally is not required on non-critical, non-safety equipment. In some limited situations, post-maintenance testing of critical or safety systems may satisfy a requirement for independent verification. However, the programs and criteria remain separate. Further information regarding post-maintenance testing is contained in DOE Order 5480.19, Chapter VIII, "Control of

Equipment and System Status," and DOE Order 4330.4B, *Maintenance Management Program*.

4.2.3 Periodic Checks during Facility Operation

Many facilities are required, by technical safety requirements or by regulatory agencies (e.g., OSHA, EPA, state agencies), to perform routine periodic checks of the operability of certain systems, structures, and components. Routine periodic checks include:

- Testing fire protection systems to ensure that they are properly aligned for operation

- Testing Continuous Emission Monitors to ensure that they detect and record regulated emissions

- Testing toxic gas monitoring equipment (e.g., in oil well drilling and production facilities) to ensure that the equipment will detect a specific concentration of toxic gas and actuate an alarm.

These periodic checks (defined as surveillance tests in some facilities) are independent of the activities that established the status of the system, and therefore qualify as independent verifications.

When there are no regulatory requirements for periodic verification or surveillance, it is still a good practice to periodically check the alignment and status of safety and mission-critical equipment. Verification may be performed using normal operating procedures, or specific checklists may be developed for the purpose. Components to be checked may be included on operator round sheets.

If the position or status of a component is changed during performance of one of these checks, the check does not qualify as an independent verification. If the affected component was designated in accordance with Section 4.1, then a separate independent verification of the positioning change should be performed.

4.2.4 Temporary Modifications

Installing or removing temporary modifications (e.g., jumpers, bypasses, or other temporary connections) should be independently verified when an error could cause the shutdown of critical equipment, actuation or disabling of a safety system, or uncontrolled start of equipment that could endanger personnel. In these situations, verification should be performed before and during performance of the activity using concurrent dual verification.

4.3 Verification Techniques

It is not the intent of this guide to describe appropriate techniques for independent verification of all the components and processes used throughout DOE facilities. Each facility should develop instructions for independent verification, using input from experienced facility personnel and equipment manufacturer's recommendations. The instructions should describe techniques for independent verification of manual valves, motor-operated and air-operated valves, solenoid-operated valves, blank flanges, circuit breakers, removable links, fuses, availability of control power, accuracy of calculations, etc. Techniques may involve direct verification (e.g., physically checking that a valve is closed) or indirect verification (e.g., observing system parameters to determine that a valve is closed).

The instructions should focus the verifier's attention on the aspects of the operation that are most susceptible to errors and/or are most critical for proper function of the system. Some operations can be verified by checking the final condition or position of components against a standard, i.e., a product-based approach. For example:

- C During a lockout/tagout, it is critical that the tags be placed on the correct components. To ensure that no identification errors were made, the instructions should require the verifier to independently identify each component using the same procedures, drawings, checklists, and component label information that were used by the performer; then verify that the component is correctly tagged.

- C When isolating a component or aligning a system for operation, each valve, switch, bypass, or other device must be correctly positioned according to an operating procedure or other documentation. The verifier should be instructed to independently check the physical position of these components, or perform other checks that will positively indicate that the components are properly positioned.

In some operations, it is critical that the performer follow a specific process or series of sequential steps. It may be impossible for the verifier to determine that the steps were performed correctly through observation of the finished product. These operations should be verified by independently observing that the proper steps, sequence, or adjustments are performed according to a standard. The method for this is known as concurrent dual verification. For example:

> When installing a bolted cover on a piece of equipment, the bolts must be tightened to a specific torque value in a specific sequence to prevent damaging the cover. Instructions for verifying this operation should have the verifier independently observe that the correct torque is applied and that the bolts are tightened in the required sequence.

In all cases, the instructions should minimize the interaction between the performer and the verifier to preserve the independence of each.

Once the instructions are developed, personnel involved in performing independent verification should be trained on the techniques. Operating experience alone may not provide adequate knowledge for performing independent verification. Specific training on the techniques for independent verification enhances their reliability. The training may be performed as part of the operator qualification program and/or the facility continuing training program.

The general guidelines that follow should be considered when developing specific verification techniques. When possible, verification should be performed using more than one indication or technique, e.g., performing a physical verification and checking system parameters.

4.3.1 Verifying Valve Position

It is not always possible to determine if a valve has been completely closed or opened by merely observing the action. The relative height of a valve stem is not considered a reliable position indicator for independent verification. Lines scribed on the valve stem or other positive indicators of stem position can aid in accurately determining the valve position. However, a mechanical indicator may not accurately reflect the position after maintenance has been performed on the valve, or even after a period of normal use.

The preferred method for verifying valve position is a physical verification. A visual check of the stem position or position indicators should be used whenever possible to confirm the physical verification. Physical verification of a manually operated valve should be performed by attempting to turn the valve in the closed direction. The effects of this are:

- If the valve is closed, attempting to turn the valve in the closed direction will not effect its position. Closed valves should NOT be opened for verification to prevent adversely affecting system integrity, because even a slight opening can pressurize or release hazardous materials into the downstream piping.

- If the valve is open, the verifier will be able to turn the valve in the closed direction. Only a slight movement in this direction is needed to confirm that the valve is open, without affecting the flow or process. The verifier should then restore the valve to its original position.

If the valve position is not in accordance with the requirements, the verifier should NOT operate the valve further, and should notify the cognizant supervisor.

4.3.2 Verifying Throttled Valves

Some valves are required to be in a throttled position, i.e., intermediate between fully open and fully closed. Often the procedure for establishing the throttled position is to close the valve, then count a specific number of turns in the open direction. If this same action were to be performed by a verifier, the original positioning would be nullified, constituting no verification.

If possible, alternate means should be established for verifying throttled valves. If the position of the valve stem would provide visible indication of the valve position, the facility may place a label or scribe marks on the valve stem to use in independent verification. Other types of valve position indicators may be approved by the facility. In these cases, the throttled valve position may be independently verified by visually checking the valve and the position indicator.

If it is necessary to close and reopen the valve to establish its position, it is preferable to have both the performer and the verifier present (concurrent dual verification). The verifier should independently verify that the correct valve was identified, its required position was correctly determined according to the procedure, the positioning was performed correctly, and process parameters, if available, confirm the correct positioning.

4.3.3 Checking Process Parameters

Observation of process parameters (e.g., pressure, flow, voltage) may help verify the correct position of components. However, process parameters alone may not give an accurate indication of component status, because alternate flow paths or other factors may cause misleading indications. For example,

- Voltage on a circuit does not prove that a particular supply breaker is closed unless there is no alternate power supply

- Flow and pressure do not necessarily prove that a valve is fully open.

Observation of process parameters should be combined with other verification methods, such as physical checks of component position, whenever possible. Facility guidelines should specify where and when process parameters alone are acceptable indicators of component position.

4.3.4 Checking Remote Position Indicators

Independent verification should always be performed locally, unless precluded by exposure to radiation, hazards, or other overriding factors. In those limited situations, independent verification may be performed using remote position indicators. The most common of these are indicating lights.

Remote position indicators may seem to represent an ideal method for independent verification. However, equipment failures in the sensor, signal transmission, or display device can cause valve-position-indicating lights and other control board indications to be incorrect. Some failures of this type have gone undetected for a significant length of time. Independent verification using remote position indicators should be checked using other verification methods, such as process parameters, whenever possible.

4.3.5 Surveillance (Operational) Testing

Certain systems and components are subject to periodic surveillance (operational) tests due to regulatory requirements. In many cases, the nature of the test qualifies it as an independent verification of system alignment and capability. For example, a full-flow test of a system can prove that the alignment of components and positioning of flow-controlling valves is correct. This means of proving operability is not the same as the means used to establish the position of the components, and therefore is independent of the original activity.

Some surveillance tests may not test the components in their operating configuration, or they may not include all the components that would be required for operation. For example, running a pump in recirculation to verify discharge pressure would not prove that the main flow-path valves were correctly positioned, and may not prove that external cooling or backup lubrication pumps are properly aligned.

Surveillance testing may be used to satisfy independent verification requirements ONLY if it is shown conclusively that the test proves the required position of the components in question. Because surveillance testing involves operation of equipment, the operations supervisor should approve any performance of surveillance tests.

4.3.6 Verifying Operational Processes

Sometimes verification is required for an operational process or proper completion of a series of procedural steps. Concurrent dual verification is one method for accomplishing this. The following is an example of independent verification of an operational process, in this case performing a calculation:

> A calculation of the estimated critical position (ECP) for reactor control rods is required before a reactor startup. In at least two recent incidents, errors in this calculation went undetected until the reactor startup was in progress. When the discrepancy was discovered, the reactors in question were shut down in accordance with procedures, and further investigation revealed errors in the calculations. As a result of these incidents, DOE has directed all reactor facilities to perform two independent ECP calculations when required for reactor startup. If a computer code is used to calculate the ECP, two independent determinations of input parameters are required. The responsible manager must reconcile any differences in the calculations prior to startup.

4.3.7 Verifying Locked/Tagged Components

Components that are danger tagged in accordance with the facility's lockout/tagout procedure must NOT be manipulated in the performance of an operating procedure or for the purpose of independent verification. If such components are encountered during independent verification, the verifier SHOULD NOT attempt to physically verify the position. The verifier SHOULD verify that the correct component has been identified, determine the required position in accordance with the procedure, determine the position of the component as recorded on the danger tag, and use all other appropriate methods to verify that the component is positioned as stated on the danger tag (e.g., observe process parameters, remote indicators, etc.). Additional information relating to locked/tagged equipment is contained in DOE Order 5480.19, Chapter IX, "Lockouts and Tagouts," and in DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*.

4.3.8 Resolving Inconsistencies Discovered during Independent Verification

The underlying principle of independent verification is that anyone can make a mistake. This also means that any inconsistency identified by the verifier could be the verifier's mistake. The verifier should NOT change the position or status of a component to correct an inconsistency. Whenever an inconsistency is discovered, the verifier should immediately stop and notify the appropriate supervisor. Facility procedures should identify the supervisory position responsible for resolving independent verification inconsistencies.

When informed of the inconsistency, the supervisor should resolve the issue (e.g., by physically verifying the position of the component in question). If repositioning is required, it should be approved by the supervisor. If the component is subject to administrative controls (e.g., lockout/tagout), the supervisor must ensure compliance with those guidelines during physical verification or repositioning.

4.4 Operations Self-Appraisal and Verification

Independent verification is a formal process for ensuring safety and reliability in facility systems. However, the concepts of verification and independence have a wider application. Programs and activities that affect operations should receive independent appraisals or verifications to ensure that they meet established criteria relating to safety, health, environmental protection, and operational practices. For example, procedure development and training are activities that have a direct impact on operations. These activities should be evaluated through self-appraisal and independent (e.g., operations organization) review to ensure that they accomplish their intended purpose and are consistent with applicable regulatory and operational guidelines.

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SUPPLEMENTAL RESOURCES

The following sources provide additional information pertaining to topics discussed in this Guide to Good Practices.

DOE Order 4330.4B, *Maintenance Management Program*.

DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, Chapter VIII, "Control of Equipment and System Status."

DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, Chapter IX, "Lockouts and Tagouts."

DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*.

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CONCLUDING MATERIAL

Review Activities:	**Preparing Activity:**
DOE	DOE-EH-31
DP	
EH	**Project Number:**
EM	
ER	MISC-0008
NE	
NS	