



Department of Energy
National Nuclear Security Administration
 Washington, DC 20585

January 23, 2006

MEMORANDUM FOR MANAGER, LOS ALAMOS SITE OFFICE
 MANAGER, LIVERMORE SITE OFFICE
 MANAGER, PANTEX SITE OFFICE
 MANAGER, Y-12 SITE OFFICE
 MANAGER, SANDIA SITE OFFICE
 MANAGER, NEVADA SITE OFFICE
 MANAGER, SAVANNAH RIVER SITE OFFICE
 MANAGER, KANSAS CITY SITE OFFICE
 DIRECTOR, ALBUQUERQUE SERVICE CENTER

FROM:

Thomas P. D'Agostino
 Assistant Deputy Administrator
 for Program Integration

SUBJECT:

ACTION: REVITALIZING INTEGRATED SAFETY
 MANAGEMENT; SITE OFFICE ACTION PLANS FOR
 IMPROVING ACTIVITY LEVEL WORK PLANNING AND
 CONTROL PROCESSES

This purpose of this memorandum is to document the expected schedule and content for the Site Office Action Plans for improving activity level work planning and control processes required by commitment 23 of the Implementation Plan for Defense Nuclear Facilities Safety Board recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*.

The Action Plans should consist of commitments to perform the six actions listed below. These actions were identified and developed at two NNSA workshops on incorporating Integrated Safety Management (ISM) into work planning and control (October 2004 and July 2005) and three follow-up meetings held in conjunction with NNSA Quality Assurance workshops (February, August, and December 2005) by a team consisting of Headquarters, Site Office and contractor experts, including designated ISM Champions identified in Bruce Carnes memorandum of October 18, 2005.

1. Review existing site work planning and control processes against the "attributes" from Attachment 1, *Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance*, identify any gaps, and identify corrective actions to eliminate the gaps;



2. Review existing site work planning and control processes against the best practices and guidance from Attachment 1, *Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance*, identify areas for improvement, and take appropriate actions;
3. Institutionalize the Appendix B Critical Review and Approach Documents (CRAD) (*Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites*) from Attachment 1, *Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance*, so that activity level work is routinely assessed by the site offices and contractors for all contractor organizations that perform work;
4. Confirm that work planners are adequately trained and qualified to the criteria/expectations defined in Attachment 2, *Training and Qualification of Work Planners*, or for those work planners who are not qualified, identify dates by which they will be qualified;
5. Implement periodic/routine management observation of work activities and interaction with workers in the field/on the floor in accordance with the criteria/expectations defined in Attachment 3, *ISM - Management on the Floor Interaction with Workers*; and
6. Document how the above actions will flowdown to ensure the adequacy of work performed by subcontractors, and how adequate implementation by subcontractors is verified.

The action plans should provide target completion dates and identify responsible site office and contractor points of contact for completion of the above actions. Actions 1, 3, 4, and 5 should be included as separate items in the *Site-wide Integrated Issues Management System*. All actions should be scheduled to be completed by April 2007. Action 3 should be implemented and the first assessment(s) completed within two months after approval of the action plans, i.e., by the end of April 2006, with a second assessment scheduled by the end of July 2006.

The action plans should be approved by the site office manager and submitted to NA-10 for approval by February 4, 2006. An example of an acceptable site office action plan format and content is provided in Attachment 4.

If you have any questions concerning the action plans, please contact Rick Kendall at (301) 903-3102 or Rick.Kendall@nnsa.doe.gov.

Attachments

cc w/attachments:

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Activity Level Work Planning and Control Processes

**Attributes, Best Practices, and Guidance for
Effective Incorporation of Integrated Safety
Management and Quality Assurance**



January 2006

Introduction and Background

Department regulations and directives require that Integrated Safety Management (ISM) and Quality Assurance (QA) be integrated into work planning and control activities.

The Department of Energy Acquisition Regulations (DEAR) require that work be performed safely in a manner that protects workers, the public, and the environment, and that the management of environment, safety, and health (ES&H) functions and activities be an integral and visible part of the work planning and execution process (see 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*). The DEAR further require that work be managed and performed in accordance with a documented safety management system that describes how the contractor will ensure that the ISM five core functions and seven guiding principles are implemented. The ISM core functions require that work be defined, the associated hazards identified and analyzed, and the work performed within controls implemented to protect workers, the public, and the environment from the hazards.

The QA rule (10 CFR 830.120) requires that contractors conducting activities, including providing items or services, that affect, or may affect, the nuclear safety of DOE nuclear facilities, conduct work in accordance with the QA criteria in 10 CFR 830.122, and that the contractor responsible for a DOE nuclear facility conduct work in accordance with a Quality Assurance Program (QAP) that integrates the QA criteria with the safety management system, or describe how the criteria apply to the safety management system. The QA criteria require that work be conducted consistent with hazard controls using approved instructions and procedures. DOE Order 414.1C, *Quality Assurance*, requires application of the same QA criteria beyond nuclear facilities to cover all work performed at all DOE/NNSA facilities. Additional quality management requirements for Nuclear Weapons Complex activities are provided in the *DOE/NNSA Weapon Quality Policy, QC-1, Revision 10*.

Taken collectively, the ISM DEAR clauses and QA criteria require a formal, deliberate process for identifying, scheduling, prioritizing, planning, analyzing, coordinating, performing, documenting, assessing, and improving work activities. The goal is safe, efficient, and reliable conduct of work in support of the NNSA mission. For a typical facility, work is multi-organizational and requires coordination, understanding, and support of those involved and/or impacted by work activities.

This document was developed following indications that ISM was not being effectively implemented or practiced on the floor where work is being performed. The indications were provided from the Defense Nuclear Facilities Safety Board (DNFSB), the DOE Office of Independent Oversight and Performance Assurance (OA), incidents identified by the Electrical Safety Assurance Group (ESAG), and in Occurrence Reporting and Processing System (ORPS) reports.

This document provides attributes and best practices/guidance for effectively incorporating ISM core functions and guiding principles, and QA criteria, into activity level work planning and control processes. The attributes were drafted by DOE/NNSA Headquarters, Site Office, and contractor personnel involved in work planning and control for the various types of NNSA non-office environment work activities (e.g., construction and modification work, operations activities, research and development, maintenance). Thus the attributes are intended to be applicable to all types of work and the workers (e.g., scientists, operators, crafts, engineers) who

perform the work. Information contained in this document also reflects input from the DNFSB staff, the Institute for Nuclear Power Operations (INPO), the Energy Facility Contractors Owners Group (EFCOG), and other sources related to activity level work planning and control. This document focuses at the activity level because site level ISM System Descriptions, policies and procedures have been generally found to be adequate and to flow down to the facility level.

Incorporation of the attributes into work planning and control processes will help to ensure that ISM and QA requirements are met. The attributes generally are derived from the QA criteria in 10 CFR 830.122 and the ISM core functions and guiding principles in the DEAR clauses that are included in management and operating contracts. NNSA expects that processes used to plan and control activity level work incorporate the attributes. Existing processes should be compared to the attributes, and corrective actions developed to eliminate identified gaps. The best practices and guidance listed under the attributes are not requirements and are not intended by NNSA for use as assessment criteria. Each site and contractor has unique work planning and control processes that have been developed to fit their specific situation to meet their specific needs. However, NNSA expects its contractors to review their work planning and control processes in light of the best practices and guidance and to make improvements to their processes where appropriate.

The attributes, supported by the best practices and guidance, provide the characteristics of an effective activity level work planning and control process. Incorporating these characteristics into existing work processes should ensure appropriate incorporation of ISM and QA requirements from Department directives and regulations, contractor policies, and ISM systems into specific activity level work tasks.

The focus of this document is on the planning and control of any work where the worker could be potentially exposed to radiological, chemical, physical, industrial, biological, or other types of hazards. This document does not address certain QA programs or initiatives that interface with the work planning and control process (e.g., suspect and counterfeit parts, procurement, calibration of M&TE) and are addressed in detail in Department directives.

NNSA expects that use of this document will complement existing site ISM processes that flow down requirements to the work/activity level by providing emphasis at the work/activity level that will educate workers, work planners, and first line work supervisors on activity level work requirements and expectations so that: 1) requirements that flowdown are better received, understood, and more effectively implemented, and 2) the knowledge and experience of workers, work planners, and first line work supervisors are used to improve activity level work planning and control processes. Figure 1 shows that the hazard controls implemented to ensure that activity level work is performed safely are determined at the site, facility, and individual work activity/task levels, and shows the communication/integration between the levels (flowdown of departmental and contractor requirements to the activity level work, and feedback from the activity level up to the facility and site levels for process improvement).

The management of work activities is a multi-organizational process that requires effective integration, coordination, and ownership by all individuals involved in or potentially impacted by work activities to ensure efficient, productive, and reliable conduct of work. Management should be actively involved in control of work activities, including promotion of excellence in work planning and performance, and routine and periodic evaluation of activity level work planning and control processes, to ensure that work practices are effective in maintaining safe

and reliable facility operation. This control should extend to all facility, contractor, and subcontractor personnel involved in the activities.

This document is intended to be used as a reference source or tool to help ensure that the integration of ISM and QA into activity level work planning and control activities is effective by documenting attributes, best practices, and guidance for use by those developing or implementing activity level work planning and control processes. The approach herein is consistent with NNSA commitments to the DNFSB, the NNSA QA Roadmap, and the Department's Implementation Plan for DNFSB Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*. Although significant work has gone into its development, it is considered a work in progress that can benefit from other best practices and guidance from across the NNSA complex. Suggested additional best practices or guidance for inclusion, or other comments, should be submitted to Rick Kendall, NA-124 at Rick.Kendall@nnsa.doe.gov. NNSA encourages suggestions for improvement and other feedback from its Site Offices and contractors.

The ISM core functions and guiding principles and QA criteria are listed in Appendix A. Key ISM and QA references, such as applicable DOE directives, are listed below. NQA-1-2004, *Quality Assurance Requirements for Nuclear Facility Applications*, is a preferred standard for implementing DOE Order 414.1C requirements.

References:

- [Quality Assurance Rule 10 CFR 830](#)
- [Quality Assurance Order, O 414.1C - Quality Assurance](#)
- [Quality Assurance Guide 414.1-2a - Quality Assurance Management System Guide](#)
- [Quality Assurance Guide 414.1-3 - Suspect/Counterfeit Items Guide](#)
- [Safety Software Quality 414.1-4 - Safety Software Guide](#)
- DOE/NNSA Weapon Quality Policy, QC-1, Revision 10 dated 02/10/2004
- ASME NQA-1-2004, Quality Assurance requirements for Nuclear Facility Applications
- DOE P 450.4, *Safety Management System Policy*, 10/16/1996
- DEAR 970.5223-1, *Integration of environment, safety, and health into work planning and execution*
- DOE G 450.4-1B, *Integrated Safety Management System Guide*, 3/1/2001
- DOE-HDBK-3027-99, *Integrated Safety Management Systems Verification Team Leader's Handbook*, June 1999
- DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, 12/31/2003
- DOE P 450.7, *Environment, Safety and Health (ESH) Goals*, 8/2/2004
- DOE O 226.1, *Implementation of Department of Energy Oversight Policy*
- DOE O 450.1, *Environmental Protection Program*
- DOE G 450.1-1A, *Implementation Guide for Use with DOE O 450.1, Environmental Protection Program*
- DOE G 450.1-2, *Implementation Guide for Integrating Environmental Management Systems into Integrated Safety Management Systems*
- DOE P 450.2A, *Identifying, Implementing, and Complying with Environment, Safety, and Health Requirements*

Functions - , , & Activity

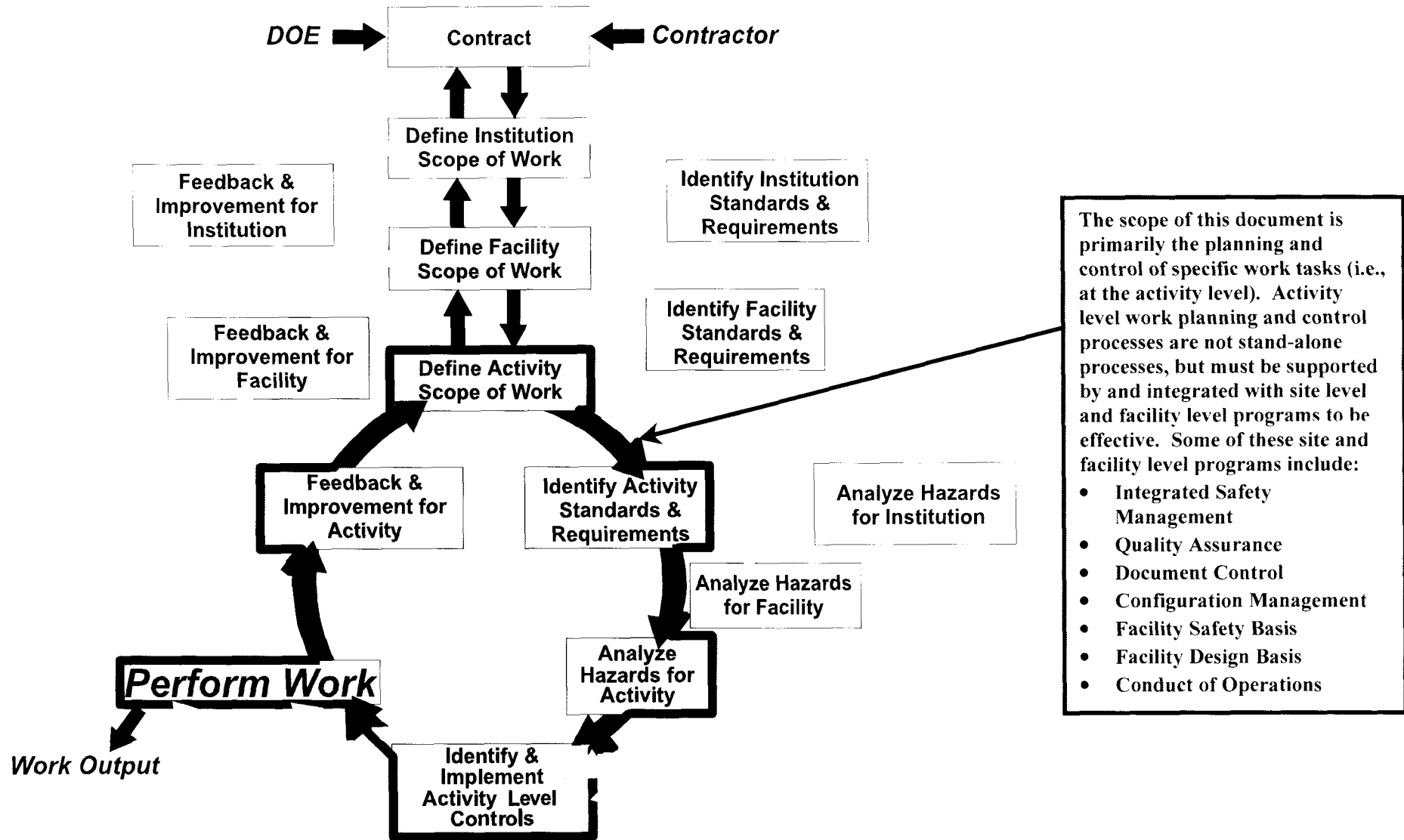


Figure 1 - Integration of Work Controls Between Site, Facility, and Activity Levels

Activity Level Work Planning and Control Process Attributes and Best Practices/Guidance

Introduction

This document provides attributes and best practices/guidance for effectively incorporating Integrated Safety Management (ISM) core functions and guiding principles, and Quality Assurance (QA) criteria, into activity level work planning and control processes. Incorporation of the attributes into work planning and control processes will help to ensure that ISM and QA requirements are met. There are 40 attributes listed among the following seven headings: 1. Activity Level Work Planning and Control Process; 2. Identify, Prioritize, and Approve Work; 3. Scheduling; 4. Planning Work; 5. Readiness; 6. Performing Work; and 7. Post Work Review and Closeout. The attributes can be identified by capital letters and **bold text (A, B, C, ...)**. Specific requirements, e.g., from existing regulations and the Contractor Requirements Document (CRD) of DOE Orders, that the attributes help to implement are identified in a blue text box directly following each attribute. The requirements identified are examples and are not intended to be a complete list.

NNSA expects contractor work planning and control process procedures to document and describe the attributes listed within this document. These procedures and associated training should provide sufficient detail to ensure successful development and implementation of the attributes at the activity level. While most of the attributes are directly applicable for all types of work and to the associated work planning, control, and execution processes, it is recognized that each site and contractor has unique work planning and control processes that have been developed to fit their specific situation to meet their specific needs. There will likely be situations where an individual attribute may not apply or where it may be necessary to adapt or tailor its application so that it is appropriate for the specific work and work management process being used. For example, attribute **4I** concerns specifying acceptance criteria for determining whether work was accomplished successfully - while this attribute is applicable to most work, it may not be applicable for certain types of research or experimental work where the outcome is unknown, can not, and need not be precisely determined in advance. Documented justification based on thorough technical and managerial evaluation and should exist where an attribute is determined to not be applicable or is tailored to be more appropriate for a specific application.

The best practices and guidance information provided under each of the attributes is intended to help implement the attributes, and thus to meet associated requirements. NNSA expects its contractors to review their work planning and control processes in light of the best practices/guidance and to make improvements to their work planning, control, and execution processes where appropriate. The best practices/guidance provides supplemental non-mandatory information and suggested approaches for meeting NNSA's expectations and acceptable methods of implementing its requirements. Alternative methods/approaches to those identified herein that meet the intent of the associated attributes are acceptable. Documented justification based on thorough technical and managerial evaluation should exist where there are substantive differences between the intent of this document and the proposed alternative.

Definitions

The following terms and their definitions are provided to establish clear understanding and consistency of interpretation of their use throughout this document.

Activity level work: Activity level work is any job, task, or sub-task (e.g., any activity, step, or action that is part of an instruction, procedure, process, sequence of steps, or evolution) performed in the field/on the floor at DOE/NNSA sites or facilities where hazards are present that are either associated with the work or the work environment (regardless of who is performing the work or the organization with which they are affiliated). The hazards involved could potentially adversely affect worker health or safety (e.g., result in worker injury or sickness) if the worker is exposed to them, and include radiological, chemical, industrial, biological, and other types of hazards. This definition excludes common hazards that the public is routinely exposed to and accepts on a daily basis such as those associated with commuting to and from work and those associated with an office environment.

Work Planner: A work planner is anyone who, as a part of planning activity level work, performs the following functions: ensures that the scope of work being performed is adequately defined; confirms that hazards associated with the work and the work environment have been identified and analyzed to determine the controls that must be implemented to ensure worker safety; determines applicable work process requirements (i.e., applies the appropriate graded approach for the work being planned); breaks down work activities into discrete steps/tasks; establishes acceptance criteria for work performed; develops technical work documents; and provides input to the scheduling process (sequencing and timing, and resources such as personnel, tools, materials, support, training, etc.).

Worker: A worker is anyone who performs assigned activity level work tasks. Examples of workers include crafts, researchers and scientists, engineers, technicians, operators, maintenance and test personnel, etc. Workers can be contractor or subcontractor personnel who either normally work at the facility where the work is being performed, or who normally work elsewhere at the site or off site and are present at the facility to perform or support ongoing work activities.

1. Activity Level Work Planning and Control Process.

The attributes in this section are generally applicable to many or all of the sections that follow and have been listed here once to avoid repeat listings in multiple sections.

A. The process(es) and requirements for incorporating Integrated Safety Management Core Functions and Guiding Principles and Quality Assurance Criteria into activity level work planning, control, and execution are clearly documented.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that

the public, the workers, and the environment are protected from adverse consequences).

- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
 - 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - DOE O 433.1 CRD Requirement 1.f.(1) - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the integration of the maintenance management program with the ISMS established by DOE P 450.4 and 48 CFR 970.5204-2.
 - DOE O 433.1 CRD Requirement 1.f.(4) - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the integration of the maintenance management program with a Quality Assurance Program established under 10 CFR Part 830, Subpart A.
- a. DOE expectations for working safely (i.e., standards and requirements for ensuring the safety of workers, the facility, the public, and the environment) are set forth in contract requirements that are implemented through contractor Manuals/Codes of Practice. Manuals/Codes of Practice (MCPs) should exist that contain the requirements for work planning and control for all work. MCPs should address work identification and requests; prioritization; scheduling; planning and preparation for work; coordination and approval of work activities; conditions for performing work; adequacy and completeness of work packages; conduct of work; documentation of completed work; post work acceptance; restoration and return to service; review of records and activities; training and control of facility, non-facility contractor, and subcontractor personnel; and incorporation of ISM core functions and guiding principles and QA criteria.
- b. The MCPs are adhered to in the planning and execution of activity-level work by all organizations and personnel involved with the work, including non-facility personnel and subcontractors.

B. Organizational structure, functional roles, responsibilities, levels of authority, accountability, and interfaces for those managing, planning, performing, and assessing work are clearly defined and documented.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- DOE O 433.1 CRD Requirement 1.d - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the assignment of roles and responsibilities.
- DOE O 433.1 CRD Requirement 1.d - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the interfaces between the maintenance organization and other organizations (e.g., operations, engineering, training).
- DOE O 433.1 CRD Requirement 3.a - The contractor maintenance management program should address the following element, as appropriate: Maintenance Organization and Administration (the organization and administration of the maintenance function must ensure a high level of maintenance performance through effective implementation and control of maintenance activities).
- DOE O 5480.19 Attachment 1, Chapter I, Guideline 4 - Accountability.

Roles and responsibilities are defined and understood for work planners, work supervisors, responsible line managers, workers, subcontractors, subject matter experts, and all other personnel involved in activity level work planning and control.

Note: A work environment is established that strives for excellence in work planning and performance and promotes productivity and safety. Open and effective communications, constructive feedback, and due consideration of diverse opinions are encouraged at all organizational levels. A safety conscious culture is established that promotes individual ownership, accountability, teamwork, continuous improvement, and being proactive to prevent or address and correct issues and problems before they become major.

C. The knowledge, skills, and abilities required for performing assigned work are established, documented, and maintained.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).

- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences).
- 10 CFR 830.122, Criterion 2 (Management/Personnel Training and Qualification) - (1) Train and qualify personnel to be capable of performing their assigned work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- DOE O 433.1 CRD Requirement 3.b - The contractor maintenance management program should address the following element, as appropriate: Training and Qualification of Maintenance Personnel (a maintenance training and qualification program must be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities).

Procedures establish the qualification requirements for personnel and for ensuring that only qualified personnel who meet the requirements are permitted to perform work.

D. Personnel possess the knowledge, skills, and abilities required for performing assigned work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
 - 10 CFR 830.122, Criterion 2 (Management/Personnel Training and Qualification) - (1) Train and qualify personnel to be capable of performing their assigned work.
 - DOE O 433.1 CRD Requirement 3.b - The contractor maintenance management program should address the following element, as appropriate: Training and Qualification of Maintenance Personnel (a maintenance training and qualification program must be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities).
 - DOE O 5480.19 Attachment 1, Chapter 1, Guideline 5 - Management Training.
- a. Workers (including facility personnel, non-facility contractor personnel, and subcontractor personnel) are trained to understand the hazards associated with their work, the safety significance of the controls provided to protect them from the hazards, and the importance of working within/adhering to the controls.

Note: It is particularly important that work planners, hazards analysts, and safety professionals who are responsible for planning work activities and/or participate as members of work planning teams are fully trained on the use of hazard analysis tools and formal methods used to systematically analyze work to identify hazards and select controls most appropriate for worker, public, and environmental protection.

- b. Workers (e.g., crafts, operators, scientists, engineers, specialists) must be verified to possess the skills required to perform the work and to be adequately trained prior to their performing work. Adequate time should be allotted in the work schedule to allow for required training. Personnel who are not fully trained and qualified for the specific job at hand must be continuously supervised by qualified personnel.
- c. Workers (including facility personnel, non-facility contractor personnel, and subcontractor personnel) should be trained to get the job done correctly and efficiently the first time. This includes proper use of tools and equipment, expected behaviors and protocols, including stop (or pause) work responsibility and authority, unique job-specific requirements (e.g., mock-up training), etc. necessary for workers to effectively perform assigned responsibilities.

E. Continuing training is provided, which includes lessons learned, to maintain and improve proficiency.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
- 10 CFR 830.122, Criterion 2 (Management/Personnel Training and Qualification) - (2) Provide continuing training to personnel to maintain their job proficiency.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- DOE O 433.1 CRD Requirement 3.b - The contractor maintenance management program should address the following element, as appropriate: Training and Qualification of Maintenance Personnel (a maintenance training and qualification program must be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities).

F. Personnel are trained on the activity level work planning and control process and understand how their function contributes to and integrates with the process.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.

- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
- 10 CFR 830.122, Criterion 2 (Management/Personnel Training and Qualification) - (1) Train and qualify personnel to be capable of performing their assigned work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- DOE O 433.1 CRD Requirement 3.b - The contractor maintenance management program should address the following element, as appropriate: Training and Qualification of Maintenance Personnel (a maintenance training and qualification program must be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities).

Adequate time should be allowed for work planning and control process training for line managers, work planners, safety professionals, work supervisors, hazards analysts, subject matter experts (SMEs), and others involved in work planning and control activities.

G. Work management processes are coordinated.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- DOE O 433.1 CRD Requirement 3.a - The contractor maintenance management program should address the following element, as appropriate: Maintenance Organization and Administration (The organization and administration of the maintenance function must ensure a high level of maintenance performance through effective implementation and control of maintenance activities).

Different work management processes used by different organizations or for different types or categories of work must be designed and implemented such that the combined requirements (e.g., resources, integrated schedules, support, etc.), potential effects, and interdependencies of all work activities are effectively understood, analyzed, and coordinated by the affected organizations.

H. Worker knowledge and experience is used throughout the work process.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement.
- DOE O 440.1A CRD Requirement 5 - Encourage employee involvement in the development of program goals, objectives, and performance measures and in the identification and control of hazards in the workplace.

Input from workers is sought early in the work planning process concerning how to safely and efficiently complete assigned tasks, and their input is factored into ensuring that adequate controls are in place.

I. A graded approach methodology is incorporated into the work planning and control process that determines the rigor for implementing these work planning and control attributes based on the importance/significance and associated consequences of the activity.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 4 - Balanced priorities and effective allocation of resources to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.
 - 48 CFR 970.5223-1, ISM Guiding Principle 6 - Hazard controls (administrative and engineering) to prevent/mitigate hazards shall be tailored to the work being performed.
 - DOE O 433.1 CRD Requirement 1.g - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines a configuration management process to ensure the integrity of the identified nuclear facility safety SSCs using a graded approach.
- a. A thorough analysis of the hazards associated with the work is used to ensure that the degree of detail and formality in planning the work, developing work instructions, specifying worker qualifications and skills requirements, and determining the amount of field supervision required are appropriate for ensuring that work is accomplished safely and reliably.

- b. The graded approach considers the safety classification of the equipment impacted by the work (e.g., Safety Class or Safety Significant), and the assumptions concerning equipment availability, operation, and performance documented in applicable facility safety basis documents (e.g., DSA, SER, facility hazards analyses).

Note: Work activities must be described to a level of detail that allows work planners to ensure acceptable results given the complexity of the work, the significance of the work, the hazards associated with the work, and worker knowledge and experience. The quality of work planning activities must be sufficient to ensure safe and reliable performance of work. Work planning procedures should provide the work planner with clear guidance on how to apply the graded approach in a manner that ensures thorough planning and worker safety, but allows appropriate flexibility to accomplish work without imposing overly conservative or unnecessary restrictions, costs, or burdens.

An example of an appropriate tailoring methodology is where straight forward “skill-of-the-craft” work tasks are involved, the workers analyze the hazards and use the appropriate controls for work they are trained for and accustomed to as journeymen craftsmen; where more complex but routine or repeat work tasks are involved, controls developed from previous hazard analysis can be used (this requires that work packages and records from the planning and performance of previous work tasks be maintained so that they can be reused; and verification during the current work planning process that the hazards associated with the previous work and its environment, and the adequacy of the controls used, are still valid for the current work); and for all other work, hazards are thoroughly analyzed and appropriate controls developed and implemented for the specific activity-level work tasks.

An important aspect in applying a graded approach is to ensure that the defense-in-depth (safety management programs, facility SSCs, administrative controls, and other features) provided and described in the facility safety basis documents (such as DSAs, TSRs, and SERs) to protect workers, the public, and the environment remains in place while the work is being performed. Contractor system engineers for safety systems, facility DSA safety analysts, and SMEs should be used as a resource to ensure that defense-in-depth is not unacceptably compromised.

Skill-of-the-craft work tasks do not impact facility operations, safety (i.e., no impact on safety systems such as diminished capability or loss of redundancy, and no entry into TSR LCOs), or scheduled activities, nor are outside resources or expertise, controls beyond worker capabilities, permits, safety evaluations, changes in facility configuration, or detailed work instructions required. These types of tasks only require the skills of the worker or work group, and are sometimes referred to as minor work. The EFCOG has defined “skill of the craft” type work as work that can be safely performed by a worker possessing the needed proficiency, skill, job position training, and experience to perform a given task without the need for enhanced work planning, formal hazard analysis, or direct supervision. Such work is usually a routine or low hazard activity performed in a stable environment and of a non-complex nature that supports fulfillment of a work group’s day-to-day function. These hazards are assessed and documented as part of the individual’s job description, and the training necessary to mitigate these hazards is outlined in the individual or position training requirements document. There is little potential for identified hazards to change during the work activity.

Tasks determined to be skill-of-the-craft should at least be analyzed the first time to ensure that appropriate controls are identified and are within the craft skill set. This includes operations, manufacturing, research, and maintenance tasks.

Typically, the graded approach allows for a method of performing work without requiring initiating documents for non-hazardous work that takes place in non-hazardous environments where the work is straight forward, simple, and commonplace, does not impact facility operation or safety, and does not require coordination or support. This type of work may include items such as changing light bulbs, repairing door locks or latches, patching holes in walls, work on shop or office equipment, handrails, water fountains, toilets, etc. Such work does not present safety or operational challenges or risks, does not involve safety equipment, is consistent with the facility design and safety basis, and does not require permits or critical steps that involve special controls, hold points, or independent verifications.

Although the graded approach allows for this flexibility, the work process that allows it must be formal and accompanied by associated high levels of accountability to ensure adequate performance. For the graded approach to be effective requires an organization that is conscientious and dedicated to safe and effective accomplishment of critical work, management commitment, and ownership by planners, workers, and first line supervisors.

J. Organizations use their assessment and issues management processes to drive work planning and control improvements.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement.
- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (1) Establish and implement processes to detect and prevent quality problems.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (2) Identify, control, and correct items, services, and processes that do not meet established requirements.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (3) Identify the causes of problems and work to prevent recurrence as a part of correcting the problem.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (4) Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.
- 10 CFR 830.122, Criterion 9 (Assessment/Management Assessment) - Ensure managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.
- 10 CFR 830.122, Criterion 10 (Assessment/Independent Assessment) - (1) Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement.
- 10 CFR 830.122, Criterion 10 (Assessment/Independent Assessment) - (2) Establish sufficient authority, and freedom from line management, for the group performing independent assessments.
- 10 CFR 830.122, Criterion 10 (Assessment/Independent Assessment) - (3) Ensure persons who perform independent assessments are technically qualified and knowledgeable in the areas to be assessed.
- DOE O 433.1 CRD Requirement 1.i - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines a process for feedback and

improvement based on relevant information from the results of operations, maintenance, and assessment efforts.

- a. The contractor self-assessment program requires periodic and thorough evaluation of the effectiveness of incorporation of the ISM core functions and guiding principles, and appropriate QA criteria, into activity-level work planning and control. The evaluation process includes line management and independent assessment activities, review and analysis of results, and dissemination of lessons learned and noteworthy practices. The organizational structure, staffing levels and expertise, adequacy of resources, and effectiveness of methods, processes, and alternatives for activity level work should be assessed.
- b. The use of the *Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites* provided in Appendix B should be required by site procedures for assessing all types of activity level work.
- c. The results from these (items a and b above) and other assessments of work processes, including post-work feedback, are trended, evaluated to identify weaknesses, and used for work planning and control process improvement.

Note: Assessment data should be analyzed both vertically within a program, project, or organization, and horizontally across the different programs, projects, and organizations at a site to identify trends and potential problems.

- d. A computer-based system is used to:
 - 1) track significant issues identified from assessments, and from post-work feedback and lessons learned provided by workers, planners, and supervisors;
 - 2) identify responsible individuals and corrective actions planned and implemented in response to identified issues; and
 - 3) document final resolution and closeout of issues.

Note: The system used to track the status of issues and corrective actions from these assessments should be the *Site-wide Integrated Issues Management System* (when implemented) used to share information between the M&O contractor for a site and the NNSA Site Office. NNSA is working to have a *Site-wide Integrated Issues Management System* in place at all of its sites, but several sites have yet to fully implement the system.

It is only intended that significant actions requiring DOE/NNSA and contractor line management attention be included in the computer-based issues tracking system. This system is not a replacement for other mechanisms (e.g., facility specific computer system, researcher, project, or operations logbooks, etc.) normally used to record, track, communicate, and disposition issues of lesser significance.

- e. Assessment activities include routine and periodic management oversight of work activities on the floor (i.e., direct observation of work and interaction with workers) for the purpose of demonstrating management commitment to and expectations for

effective ISM and QA, and identifying opportunities for work process and performance improvements through observations, direct communication with workers, and line ownership of safety. The process that implements this action should include the following attributes:

- 1) Participation of all levels of management in organizations that support the integration of safety into work activities;
- 2) Managers have a sound understanding of the site's implementing work planning and execution processes as described in its ISM System description;

Note: It is important that managers be trained sufficiently to understand the work planning and control process, ISM and QA, the technical aspects of the work being performed, and how to conduct the assessments to ensure that the assessments add value, and do not unintentionally result in condoning non-optimal work practices.

- 3) Documentation of the process and its implementation, including the establishment of clear expectations and performance measures by senior management;
- 4) Interaction with workers in a coaching relationship to encourage positive behaviors and to discern opportunities for improvement;
- 5) Observes all phases of work (e.g., requests, planning, execution, and/or critique) and verifies appropriate worker involvement;
- 6) Results are documented, and are an input to the site assurance systems; and
- 7) Metrics are used to measure ISM process effectiveness.

2. Identify, Prioritize, and Approve Work

A. A defined process is used to identify and request work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences).
- 48 CFR 970.5223-1, ISM Core Function 1 - Define the Scope of Work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan (MIP) that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- a. Work request processes are standardized, electronic, accessible by all personnel who need to request work, and have the functionality to manage the activity level work planning and control process from inception to completion.

Note: The electronic work request system should have the capability to indicate and track the status of all work in progress (e.g., in planning, in progress, waiting for parts, etc.), and should include information on assigned priority, facility conditions required in order to perform the work, planned dates, start date, and completion date. It should allow work activities to be identified and sorted by job title, number, originator, and systems affected by the work.

- b. The information included in the work request should be sufficient to allow the work to be planned (as described in section 4, *Planning Work*, below) for safe, efficient, technically correct, and reliable work execution consistent with the facility design and safety bases. Originator, requestor, and/or user contact information should be included so that planners know where to go to get additional information that may be necessary to plan the work.

B. A defined process is used to prioritize requested work; work priority is managed to achieve integration among all necessary interfaces.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 48 CFR 970.5223-1, ISM Guiding Principle 4 - Balanced priorities and effective allocation of resources to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work

consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.

- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan (MIP) that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
 - DOE O 433.1 CRD Requirement 1.h - Develop and submit for DOE approval a Maintenance Implementation Plan (MIP) that clearly defines a prioritization process that places proper emphasis on safety requirements, the maintenance backlog, system availability, and requirements for those infrastructure elements identified as part of the nuclear facility safety basis.
- a. The activity level work planning and control process has a formal work screening and validation process that determines work need and priority, identifies tentative work schedule and required resources, ensures that work is not duplicative, and initially determines applicable work planning and control process methods based on the nature of the work.
- b. Prioritization considers safety and mission impact. Safety impact includes both personnel safety (e.g., OSHA, radiological, and industrial hygiene types of considerations) and facility safety (e.g., authorization basis assumptions concerning worker and public safety and environmental impact). The prioritization method should be effective in assigning meaningful work priorities so that jobs most important to safe and reliable facility operation are accomplished first.

Note: Work requests that have immediate impact on the health and safety of contractor personnel need to be processed rapidly. Work requests that have equipment impacts must be evaluated and prioritized considering the need to protect equipment and workers, to stay in compliance with the established safety basis and operating requirements for that facility or project, and the interface with mission requirements.

C. Requested work is approved to proceed to the scheduling and planning phase.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 10 CFR 830.122, Criterion I (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan (MIP) that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of

Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).

Facility management signs off on proposed work activities indicating agreement that the work needs to be performed, acceptance of the impact of work activities on facility operations, and acceptance of all costs associated with planning and execution, including items such as special training needs (e.g., design and fabrication of mock-ups) and all post work review and closeout activities discussed in section 7, *Post Work Review and Closeout*, below.

Note: Approval to proceed with work planning activities may take different forms depending on the work. For unique, complex, hazardous, and/or major work items, documented management approval would typically be expected. For simple and less hazardous work activities less formal approval at lower management levels may be appropriate. For routine operations, initial planning typically results in development of approved work procedures to be used in subsequent evolutions such that future approval is not necessary unless changes are made. For research activities approval may be in the form of a general or blanket delegation of authority that allows all work within certain constraints (e.g., amount and form of material for a specific process location) to be planned without requiring further approval. The required form of approval should be clearly delineated.

3. Scheduling

Note: For some work, e.g., Research and Development (R&D) work, scheduling may be addressed at either the project or activity level, and thus the attributes listed in this section would be applied at the appropriate level.

A. An integrated schedule(s) is developed that balances priorities and resources in a disciplined manner to ensure that work is accomplished safely and efficiently. The scheduling process has provisions for work not requiring a formal schedule. The schedule is managed through a formal change control process.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 6 - Hazard controls (administrative and engineering) to prevent/mitigate hazards shall be tailored to the work being performed.
- 48 CFR 970.5223-1, ISM Guiding Principle 4 - Balanced priorities and effective allocation of resources to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.
- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an

organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.

- 10 CFR 830.122, Criterion 1 (Management/Program) - (2) Establish management processes, including planning, scheduling, and providing resources for the work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- DOE O 433.1 CRD Requirement 1.h - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines a prioritization process that places proper emphasis on safety requirements, the maintenance backlog, system availability, and requirements for those infrastructure elements identified as part of the nuclear facility safety basis.
- DOE O 433.1 CRD Requirement 3.a - The contractor maintenance management program should address the following element, as appropriate: Maintenance Organization and Administration (The organization and administration of the maintenance function must ensure a high level of maintenance performance through effective implementation and control of maintenance activities).
 - a. The rigor of scheduling matches the complexity of the work (i.e., complex work requiring multiple resources, coordination, etc. is scheduled in detail, where simple work may not require scheduling beyond understanding resource requirements).
 - b. The scheduling process should ensure that affected organizations are notified of short-range and long-range schedules. Schedules should be reviewed during preparation to identify issues, problems, and conflicts for resolution so that final schedules are workable and successful.

Note: The schedule review process is intended to reach agreement on the schedule by those who are expected to implement it, and to have them develop a sense of ownership of the schedule.

- c. The schedule should be an accurate and credible management tool used to direct and control work activities. It should be a flexible, living document that uses the best available information to reflect changing situations so that work can be effectively reprioritized and/or rescheduled in response to unanticipated events to achieve optimum results. The schedule must be updated daily to reflect progress and current status and to provide needed information to those responsible for planning and performing work. The individuals responsible for the work should also be responsible

for reporting progress for purposes of updating the schedule and should be clearly identified on work planning/scheduling documents.

Note: The schedule may be issued in different formats to provide information needed by various users (e.g., the level of detail required by a work supervisor would be different than for the facility manager). It should be computerized and readily accessible to all who need it.

- d. A single overall daily schedule should be developed that addresses all significant work activities to be performed within a facility, whether performed by facility, non-facility, or subcontractor personnel, that considers the restraints required on each work activity and the restraints that each work activity places on other work activities.

B. The schedule(s) is resource loaded and the sequence and timing of activities adjusted to ensure that adequate resources are available and consistent with the applicable requirements.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 4 - Balanced priorities and effective allocation of resources to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (2) Establish management processes, including planning, scheduling, and providing resources for the work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means
- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- DOE O 433.1 CRD Requirement 3.a - The contractor maintenance management program should address the following element, as appropriate: Maintenance Organization and Administration (the organization and administration of the maintenance function must ensure a high level of maintenance performance through effective implementation and control of maintenance activities).

- a. Schedule tools such as rolling work week schedules and Plan-of-the-Day (POD) and Plan-of-the-Week (POW) meetings are used to manage and coordinate all work activities that can potentially impact safety and/or operations.
- b. Schedules are developed and updated as necessary to effectively coordinate and communicate work activities.

Note: The scheduling of work activities based on accurate planning estimates and coordination will reduce the amount of wasted time, improve job efficiency, and thus help to reduce the amount of time that workers are exposed to job hazards. Coordination involves effective communication, understanding, and agreement among various organizations that are involved in performing the work or can affect or be affected by work activities. These organizations can include operations, engineering, security, training, maintenance, and their support organizations such as radiological control, quality assurance, and records management. Examples of areas where such coordination is required includes preparation of mock-ups and performing practice runs, preparation and use of permits (e.g., RWPs, confined space entry, excavation, waste disposal), electric power or equipment lockouts/tagouts, QC verifications, and securing availability of trained and qualified workers (e.g., electrical, mechanical, instrumentation and control). A key individual (e.g., work planner, supervisor, or designated individual) within the organization responsible for the work should be assigned responsibility for identifying and coordinating needed support. Work planners should maintain a library of work instructions, procedures, and scheduling information to help in estimating time and coordination requirements. Feedback information should be routinely sought to improve the accuracy of work planning information.

Effective scheduling should result in the most efficient use of resources by significantly decreasing duplication of work and technical support, decreasing personnel idle time, and ensuring timely completion of planned tasks. Scheduling is an integral part of the overall preparation for work activities, and is an iterative process that is performed in conjunction with the work planning activities discussed in section 4, *Planning Work*, below.

Meetings should be held as frequently as necessary to ensure effective communication among affected organizations regarding facility work priorities, status of ongoing work, current problems, upcoming work, work restrictions or interferences, etc. These meetings should be run by the facility operations organization, and involve appropriate personnel (e.g., supervisor or coordinator) from affected and support organizations and disciplines.

Some facilities have been successful in identifying support requirements, such as RWP requirements, within the coding structure for activities in the schedule. When this is done, it is very important that sufficient training and familiarization be given to enable personnel to interpret the coding easily. It has generally been found necessary to explicitly schedule the support needed for major tasks rather than use only activity coding.

- c. The scheduling process:
 - 1) is owned by the facility operations organization;
 - 2) identifies the optimum window(s) of opportunity for performing work based on the time required to plan for the work (including thorough identification and analysis of hazards, identification and implementation of controls, and necessary training); the importance of the work to mission and safety; the impact of the work on facility operations; the required or desired sequence of planned work; and the availability and efficient use of resources (parts, materials, equipment, personnel, and any other items, support, or services required to accomplish the work);

Note: To make the best possible use of resources and minimize impact on operations (e.g., limiting the time that equipment is inoperable or unavailable), scheduling should take into consideration where multiple work activities involve common systems, equipment, or locations, require common facility conditions (e.g., common lockout/tagout requirements or isolation boundaries), or require the same crafts or support organizations or personnel.

- 3) tracks the status of planned work (e.g., ready to perform, waiting for parts, on hold for certain facility conditions, etc.) to ensure it is performed when appropriate;
- 4) is designed to be flexible to accommodate changing work priorities so that higher priority work is accomplished first while ensuring efficient use of resources and avoiding congestion, over-commitments, unnecessary challenges to personnel or property, and delays;
- 5) involves senior management as necessary for problems and critical path issues;
- 6) includes methods for evaluation of effectiveness (e.g., feedback and improvement mechanisms, performance metrics, periodic meetings to critique performance, analyze trends, address emerging issues and concerns, etc.); and
- 7) includes provisions that allow for “fill-in” work (i.e., work that has been planned but not scheduled or is scheduled to be performed at a later date) to be performed when unexpected facility conditions or other circumstances occur that allow the work to be performed safely and correctly.

4. Planning Work

A. Define the work scope by identifying all activities required to complete the work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 1 - Define the Scope of Work.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
 - 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- a. Work activities and boundaries are defined in sufficient detail to allow a work planning team to determine the job steps necessary to complete the work so that all hazards can be identified, appropriate controls can be established, and adequate work instructions developed.

- 1) The work needed, objective to be accomplished, condition to be achieved or corrected, problem being addressed, expected outcome, etc, are well documented.
 - 2) The specific tasks necessary to accomplish the work are identified. Workers, customers/users, supervisors, planners, and others are involved in task identification as appropriate.
 - 3) Equipment, components, locations, etc. described are verified to be correct and accurate;
 - 4) Applicable and affected documents are identified (e.g., procedures, drawings, specifications, vendor manuals, training materials, etc.), and the latest versions/revisions are used in work planning.
 - 5) The work activity is clearly and adequately bounded/limited (e.g., physical boundaries such as equipment/components to which work activity is limited, specific area to which work is confined; conditions under which work can be performed; and organizations responsible for the various tasks, etc.).
 - 6) Clear indication is provided if the work activity can affect personnel or facility safety, can pose challenges to facility equipment, processes, or operations (e.g., result in shut-downs, delays, significant costs or losses), or can result in other unacceptable/undesirable consequences.
- b. The work planning process specifies when walkdowns are required to assist in defining work scope and boundaries, and clearly defines roles and responsibilities regarding worker involvement.
- 1) Walkdowns are performed for all initial, complex, and/or hazardous work activities. Subsequent walkdowns should be performed where it is believed that the job conditions or hazards may have changed since the initial walkdown (this applies for both initial work and repeat work activities).
 - 2) Workers that will be performing the tasks participate in the walkdown where possible.
 - 3) Work site conditions are documented, including use of photographs if necessary, to ensure appropriate consideration of special or unique planning requirements or circumstances (e.g., lookouts/watches, permits, constraints or interferences to use of normal/routine practices or procedures, resources, support needs such as equipment, labor, engineering or operations, etc.).
- c. Associate equipment, parts, and components with systems, processes, and operations. This aids work planning efforts by helping to ensure that the impact of the equipment, part, or component on facility mission and safety is understood; and to schedule multiple tasks affecting systems, processes, or operations at the same time to minimize impact.

- d. The work activity is carefully reviewed to determine if it involves a change and/or a unreviewed safety question (USQ).

Note: An important goal when performing work is to maintain the facility physical configuration and documents consistent with the facility design and safety basis requirements and performance criteria for systems, structures, and components (SSCs). It must be assured that SSC requirements and performance criteria continue to be met upon completion of work activities (e.g., suspect/counterfeit items must be avoided; the adequacy of substitute replacement parts must be confirmed by engineering; and parts must be inspected, stored, and handled such that they continue to meet applicable specifications and perform as expected).

A change is any temporary or permanent alteration to the requirements, installation, or associated documentation for SSCs important to the facility mission and/or safety. Work activities that involve a change require additional planning effort to ensure technically correct and consistent agreement among SSC requirements, the facility installation, and the associated documents. The change control process is intended to ensure this technical correctness and consistency by requiring focused reviews (e.g., technical design reviews, safety basis/DSA reviews, topical area reviews by appropriate disciplines and organizations, and a USQ review) by qualified individuals. A change involves a positive USQ if it would result in an increased level of hazards or a decreased level of hazard controls from the DOE-approved DSA, or a change to the TSRs. The USQ process does not determine whether a change is safe or not (the safety of a proposed change should be verified by the contractor before deciding to make the change), but rather the appropriate approval authority for the change (changes within boundaries of the DOE-approved DSA may be approved by the contractor for implementation; otherwise, DOE review and approval of the change is required prior to implementation).

Work activities should also be reviewed to ensure consistency with applicable safety management programs such as fire protection, criticality safety, radiation protection, change control, document control, and quality assurance. Work that involves changes in the content, documentation, or implementation of safety management programs must be carefully reviewed and approved by appropriate individuals from the responsible organization(s).

B. Personnel with the appropriate functional area expertise are used to plan the work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
- 10 CFR 830.122, Criterion 2 (Management/Personnel Training and Qualification) - (1) Train and qualify personnel to be capable of performing their assigned work.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.

Work planners should be trained and qualified in the following areas:

- 1) Integrated Safety Management Core Functions and Guiding Principles, and Quality Assurance Criteria;

- 2) The roles, responsibilities, authorities, and accountabilities of interfacing organizations;
- 3) Applicable work management system(s) - e.g., types of work performed, processes used, tools, software, work package content, how to apply lessons learned, etc.;
- 4) Hazard identification and analysis, and how to incorporate controls into work instructions;
- 5) How to apply applicable requirements, standards, permits, regulations, etc. to work planning (includes use of subject matter experts and system engineers);
- 6) How and when to conduct walkdowns; and
- 7) Effective communications and technical writing.

C. Criteria are established for when team planning is required.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards
 - 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
 - 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
 - DOE O 440.1A CRD Requirement 5 - Encourage employee involvement in the development of program goals, objectives, and performance measures and in the identification and control of hazards in the workplace.
- a. A team approach is used to identify and analyze hazards associated with complex or unique work involving multiple hazards.
 - b. The team operates (i.e., meets, communicates, reports, etc.) as defined in approved, controlled procedures.
 - c. The team consists of appropriate types of personnel (e.g., safety analysts, work planners, safety professionals, and SMEs such as health physicists, electrical safety

specialists, criticality safety engineers, fire protection engineers, security experts, etc.) for the work being performed given the hazards involved.

Note: The work planning documentation should identify the team members and expertise used in planning the work.

- d. Workers are involved in work planning to draw upon their knowledge and experience, to understand their concerns, and to get their input concerning preferred methods and approaches to work (what works and what doesn't, obstacles frequently encountered and how to avoid them, etc.). This helps to familiarize workers with the tasks to be performed, and to garner their consent with the selected approach for accomplishing the work.

D. Plan work using previous work documents, documented work history, existing knowledge and operating experience, lessons learned, applicable standards and requirements, and manufacturer's recommendations.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement
- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences).
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (3) Identify the causes of problems and work to prevent recurrence as a part of correcting the problem.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 3.f - The contractor maintenance management program should address the following element, as appropriate: Planning,

Scheduling, and Coordination of Maintenance (an effective system for planning, scheduling, and coordinating maintenance activities is implemented to (1) ensure that maintenance, including surveillances associated with Technical Safety Requirements (TSRs), is accomplished in a timely manner; (2) improve maintenance efficiency; (3) reduce chemical and physical hazard radiation exposure (ALARA); (4) increase equipment availability; (5) ensure worker safety through training and proper use of personal protective equipment; and (6) ensure hazardous waste is properly segregated, treated, or disposed).

- DOE O 433.1 CRD Requirement 1.j - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines a systems engineer program for the management of vital safety systems that is consistent with DOE O 420.1A and designates a "system engineer" with (1) the requisite knowledge of the system safety design basis and operating limits from the safety analysis and (2) the lead responsibility for the configuration management of the design.
- DOE O 433.1 CRD Requirement 1.k - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines accurate maintenance history that compiles structures, systems, and components data and other maintenance, resource, and cost data in a system which is retrievable and capable of entering required-maintenance costs, actual maintenance costs, and availability data and failure rates for mission-critical and safety SSCs into the DOE Facility Information Management System.
- DOE O 5480.19 Attachment 1, Chapter I, Guideline 6 - Planning for Safety.
- DOE O 5480.19 Attachment 1, Chapter II, Guideline 2 - Safety Practices.

Work planning should consider the following types of information as applicable:

- 1) design and design basis information (the design authority/Authority Having Jurisdiction (AHJ) should be involved where appropriate), including:
 - i) component/equipment specifications (e.g., quality, operating environment, physical characteristics and capabilities);
 - ii) system requirements and performance criteria;
 - iii) facility design and operating information such as operating and maintenance procedures; policies and procedures that implement safety management programs such as criticality safety, fire protection, quality assurance, configuration management, etc.; as-built drawings; one-line diagrams and schematics; installation diagrams; piping and instrumentation diagrams (P&IDs); flow diagrams; load lists; and master equipment lists (MEL); and
 - iv) surveillance, test, and inspection criteria used to verify operability, integrity, or capability of SSCs to perform their associated design and safety functions.
- 2) applicable industry standards and manufacturer/vendor information;

- 3) safety basis information (e.g., DSA, TSRs, EIS, etc.);
- 4) MCPs that implement applicable contract requirements (List A and List B), and/or applicable Standards/Requirements Identification Documents (S/RIDs) or Work Smart Standards (WSSs); and

Note: The applicable standards and requirements not only include those applicable to the specific work activity (for example NFPA codes for design and installation work on a fire sprinkler system) but also those applicable to work control processes and worker safety in general such as DOE Order 414.1C, *Quality Assurance*, DOE Order 5480.19, *Conduct of Operations*, DOE Order 440.1A, *Worker Safety and Health*, and DOE Order 433.1, *Maintenance Management*.

- 5) operating experience, including lessons learned and feedback information, from previous or similar work activities.

Note: The controls used to protect workers that have been identified from activity/task-specific hazard analyses for previous similar work should be considered to determine which are good candidates for the current work being planned. Examples of these controls include: permits (confined space, radiological work, excavation, hot work, etc.); lockouts/tagouts; using tents, enclosures, or other confinement methods, use of insulated tools; Personal Protective Equipment (PPE); etc.

Capability should exist for archiving and easy retrieval of documentation associated with the planning and execution of completed work, including feedback and lessons learned information, to allow it to be used in the planning of subsequent similar work activities.

Lessons learned that may be applicable to the work being planned can come from sources such as accident investigations; assessments, audits and appraisals; causal analysis and root cause determinations; client feedback, deficiency reports; field activities (field work package planning and post-work critiques); emergency readiness assurance activities, near misses, occurrence reports, operational readiness reviews, personal experiences/observations, process improvement initiatives, Price-Anderson Amendments Act findings, and safety meetings. Lessons-learned are not expected to be specifically pointed out as such in the work authorization documents. Lessons learned are expected to be incorporated into the work procedure and/or work package in any combination of ways, including being covered as a topic for a pre-job briefing, attached for review by those approving the work procedure/work package, incorporated into the hazard controls, and/or incorporated directly into the work step instructions.

E. Identify and analyze the hazards with the work and the work environment; including potential undesirable events (e.g., “what if” scenarios), and select controls necessary for the protection of workers, the public, and the environment.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
- 48 CFR 970.5223-1, ISM Guiding Principle 6 - Hazard controls (administrative and engineering) to prevent/mitigate hazards shall be tailored to the work being performed.

- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - DOE O 433.1 CRD Requirement 3.f - The contractor maintenance management program should address the following element, as appropriate: Planning, Scheduling, and Coordination of Maintenance (an effective system for planning, scheduling, and coordinating maintenance activities is implemented to (1) ensure that maintenance, including surveillances associated with Technical Safety Requirements, is accomplished in a timely manner; (2) improve maintenance efficiency; (3) reduce chemical and physical hazard radiation exposure; (4) increase equipment availability; (5) ensure worker safety through training and proper use of personal protective equipment; and (6) ensure hazardous waste is properly segregated, treated, or disposed).
 - DOE O 5480.19 Attachment 1, Chapter IX - Lockouts and Tagouts.
 - DOE O 440.1A CRD Requirement 9 - Identify existing and potential workplace hazards and evaluate the risk of associated worker injury or illness.
 - DOE O 440.1A CRD Requirement 10 - Implement a hazard prevention/abatement process to ensure that all identified hazards are managed through final abatement or control.
 - DOE O 440.1A CRD Requirement 14 - Construction Safety.
 - DOE O 440.1A CRD Requirement 18e - Industrial Hygiene (specification of appropriate engineering, administrative, work practice, and/or personal protective control methods to limit hazardous exposures to acceptable levels).
- a. A formal, structured methodology is followed for the systematic identification and analysis of hazards that:
- 1) ensures thorough and complete analysis of hazards and identification of controls:
 - i) associated with the work tasks; and
 - ii) associated with the work environment.

Note: Section 4.3, *Hazard Identification and Evaluation*, of DOE G 440.1-1, *Worker Protection Management for DOE Federal and Contractor Employees Guide for use with DOE Order 440.1*, lists several techniques to assist in the performance of hazard analyses, including Safety Reviews, Change Analysis, and Energy Trace and Barrier Analysis (ETBA). In addition, references are provided that contain detailed information on the selection and use of various hazard analysis methodologies and techniques (e.g., American Institute of Chemical Engineers Guidelines for Hazard Evaluation Procedures) and the conduct of Job Safety Analyses (e.g. DOE 76-45/19 SSDC-19, Job Safety Analyses).

In analyzing the hazards associated with a particular scope of work, not only should the hazards associated with each of the tasks that make up the scope of work be analyzed, but so should the entire scope of work as an integrated whole. Interfaces between different organizations involved in the work, including subcontractors, should be specifically considered. Operating experience has demonstrated the importance of not analyzing hazards for a specific work task independent of the other work tasks. Examples include: 1) a situation where the hazards associated with the construction of scaffolding to support a work activity were not considered in the hazards analysis of the work to be performed on the scaffolding, resulting in workers who were assembling the scaffolding being exposed to hazards (toxic fumes); 2) cases where the disabling of a site-wide system (e.g., water supply or electric power), or portion thereof, was not adequately communicated to the facilities supported by the system, resulting in degradation of facility safety systems; and 3) a situation where work involving hazardous material was performed in one facility and then shipped to a second facility for additional work before being returned to the original facility, but personnel at the second facility were not sufficiently familiar with the handling of, or hazards posed by, the material resulting in a worker being exposed.

Identification of hazards should not be a computer exercise. Hazards should be identified and documented in the field by knowledgeable and experienced personnel wherever possible. The mechanism used to identify and document hazards should cause individuals to seriously think about the hazards and potential consequences. Hazardous conditions or situations are often not as apparent from remote locations, even when the specific work activities are thought to be well understood.

Hazards associated with the work environment include those that are not directly associated with the work tasks such as hazards posed by adjacent ongoing activities. Tools that are normally used without posing a hazard may pose unique hazards depending on the work environment. There may be hazards involved in the selection and use of staging areas intended to support the work. Reviews of the work area environment for hazards typically include the adequacy of lighting, accessibility/egress, cleanliness and housekeeping, noise levels, temperature and humidity, and other industrial hazards in addition to chemical, biological, radiological, and other process hazards.

Analysis of the hazards associated with typical work tasks within a facility and with different work locations within a facility can be documented and maintained for use in planning future work. However, such information should only be used as a starting point. Because of the dynamic nature of the missions, hazards, operations, and work activities at DOE/NNSA facilities, analyses from previous work activities can quickly become obsolete and misleading. This is one of the reasons why it is so important to carefully observe and consider potential hazards at the actual work location during work planning. Documented or computer based hazards identification methods and checklists can be a valuable tool to start the thinking process, but over-reliance on these methods may result in narrowly focused hazards analysis that fails to identify credible hazards that could be detected during field walk-down of the job location.

Typically, work performed using an approved, controlled procedure would not require additional hazards analysis beyond that performed during the procedure development and approval process unless the hazards, controls, or work environment have changed, or significant changes are made to the procedure itself. When procedures for routine or periodic work, operations, or evolutions are developed, a detailed analysis should be performed to identify the hazards associated with use of the procedure, and the hazards and controls used to protect workers from the hazards should be incorporated into the procedure. Responsibility for procedure hazard analysis and to ensure that the procedure can be used in a safe and efficient manner normally should reside with the procedure owner responsible for its technical content. Hazard analysis conducted for subsequent use of the procedure may simply consist of verifying that hazards associated with the work, and the work environment, have not changed.

Initial hazards analysis or prescreening is often used to determine if work can be classified as minor, everyday work performed by the public, or placed in a similar category where application of more structured hazard analysis is not considered necessary. One must be careful not to inappropriately exclude work based solely on type or category. Decisions to exclude work should

only be made by qualified hazards analysts or other trained individuals that are familiar with facility hazards and consider not only the work, but also hazards associated with the work location/environment, the potential impact of adjacent ongoing work activities, and other factors that could introduce hazards that may not be obvious to others.

Thorough, deliberate, and systematic analysis of hazards and identification of controls by qualified individuals who collectively possess extensive experience and expertise related to the work activities and associated hazards is necessary for all work that involves more than minor hazards. A team approach to hazard analysis should generally be used for work that involves significant or multiple hazards; could cause serious injury or death; involves multiple crafts or organizations and complex sequencing, coordination, or integration; is non-routine or infrequently performed; involves unknown hazards (either type or quantity), environments, or risks; or has a previous work history or high probability/potential for releases to the environment.

- 2) includes consideration of potential transients or accidents (i.e., “what if” scenarios such as spills, fires, exposures, failures, changing conditions, interference, alarms, unexpected equipment actuations, errors, etc.) and their consequences;
- 3) avoids over-reliance on generic work documents, automated job hazard analysis (AJHA) tools and administrative controls such as permits (e.g., radiological, confined space, etc.) in lieu of thorough analysis of specific work tasks/activities;

Note: Over-reliance on generic work documents, permits, automated job hazard analysis (AJHA) tools, administrative controls, or the existence of higher level ES&H programs can result in hazards or hazardous conditions associated with the specific work activity or its environment being missed or not being properly analyzed. The hazards analysis process is intended to ensure thorough and systematic identification and analysis of hazards by appropriate qualified individuals who interact and thoughtfully consider potential hazards and consequences and identify controls that need to be implemented to ensure safe, reliable conduct of work. Work planners need to be careful not to become over-reliant on general or higher level controls or AJHA tools to the point where they become a crutch or substitute for engineering judgment and thoughtful analysis that leads, or misleads, the analyst or provides a false sense of security.

Generic work documents, vendor-supplied work instructions, or previously used work packages/procedures are only used following confirmation of continued applicability and appropriateness to the current work site and activities, and after applicable lessons learned and operating experience information has been incorporated.

- 4) requires that hazards be sufficiently quantified (e.g., noise db levels; radiation dose rates; chemical volumes or airborne levels; temperature limits or extremes; fluid or gas pressures; electrical voltage and amperage; weight of lifted or suspended components, etc.) so that analysis results in identification of appropriate controls;
- 5) verifies that work activities are consistent with applicable standards and requirements, and do not challenge the facility safety basis or environmental limits;
- 6) reviews work tasks from a human performance perspective to identify and either eliminate or develop contingencies for error likely situations; and

Note: The frequency and severity of events caused by human error can be minimized by reducing or eliminating latent conditions that contribute to human errors, whether these conditions relate to the organization, the individual, or the work environment. Error precursors include excessive task

demands (e.g., high workloads and time constraints, especially when combined with unclear or confusing direction); individual characteristics such as unfamiliarity, illness or fatigue, stress, personality conflicts, failure to adequately communicate/understand, or unsafe attitudes (e.g., arrogance, pride, or insubordination); distractions or interruptions; changes or departures from normal routines; confusing equipment, controls, or displays; unexpected results or equipment responses; and use of workarounds. The application of proven human performance principles and error-prevention techniques and defenses can reduce human error and the frequency and severity of occurrences. These techniques include peer reviews; clearly written directions and procedures; stopping work (or pausing/suspending work, or taking a time out) when unsure; maintaining a trusting but questioning attitude towards safety and work progression; independent verification; adherence to procedures; management supervision and internal and external oversight; walkdowns; pre-job briefings and post-job reviews; training; thorough planning and scheduling; accountability; teamwork; open and honest direct communications; and a learning culture.

7) ensures that the hazard analysis is adequately documented and maintained for future use and reference.

b. Hazards are analyzed collectively to arrive at the optimum set of controls for the work being performed, and to ensure that the selected controls do not conflict with each other or introduce additional hazards. This is an iterative process that must be repeated as tasks are added or changed and as controls are identified or modified.

Note: Examples of where controls might conflict would be where ear protection provided for noise reduction could impair the ability to hear emergency alarms, locking out power for electrical safety reasons could inadvertently disable safety alarms or indications, or where physically restricting access to prevent unwanted interference could impede egress or emergency response actions.

The selection of hazards controls should consider work area controls necessary to prevent exposure to hazards by personnel who are not involved in the work activity.

When selecting controls, it is important to ensure that the defense-in-depth (safety management programs, facility SSCs, administrative controls, and other features) provided and described in the facility safety basis documents (such as DSAs, TSRs, and SERs) to protect workers, the public, and the environment remains in place while the work is being performed. Contractor system engineers for safety systems, facility DSA safety analysts, and SMEs should be used as a resource to ensure that defense-in-depth is not compromised.

The final control set selected should be based on a thorough analysis of the hazards for the specific work being performed. Identification and use of controls that are unnecessary can diminish the importance of necessary controls and can reduce job efficiency. DOE has identified cases where broad generic control sets were specified for all work activities in an attempt to satisfy auditors that sufficient controls were being used. However, unnecessarily including standard controls in work packages can cause workers to ignore or miss other non-standard controls. The basis for the control set selected should be readily apparent or documented.

The need to develop and use mock-ups to improve work safety and efficiency should be considered for highly hazardous or complex tasks. Mock-ups can be a useful tool for better understanding work tasks, validating the effectiveness of selected controls, and ensuring that the work can be performed safely and effectively in a timely manner that reduces/minimizes worker exposure to hazards.

For some high-risk work situations, the conservative use of PPE in addition to engineered and administrative controls has proved to be beneficial and should be considered.

c. Potential unwanted/undesirable impacts from the conduct of work activities (e.g., unanticipated alarms, unplanned entry into TSR LCOs, need for additional support, degraded or diminished safety or mission capability) are identified and eliminated.

Note: Changes in the status of safety systems and equipment, facility processes, status monitoring capability, etc. should be identified and carefully evaluated to understand the associated safety impact and any necessary controls/compensatory measures needed to ensure safety.

- d. Goals to be achieved when planning activity level work tasks should include to understand the potential impact/consequences on safety and operations so that:
- 1) challenges to safety systems and equipment can be prevented or minimized and controlled;
 - 2) worker radiological exposures and exposures to other hazards (e.g., chemicals, electricity, noise, fumes, confined spaces, heights, etc.) can be prevented or minimized and controlled; and
 - 3) adverse impacts on facility processes and operations can be eliminated or minimized and controlled (this includes making sure that work is accomplished successfully the first time so that repeat work/rework is not necessary).

F. Focus on eliminating or reducing the hazards; for any remaining hazards use a hierarchy of controls (i.e. engineered controls first, administrative controls second, and PPE last).

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
- 48 CFR 970.5223-1, ISM Guiding Principle 6 - Hazard controls (administrative and engineering) to prevent/mitigate hazards shall be tailored to the work being performed.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

A hierarchy of controls methodology is employed that seeks to prevent or mitigate the hazards by first eliminating hazards, second by controlling the hazards (first through engineered controls and next through administrative controls), and as a last resort through the use of personnel protective equipment to protect the worker from the hazard. Preference should be given to passive controls over active controls.

Note: It is important not to casually dismiss the use of engineered controls, but to carefully consider if engineered controls should be used. Where engineered controls are specified, the design and implementation of the controls should be carefully reviewed to verify that 1) they adequately perform their intended safety function(s), and 2) they do not constitute unreviewed design changes that alter the reviewed and approved configuration of SSCs provided to prevent or mitigate hazardous conditions.

G. Work plans identify the resources, including support organizations, needed to perform the work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 4 - Balanced priorities and effective allocation of resources to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- 10 CFR 830.122, Criterion 1 (Management/Program) - (2) Establish management processes, including planning, scheduling, and providing resources for the work.
- DOE O 433.1 CRD Requirement 3.i - The contractor maintenance management program should address the following element, as appropriate: Procurement of Parts, Materials, and Services (parts, materials, and services required for maintenance activities should be available when needed.).

The resources needed to ensure the job is done right the first time should be identified, including:

- 1) documents necessary for accomplishing the work (e.g., procedures, drawings, vendor manuals, specifications, requirements, performance criteria, etc.);
- 2) equipment, tools, materials, and parts;

Note: The adequacy of tools and equipment used for the work being performed must be verified (e.g., correct instrument ranges and accuracy).

- 3) personnel labor and skill (types and numbers of crafts, skills requirements, knowledge, and experience); and
- 4) required services and support such as QA/QC, permits, radiological control, fire watches, etc.

H. Develop instructions necessary to complete work activities safely and efficiently, including integration of specific hazard controls. Identify and integrate into the instructions applicable technical and administrative requirements (ES&H, QA, Security, Emergency Management, Safety Basis, etc.).

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse

consequences).

- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
 - 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - DOE O 433.1 CRD Requirement 3.e - The contractor maintenance management program should address the following element, as appropriate: Maintenance Procedures (maintenance procedures and other work-related documents (e.g., drawings and instructions) must be prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently).
 - DOE O 5480.19 Attachment 1, Chapter X - Independent Verification.
 - DOE O 5480.19 Attachment 1, Chapter XVI, Guideline 2 - Operations Procedures - Procedure Content.
- a. The sequence of steps in work instructions ensure that work is performed safely, efficiently, and effectively/successfully.
 - b. Written work procedures and instructions should be provided for all work that if not performed correctly could result in a facility transient or degraded condition, a facility, equipment, or personnel hazard, or where work involves complex or complicated systems, equipment, or actions.
 - c. Specific work instructions should be provided for any work that exceeds minimum skill-of-the-craft training levels. Additional detailed instruction (and perhaps training) is required for work that involves specific or unique vendor instructions or requirements that exceed worker qualifications and proficiencies. Examples include the use of special tools or equipment, lifting or rigging, and use of mock-ups, especially in high-hazard or high-stress areas or situations.

Note: Approved procedures should be used where available. Approved procedures should be developed for all routine repeat work activities that involve SSCs important to facility safety or involve ALARA considerations. Work instructions should be developed with the detail necessary to ensure that the work is conducted safely and efficiently, is of high quality, and achieves desired results.

- d. Work instructions identify impacts on safety systems and equipment and/or facility operations/processes, and applicable TSRs or other administrative controls.
- e. Hazards associated with the work and the controls developed to protect the worker are appropriately documented in the work package.
- f. Written work instructions include appropriate features (e.g., identification of appropriate controls, warnings and precautions, safety QA hold points, control room communications, required inspections, approvals to proceed to next steps, independent verifications, and use of additional personnel to ensure safe and proper completion of important, complex, or difficult tasks, etc.) necessary for confirmation of critical steps, values, equipment positions, system alignment, etc., and for worker safety, equipment protection, and continuity of operations.
- g. Work planning identifies and documents in work instructions/procedures all necessary prerequisite actions to be completed and verified before proceeding with work tasks. These include verification of required facility initial conditions (e.g., correct operating mode or availability of systems or equipment); communications (e.g., notifications/announcements and approvals); confirmation of equipment position and system status; confirmation of proper installation of controls (establishment of lookouts/watches, lock-outs and tag-outs, PPE, compliance with administrative limits, controls, and requirements including TSR Limiting Conditions for Operation); availability of support equipment (e.g., lighting and scaffolding); and any other field preparations or actions that must be completed before work is begun.
- h. Work planning identifies and documents in work instructions/procedures all necessary precautions and limitations necessary to prevent or reduce personnel exposure to hazards (industrial, radiological, electrical, chemical, physical such as heights or confined spaces, environmental such as heat, cold, noise, etc.) and damage to property and equipment. Precautions and limitations should:
 - 1) inform the worker of hazardous conditions that exist or could be encountered during the work;
 - 2) identify action(s) required by the worker for protection;

Note: Precaution statements and associated specific action steps should be placed in the work instructions at the location directly proceeding where they are to be performed. General precaution statements pertaining to the overall scope of work or to a particular portion of the work should be placed at the beginning of the work instructions or prior to the portion of the instruction to which they apply.
 - 3) be considered for situations where improper action or omissions could disrupt facility operations, result in undesirable conditions or consequences, or cause inadvertent actuation of systems/equipment or entry into TSR LCOs (e.g., failure to install or remove a jumper, lead, fuse, bypass, or interlock);
 - 4) be proceeded by warning and caution statements where warranted by potentially serious consequences; and

- 5) be clear, concise, and specific (generic precaution statements should be avoided).
- i. Work instructions require documentation of as-found and as-left conditions; incomplete/uncompleted items; discrepancies; unexpected, unusual, abnormal, unplanned, or unexplained conditions; equipment responses and surrounding circumstances; and relevant indications or alarms, etc. to ensure preservation of evidence and allow for subsequent analysis.

I. Establish acceptance/performance criteria to verify completion of the work.

Corresponding Requirements:

- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
 - 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - 10 CFR 830.122, Criterion 8 (Performance/Inspection and Acceptance Testing) - (1) Inspect and test specified items, services, and processes using established acceptance and performance criteria.
 - DOE O 433.1 CRD Requirement 3.h - The contractor maintenance management program should address the following element, as appropriate: Post-maintenance Testing (post-maintenance testing should be performed to verify that components will fulfill their design function when returned to service after maintenance).
 - DOE O 5480.19 Attachment 1, Chapter VIII, Guideline 2 - Control of Equipment and System Status - Equipment and System Alignment.
 - DOE O 5480.19 Attachment 1, Chapter VIII, Guideline 7 - Control of Equipment and System Status - Equipment Post-Maintenance Testing and Return to Service.
- a. Testing should be performed following completion of work activities as necessary to verify that the work was performed correctly, the outcome is acceptable/successful, and that systems and equipment affected by the work operate correctly and are restored to normal/desired operational status. For certain work activities, such as corrective maintenance, post-maintenance testing would be required (e.g., functional testing to ensure SSCs are capable of performing their intended design and safety functions following repairs, visual inspections to check for leaks under pressure, etc.). For activities such as process operations or R&D, post-work testing may be a routine and integrated part of the activity that is not addressed separately, or may not be necessary.

- b. Acceptance/performance criteria should:
 - 1) conclusively determine whether the work was accomplished successfully;
 - 2) verify that the work did not introduce or cause other deficiencies or problems; and
 - 3) determine that applicable design, safety, and interface criteria are met.
- c. Testing is coordinated with operations where appropriate.
- d. Work package procedures ensure proper equipment restoration and return to service so that there is positive assurance/confidence that design and safety functions will be adequately performed.

J. Work documents are written so they can be understood and effectively used by those who perform the work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 3.e - The contractor maintenance management program should address the following element, as appropriate: Maintenance Procedures (maintenance procedures and other work-related documents (e.g., drawings and instructions) must be prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently).

- a. Work instructions should be developed for the user (worker). Instructions should be clearly written, complete, concise, and preclude the potential for misinterpretation or error.

Note: Work instructions/procedures should provide guidance necessary to ensure that work is accomplished in a systematic and correct manner. The guidance must be technically accurate and current (up-to-date). Workers should be involved in the preparation of work procedures and instructions where possible.

- b. Work packages are user friendly (e.g., unnecessary information, having to look up required referenced information in other documents, or other actions that result in overly complex or cumbersome work packages are avoided).

- c. All required information is identified (prerequisites, needed tools, test equipment, vendor information, reference materials, services, support equipment or personnel, conditions).

K. Work documents are formally reviewed and approved.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
 - 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
 - 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
 - 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
 - DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).
 - DOE O 5480.19 Attachment 1, Chapter XVI, Guideline 4 - Operations Procedures - Procedure Approval.
- a. Required work package reviews and approvals are appropriate (i.e., only include those that are necessary and provide value).
 - b. The individuals responsible for work package execution, typically the first line supervisor or person-in-charge (PIC), and closure are clearly identified.

5. Readiness

A. Readiness is confirmed prior to scheduled work performance with regard to: system (including software), prerequisite controls, work environment, people, documents, tools and materials.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
 - 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).
 - DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan (MIP) that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
 - DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).
 - DOE O 433.1 CRD Requirement 3.i - The contractor maintenance management program should address the following element, as appropriate: Procurement of Parts, Materials, and Services (parts, materials, and services required for maintenance activities should be available when needed).
- a. Work documents are reviewed by workers prior to work performance to ensure workability and familiarity with the work.
- b. Responsible work managers confirm that workers are trained and qualified. Where the work involves systems or equipment critical to the facility mission or safety, the responsible work manager should ensure the ready availability of appropriate engineering support such as knowledgeable system engineers who are actively involved with ensuring that performance meets applicable criteria.
- Note: Not only must workers be confirmed to be trained and qualified for the work, their capability to perform required tasks under the conditions and restraints posed by the job site should also be evaluated (e.g., geometric limitations that could increase the complexity or hazard to the worker).
- c. Availability of tools, equipment and support services is confirmed. This includes verification that equipment is calibrated (e.g., M&TE) and in good condition, proper working order, and is safe (e.g., scaffolding and rigging is properly assembled/installed and checked), tools to be used are correct and in good working condition, etc.

B. Field conditions are confirmed to match planning document(s).

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 7 - Operations Authorization (the conditions/requirements to be satisfied before operations begin shall be clearly established and agreed upon).
 - 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
 - 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).
 - DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the management systems used to control maintenance activities associated with the defined SSCs.
- a. A final check is made to determine if circumstances have changed since the work was planned that could affect the safe performance of work activities. Both the work instructions and the work site are reviewed, including walk downs where appropriate, to ensure that the hazards analysis results translate to the actual work environment (i.e., reflect actual conditions) and to verify that all hazards that could potentially affect the safety of workers have been identified and that selected controls are appropriate and adequate.
- b. The impact of tools and temporary equipment (e.g., scaffolding, rigging, power supplies, welding equipment, enclosures, insulation, shielding, etc.) on facility systems and equipment is understood and accepted.

C. Work is formally authorized to proceed

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 48 CFR 970.5223-1, ISM Guiding Principle 7 - Operations Authorization (the conditions/requirements to be satisfied before operations begin shall be clearly established and agreed upon).
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements. using approved

instructions, procedures, or other appropriate means.

- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).
- DOE O 433.1 CRD Requirement 3.n - The contractor maintenance management program should address the following element, as appropriate: Management Involvement (contractor corporate and nuclear facility managers should be sufficiently involved with nuclear facility operations to be technically informed and personally familiar with conditions at the operating nuclear facility).
- DOE O 5480.19 Attachment 1, Chapter VIII, Guideline 6 - Control of Equipment and System Status - Work Authorization and Documentation.
 - a. Work packages clearly identify the line manager responsible and accountable for authorizing the work and ensuring that the work is conducted safely.
 - b. The responsible line manager understands the scope of work being performed and its relationship to other ongoing work activities.
 - c. There is a formal work authorization process that:
 - 1) ensures all preparations have been completed (including required notifications, approvals, permits, etc.) and that required controls are implemented before the work is started;
 - 2) includes provisions to effectively integrate work activities and coordinates with others who may impact or be impacted by the work (e.g., plan-of-the-day meetings or other mechanisms used to prioritize, coordinate, and control ongoing work activities); the combined effect of all ongoing work activities should be understood; and
 - 3) requires the following signatures on the work package:
 - i. responsible line manager - indicating that the hazard controls identified for the defined scope of work have been reviewed and are appropriate, that facility/work location conditions will support the work for the specified duration (the period of time during which the work is allowed to be performed should be clearly defined by start date and time and end date and time), and that approval to start the work has been granted;
 - ii. first line work supervisor - indicating agreement that the selected hazard controls are appropriate for the scope of work, that the controls have been or will be implemented before work is begun and will remain in effect for the

duration of the work activity as appropriate, that assigned workers are trained and qualified, that current field conditions are consistent with those analyzed during work planning, and that a pre-job briefing will be conducted prior to beginning work; and

- iii. assigned workers who may potentially be exposed to hazards - indicating their complete understanding of the tasks involved and their capability to perform the tasks acceptably, that they understand the hazards involved with the work and agree with the controls provided for their protection, that they will only work within the defined scope of work and controls, and that they will suspend work for any new hazards, unexpected/unexplained or confusing circumstances or where they are uncertain of how to safely proceed, or where errors or conditions are discovered that call into question the adequacy of the work instructions.

6. Performing Work

A. Personnel with the appropriate functional area expertise are used to perform the work.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 3 - Competence commensurate with responsibilities (personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities).
- DOE O 433.1 CRD Requirement 3.b - The contractor maintenance management program should address the following element, as appropriate: Training and Qualification of Maintenance Personnel (a maintenance training and qualification program must be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities).
- DOE O 5480.19 Attachment 1, Chapter II, Guideline 5 - Personnel Protection.
- DOE O 5480.19 Attachment 1, Chapter II, Guideline 9 - Authority to Operate Equipment.

B. Pre-job briefings are conducted.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard

controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.

- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).

Pre-job briefings are held that:

- 1) ensure that workers understand the hazards in the work area and the controls provided to protect them from the hazards, and that the controls will remain in effect as long as the associated hazards are present;
- 2) ensures that all workers understand their responsibilities as related to the work activity, including required records, forms, information, or other documentation associated with the work that must be completed;
- 3) confirms that work hazards and safety provisions are understood and appreciated by all workers involved such that each worker has confidence that their coworkers are knowledgeable and prepared;
- 4) cover applicable procedures and instructions, critical job steps, warnings and precautions, error-likely situations, expected outcomes, response to unexpected outcomes, including emergency conditions (emergency communications and contingency or compensatory actions). and relevant operating experience; and
- 5) allows opportunity for workers to ask related questions; worker concerns regarding unsafe work conditions are addressed.

Note: Pre-job briefings can range from verbal communication between the first line work supervisor and the worker for minor low-risk work activities that do not involve significant hazards to formal, documented briefings that are part of the work package for initial, complex, and/or hazardous work. System engineers, radiological control personnel, and other subject matter experts should attend the pre-job briefings in addition to the workers and work supervisor where believed necessary to answer questions and ensure that the work, hazards, and controls are understood.

C. Work is performed and documented in accordance with the applicable work instruction(s). Documentation includes any problems encountered during execution of the work, and any feedback information considered useful for improving the work process.

Corresponding Requirements:

- 48 CFR 970.5223-1. ISM Core Function 3 - Develop and Implement Hazard

Controls.

- 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).
- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement.
- 48 CFR 970.5223-1, ISM Guiding Principle 5 - Identification of Safety Standards and Requirements (before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences).
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (2) Identify and control items to ensure their proper use.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (3) Maintain items to prevent their damage, loss, or deterioration.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (4) Calibrate and maintain equipment used for process monitoring or data collection.
- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).
- DOE O 433.1 CRD Requirement 3.e - The contractor maintenance management program should address the following element, as appropriate: Maintenance Procedures (maintenance procedures and other work-related documents (e.g., drawings and instructions) must be prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently).
- DOE O 5480.19 Attachment 1, Chapter VIII, Guideline 1 - Control of Equipment and System Status - Status Change Authorization and Reporting.

- DOE O 5480.19 Attachment 1, Chapter XVI, Guideline 7 - Operations Procedures - Procedure Use.
- a. Workers understand that working outside the defined scope of a work package is prohibited. Workers are responsible and held accountable for explicitly following work instructions and procedures, and performing work within established controls.
 - b. Workers maintain a positive questioning attitude towards safety and are vigilant towards:
 - 1) unsafe or potentially unsafe conditions or situations;
 - 2) the possibility of faulty analysis or assumptions, errors, failures, over-simplifications, etc.; and
 - 3) watching out for facility conditions or equipment performance problems that appear to need correcting and should be reported.
 - c. Workers understand their responsibility and authority to stop work without fear of reprisal when they judge work conditions to pose an imminent threat to the health or safety of themselves or their co-workers, or to the environment.

Note: Workers should be generally trained on how to stop work such that their safety is assured (e.g., when suspending or backing out of a procedure), and challenges to facility safety and disruptions or damage to systems, equipment, and processes is minimized.

- d. Results of the work process are adequately documented (i.e., forms properly filled out; results, observations, and comments recorded; adequate information provided describing issues, problems, deviations, abnormal conditions, as-found and as-left conditions, etc., and resultant actions taken). Documentation includes concerns and observations related both to the specific work activities performed and other facility conditions worthy of note that may not be directly related to the work being performed (e.g., leaks, degraded equipment condition, housekeeping issues, fire or other safety hazards, etc.).

D. Line management oversight is sufficient to ensure work proceeds safely as planned.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).

- 10 CFR 830.122, Criterion 1 (Management/Program) - (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- 10 CFR 830.122, Criterion 9 (Assessment/Management Assessment) - Ensure managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.
- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).
- DOE O 433.1 CRD Requirement 3.n - The contractor maintenance management program should address the following element, as appropriate: Management Involvement (contractor corporate and nuclear facility managers should be sufficiently involved with nuclear facility operations to be technically informed and personally familiar with conditions at the operating nuclear facility).

First line work supervisors and facility management should routinely monitor work activities to ensure they conform to safety and quality expectations, that work activities are performed and recorded in accordance with approved processes and procedures, and that problems are properly documented and addressed. Management involvement in the control of work activities should extend to facility, contractor support, and subcontractor personnel. First line supervisors should spend significant time in the field monitoring progress, ensuring quality workmanship, and verifying that activities are conducted safely in accordance with applicable DOE/NNSA, site, and facility policies and procedures. Good work practices should be recognized and encouraged; poor work practices should be immediately corrected, their causes identified, and necessary corrective action taken to prevent recurrence. Higher-level managers should also spend time in the field to get direct feedback on work efficiency and safety, and to provide the workforce with informal, but direct, access to management.

E. Appropriate actions are taken if unexpected hazards or conditions are encountered.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the controls (readiness is confirmed and work is performed safely).

- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 440.1A CRD Requirement 7 - Implement procedures to allow workers, through their supervisors, to stop work when they discover employee exposures to imminent danger conditions or other serious hazards. The procedure shall ensure that any stop work authority is exercised in a justifiable and responsible manner.
 - a. Workers understand that they have the responsibility and authority to stop work if conditions are deemed unsafe or if there is doubt concerning how to proceed safely.
 - b. Workers know where to go and what to do should new or different hazards or circumstances other than addressed in work planning be encountered.
 - c. Safety issues affecting work in progress are resolved in an appropriate and timely manner.
 - d. Errors discovered during the course of performing work (such as errors in equipment labeling or location, or in drawings, procedures, and other documents) are promptly reported, and the effect on current work activities thoroughly assessed before proceeding.

Note: Discrepancies found between the actual as-installed configuration of facility SSCs and work documents or other controlled documents (e.g., drawings, specifications, procedures, system design descriptions, etc.) should be documented, reported to the appropriate manager(s), evaluated, tracked, and resolved expeditiously.

F. Changes in work scope, conditions, or execution (e.g., field changes) are thoroughly reviewed, analyzed (including adequacy of hazards analysis and controls), documented, and approved before being implemented.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 1 - Define the Scope of Work.
- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
- 48 CFR 970.5223-1, ISM Core Function 3 - Develop and Implement Hazard Controls.
- 48 CFR 970.5223-1, ISM Core Function 4 - Perform work safely within the

controls (readiness is confirmed and work is performed safely).

- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).

Informal, unreviewed, or unapproved deviations, shortcuts, or workarounds are not tolerated.

Note: A graded approach is used that analyzes and approves field changes based on their importance/significance. Some field changes may be very minor where it can be readily determined that no new hazards are created or introduced, and where the existing controls are adequate, thus requiring minimal review and approval. Other field changes may involve significant changes in the hazards involved, or the adequacy of existing controls may be uncertain and need further analysis, thus requiring more formal review and approval. In all cases, the changes should be communicated to everyone involved with the work activity, from the originator and planners to the workers, and the basis for the degree of review and approval deemed appropriate should be documented in the work package.

G. Work is complete when the outcome is achieved, the documentation is complete, and the work is accepted.

Corresponding Requirements:

- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 3.g - The contractor maintenance management program should address the following element, as appropriate: Control of Maintenance Activities (management involvement in control of maintenance activities should ensure that maintenance practices are effective in maintaining safe and reliable nuclear facility operation and are integrated with the work authorization and control requirements for conduct of operations requirements for DOE facilities).

All work should be accepted by the responsible owner, user, or operator. For maintenance and repair work, the owner/user might be the operations manager, control room shift supervisor, facility manager, or cognizant system engineer. Post-work acceptance activities should include verification that the work was performed correctly; the outcome is acceptable/successful; that systems and equipment affected by the work operate correctly and are restored to normal/desired operational status; and verification that the work area has been restored, including packaging and removal of any wastes generated during the course of work, and is left in a clean and orderly condition. Routine R&D or operations work would not typically require formal acceptance.

Note: Part of the acceptance process should be confirmation that post-work testing and acceptance activities in the field effectively verified that system and equipment performance criteria and requirements are met (e.g., parameter values are within ranges specified by engineering)

7. Post Work Review and Closeout

A. Post-job reviews are conducted to collect feedback, including lessons learned.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement.
- 48 CFR 970.5223-1, ISM Guiding Principle 2 - Clear roles and responsibilities and unambiguous lines of authority for ensuring safety shall be established and maintained at all organizational levels.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (1) Establish and implement processes to detect and prevent quality problems.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (2) Identify, control, and correct items, services, and processes that do not meet established requirements.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (3) Identify the causes of problems and work to prevent recurrence as a part of correcting the problem.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (4) Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work

consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.

- DOE O 433.1 CRD Requirement 3.o - The contractor maintenance management program should address the following element, as appropriate: Maintenance History (a maintenance history and trending program should be maintained to document data, provide historical information for maintenance planning, and support maintenance and performance trending of nuclear facility systems and components; all records and documentation should be maintained according to the approved site-specific Records Retention and Disposition Schedule).
- a. Post-job reviews are conducted to obtain feedback, both good and bad, for use in making work process improvements.
- b. The post-job review process is a formal, proceduralized process that requires documentation of results and participation by appropriate workers and supervisors.

Note: Note: Feedback is essential to improving work processes and activities, and should be mandatory, not optional. Even in those cases where no significant feedback is provided, this fact should be recorded. The intent here is to ensure that credible post job reviews are conducted using appropriate personnel, and that meaningful feedback and lessons learned information is captured for use in making future improvements. The post-job review process would often be expected to be less formal and require little documentation for minor/simple and non-hazardous the work.

B. Feedback and lessons learned information is analyzed to identify improvement opportunities. Improvement opportunities are effectively dispositioned.

Corresponding Requirements:

- 48 CFR 970.5223-1, ISM Core Function 5 - Provide feedback and continuous improvement.
- 48 CFR 970.5223-1, ISM Guiding Principle 1 - Line Management is responsible for safety.
- 48 CFR 970.5223-1, ISM Core Function 2 - Analyze the Hazards.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (1) Establish and implement processes to detect and prevent quality problems.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (2) Identify, control, and correct items, services, and processes that do not meet established requirements.
- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (3) Identify the causes of problems and work to prevent recurrence as a part of correcting the problem.

- 10 CFR 830.122, Criterion 3 (Management/Quality Improvement) - (4) Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.
 - 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
 - DOE O 433.1 CRD Requirement 3.p - The contractor maintenance management program should address the following element, as appropriate: Analysis of Maintenance Problems (systematic analysis should be used to determine and correct root causes of unplanned occurrences related to maintenance).
- a. A formal feedback process exists that allows individuals involved with work planning and performing work (including workers, planners, supervisors, support organizations, SMEs, customers/users/stakeholders, etc.) to provide input for improving the work process. Feedback or suggestions should be solicited on all aspects of the work planning and control process, including the effectiveness/adequacy of work scope definition, identification and analysis of hazards, selection and use of controls, work package and work instructions, etc.
 - b. The process is user friendly, provides capability to link feedback to specific work procedures, equipment, or types of work, and is being effectively used to make meaningful improvements where practical (i.e., work planning uses lessons learned and feedback from previous work).

Note: The work process should require those involved in the planning and performance of work to think about how things could be improved. Personnel involved in work planning and execution should be trained on the importance and mechanisms for providing feedback and lessons learned information and how the information is incorporated into future work activities.

C. Work Documents are evaluated and processed in accordance with approved records management procedures.

Corresponding Requirements:

- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (2) Specify, prepare, review, approve, and maintain records.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- DOE O 433.1 CRD Requirement 1.c - Develop and submit for DOE approval a Maintenance Implementation Plan that clearly defines the management systems

used to control maintenance activities associated with the defined SSCs.

- DOE O 433.1 CRD Requirement 3.e - The contractor maintenance management program should address the following element, as appropriate: Maintenance Procedures (maintenance procedures and other work-related documents (e.g., drawings and instructions) must be prepared and used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently).

Work packages are not closed out until all required documents and records are included and are complete.

D. Timely updates and improvements are incorporated into affected documents (such as engineering drawings, training documents, operating procedures, hazard analysis, etc.).

Corresponding Requirements:

- 10 CFR 830.122, Criterion 4 (Management/Documents and Records) - (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- 10 CFR 830.122, Criterion 5 (Performance/Work Processes) - (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.

Work packages are closed out in a timely manner, i.e., timely revisions are made to documents affected by the work, such as facility drawings, the Master Equipment List (MEL), training materials, facility procedures, relevant historical information (e.g., equipment maintenance and repair history, calibration data), facility design basis documentation such as System Design Descriptions (SDDs), etc.

Appendix A

7 Guiding Principles and 5 Core Functions of Integrated Safety Management

7 Guiding Principles

1. Line Management Responsibility for Safety

Line management is directly responsible for the protection of the public, the workers, and the environment

2. Clear Roles and Responsibilities

Clear and unambiguous lines of authority and responsibility for ensuring safety shall be established and maintained at all organized levels within the Department and its contractors.

3. Competence Commensurate with Responsibilities

Personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.

4. Balanced Priorities

Resources shall be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.

5. Identification of Safety Standards and Requirements

Before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences.

6. Hazard Controls Tailored to Work Being Performed

Administrative and engineering controls to prevent and mitigate hazards shall be tailored to the work being performed and associated hazards.

7. Operations Authorization

The conditions and requirements to be satisfied for operations to be initiated and conducted shall be clearly established and agreed-upon.

5 Core Functions

1. Define the Scope of Work

Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

2. Analyze the Hazards

Hazards are associated with the work identified, analyzed, and categorized.

3. Develop and Implement Hazard Controls

Applicable standards and requirements are identified and agreed-upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

4. Perform Work Within Controls

Readiness is confirmed and work is performed safely.

5. Provide Feedback and Continuous Improvement

Feedback information on the adequacy of controls is gathered, opportunities for improving the definition and planning of work are identified and implemented, line and independent oversight is conducted, and, if necessary, regulatory enforcement actions occur.

Quality Assurance Criteria

10 CFR 830.121(a) states: Contractors conducting activities, including providing items or services, that affect, or may affect, the nuclear safety of DOE nuclear facilities must conduct work in accordance with the Quality Assurance criteria in § 830.122. DOE Order 414.1C, *Quality Assurance*, requires development, implementation, assessment, and improvement of a Quality Assurance Program (QAP) that implements these same criteria. These criteria are:

Criterion 1 - Management/Program

- (1) Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
- (2) Establish management processes, including planning, scheduling, and providing resources for the work.

Criterion 2 - Management/Personnel Training and Qualification

- (1) Train and qualify personnel to be capable of performing their assigned work.
- (2) Provide continuing training to personnel to maintain their job proficiency.

Criterion 3 - Management/Quality Improvement

- (1) Establish and implement processes to detect and prevent quality problems.
- (2) Identify, control, and correct items, services, and processes that do not meet established requirements.
- (3) Identify the causes of problems and work to prevent recurrence as a part of correcting the problem.
- (4) Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.

Criterion 4 - Management/Documents and Records

- (1) Prepare, approve, review, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
- (2) Specify, prepare, review, approve, and maintain records.

Criterion 5 - Performance/Work Processes

- (1) Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.
- (2) Identify and control items to ensure their proper use.
- (3) Maintain items to prevent their damage, loss, or deterioration.
- (4) Calibrate and maintain equipment used for process monitoring or data collection.

Criterion 6 - Performance/Design

- (1) Design items and processes using sound engineering/scientific principles and appropriate standards.
- (2) Incorporate applicable requirements and design bases in design work and design changes.
- (3) Identify and control design interfaces.

- (4) Verify or validate the adequacy of design products using individuals or groups other than those who performed the work.
- (5) Verify or validate work before approval and implementation of the design.

Criterion 7 - Performance/Procurement

- (1) Procure items and services that meet established requirements and perform as specified.
- (2) Evaluate and select prospective suppliers on the basis of specified criteria.
- (3) Establish and implement processes to ensure that approved suppliers continue to provide acceptable items and services.

Criterion 8 - Performance/Inspection and Acceptance Testing

- (1) Inspect and test specified items, services, and processes using established acceptance and performance criteria.
- (2) Calibrate and maintain equipment used for inspections and tests.

Criterion 9 - Assessment/Management Assessment

Ensure managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.

Criterion 10 - Assessment/Independent assessment

- (1) Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement.
- (2) Establish sufficient authority, and freedom from line management, for the group performing independent assessments.
- (3) Ensure persons who perform independent assessments are technically qualified and knowledgeable in the areas to be assessed.

Appendix B

Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites



January 2006

Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites

Introduction

Department regulations and directives require that Integrated Safety Management (ISM) and Quality Assurance (QA) be integrated into work planning and control activities.

The Department of Energy Acquisition Regulations (DEAR) require that work be performed safely in a manner that protects workers, the public, and the environment, and that the management of environment, safety, and health (ES&H) functions and activities be an integral and visible part of the work planning and execution process (see 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*). The DEAR further require that work be managed and performed in accordance with a documented safety management system that describes how the contractor will ensure that the ISM five core functions and seven guiding principles are implemented. The ISM core functions require that work be defined, the associated hazards identified and analyzed, and the work performed within controls implemented to protect workers, the public, and the environment from the hazards.

The QA rule (10 CFR 830.120) requires that contractors conducting activities, including providing items or services, that affect, or may affect, the nuclear safety of DOE nuclear facilities, conduct work in accordance with the QA criteria in 10 CFR 830.122, and that the contractor responsible for a DOE nuclear facility conduct work in accordance with a Quality Assurance Program (QAP) that integrates the QA criteria with the safety management system, or describe how the criteria apply to the safety management system. The QA criteria require that work be conducted consistent with hazard controls using approved instructions and procedures. DOE Order 414.1C, *Quality Assurance*, requires application of the same QA criteria beyond nuclear facilities to cover all work performed at all DOE/NNSA facilities. Additional quality management requirements for Nuclear Weapons Complex activities are provided in the *DOE/NNSA Weapon Quality Policy, QC-1, Revision 10*.

Taken collectively, the ISM DEAR clauses and QA rule require a formal, deliberate process for identifying, scheduling, prioritizing, planning, analyzing, coordinating, performing, documenting, assessing, and improving work activities. For a typical facility, work is multi-organizational and requires coordination, understanding, and support of those involved in and/or impacted by work activities. The goal is safe, efficient, and reliable conduct of work in support of the NNSA mission.

However, recent indications are that ISM and QA are often not being effectively implemented or practiced on the floor where work is being performed. These indications have come from the Defense Nuclear Facilities Safety Board (DNFSB), the DOE Office of Independent Oversight and Performance Assurance (OA), incidents identified by the Electrical Safety Assurance Group (ESAG), and in Occurrence Reporting and Processing System (ORPS) reports.

Therefore, the assessment criteria and guidelines contained in this document are focused at the work activity level. NNSA expects that use of this document will complement existing site ISM processes that flowdown requirements from the site and facility levels to the work/activity level by providing emphasis at the work/activity level that will help to better educate workers, work planners, and first line work supervisors on activity level work requirements and expectations so that: 1) requirements that flowdown are better received, understood, and more effectively implemented, and 2) the knowledge and experience

of workers, work planners, and first line work supervisors is used to improve activity level work planning and control processes.

Purpose and Scope

These *Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites* are intended for use in evaluating all types of NNSA work activities (e.g., research and development, construction, modifications, operations, maintenance).

The assessment criteria and guidelines were developed to be applied to an individual and specific scope of work that is requested, prioritized, approved, scheduled, planned, performed, critiqued, and closed out in accordance with the applicable contractor work planning and control process. The assessment is intended to determine whether the ISM core functions and guiding principles and applicable QA criteria are being effectively incorporated into activity level work planning and control activities. Specifically, the assessment should determine for a specific scope of work whether:

- the scope of work was sufficiently defined to allow thorough analysis of hazards; identification of controls, and development of work instructions;
- hazards were adequately analyzed and appropriate hazard controls implemented;
- the work was properly planned and work package instructions and procedures are adequate;
- readiness to perform the work was adequately verified;
- the work was performed in accordance with the instructions and procedures; and
- post work review activities were adequate, including the processing of feedback and lessons learned information.

Because the assessment is focused at the work activity level, it does not include the review of site level ISM policies, procedures, or system descriptions, or QA programs or procedures. Nor is the assessment intended to be resource intensive. In most cases, the assessment can be performed by one or two individuals from the site office, contractor, or a combination of both. Because the assessment will usually be of a single work activity, and because the assessment documentation requirements are focused and limited, the assessment will normally be completed within a day or two following completion of the work. Therefore, assessments can be conducted for each of the various different organizations that perform work at a site over a relatively short period of time as compared to other types of assessment activities. By assessing activity level work in this manner, all site workers and organizations, including subcontractors, should become familiar with ISM and QA requirements and expectations pertaining to activity level work. The benefits of performing assessments in this manner are two fold: 1) the assessments serve as a training tool to educate workers, work planners, and first line work supervisors on ISM and QA requirements and expectations for activity level work, and 2) problem areas and opportunities for improvement can be identified and corrective actions taken to improve work planning and control processes so that ISM and QA are effectively implemented and practiced on the floor.

As part of each NNSA site office action plan submitted in response to commitment # 23 of the 2004-1 Implementation Plan, these assessment criteria and guidelines should be institutionalized into site office and contractor processes for assessing work. The frequency of application should be such that all organizations performing hazardous work are assessed over the course of a year, and application should be such that different work planning teams, work crews, and work activities are assessed in subsequent years so that all workers, first line work supervisors, and work planners eventually benefit from the assessments.

These assessments can be used as inputs to other required assessments that look at overall ISM and work control processes, such as ISMS re-verifications and assessments conducted in accordance with the DOE Oversight Manual.

Assessment Methodology

The following principles should guide conduct of the assessment

General Approach

Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites are generally intended to be short, non-intrusive, and focused assessments conducted by one or two persons and documented on standard prepared forms. In this sense the assessments resemble checklist verifications more than other types of more intense formal assessments, such as ORRs or Phase II assessments of safety systems. Although the assessments do not require the degree of effort or formality (e.g., no plan of action or formal entrance meeting is required), there are some similarities such as use of a Criteria, Review, and Approach Document (CRAD) containing objectives, criteria and review approaches; performing record reviews, interviews, and observations; and entering identified issues into the *Site-wide Integrated Issues Management System* for tracking and resolution.

Preparation

Prior to performing an assessment, it will be necessary to select a specific work activity to be assessed. The selection process should consider the type of work and hazards involved, the expected duration of the work planning effort and the amount of time required to perform the work to ensure that the assessor(s) assigned to perform the assessment have the appropriate expertise and are available. The work to be assessed should be identified as far in advance as possible to allow the assessor(s) to attend work planning meetings.

The assessor(s) should obtain and review copies of the work request, hazards analysis, and work package to become familiar with the work to be performed and associated instructions and procedures, hazards and controls, expected outcomes, and applicable related documents and requirements such as:

- safety basis information, e.g., Documented Safety Analysis (DSA) commitments and assumptions, Health and Safety Plans (HASPs), Unreviewed Safety Question Determinations, Safety Evaluation Reports approved and issued by DOE, etc.
- codes, standards, and other design requirements and design basis information (e.g., System Design Descriptions, SDDs), and applicable drawings/diagrams and procedures;
- Technical Safety Requirements, Operational Safety Requirements, and surveillance test procedures or other applicable acceptance/performance criteria for systems, structures, equipment, and components; and
- records of operational history and prior related work, including feedback and lessons learned information.

Conduct of the Assessment

Assessor(s) will be expected to sit in on work planning team meetings where possible, to observe walk-downs performed of the work site, to attend pre-job briefings and post-work review meetings, to observe work being performed in the field, and to interview workers, work planners and work planning team members, and work supervisors. Assessors should not interfere with the conduct of meetings, work, or walk-downs, but rather observe from an appropriate and safe distance. It is suggested that work planners

be interviewed after the work package is completed. Planning team members, workers, and others can be interviewed after team planning or post-work review meetings.

The assessment results will be documented using the attached tables (see the section on Reporting below). It is expected that the assessments will obtain and document information necessary to allow a full understanding of any activity level work planning and control issues, problems, or concerns so that the associated causes can be determined and necessary corrective actions identified. Causes and recommended corrective actions should be documented where known.

Site office and contractor management should be briefed on the results of the assessment.

Reporting

The assessment results should be documented on the attached form, consisting of a cover page, the assessment objectives, criteria, and review approach, and the follow-on tables for entering findings and observations. The cover page identifies the site, facility, work activity assessed, date(s) of the assessment, the assessor(s) and their contact information, and a brief executive summary. The remainder of the report consists of data entries into the tables. For each criterion, the assessor indicates whether it was met or not - either "Yes" or "No." For those criteria that are met, no detailed explanatory write-up is required. Simply indicate in the "Review Results/Comments" column an appropriate reference (e.g., page and section number from the work package or other document, and/or reference a particular observation or interview, etc.) providing objective evidence that the criteria is met. However, if a criterion is not met, then a short concise explanation should be provided to characterize the situation in sufficient detail to allow it to be subsequently understood and corrected.

In addition to the above direction, significant results from the assessment should be labeled in one of the following three categories: 1) **Issues** - issues are considered to have the potential for significant impact on the safety of workers, the public, or the environment, or on the facility or NNSA mission, should be addressed in a timely manner, and should be formally tracked in the *Site-wide Integrated Issues Management System* until closed; 2) **Opportunities For Improvement (OFIs)** - OFIs are recommendations considered by the assessor(s) to provide value added toward improving activity level work planning and control processes or their implementation, and should be dispositioned as agreed to by the Site Office and contractor based on their safety benefit and cost-effectiveness; and 3) **Noteworthy Practices** – noteworthy practices (NPs) are unique or exceptional practices considered by the assessor to add significant safety value that should be shared with other contractor organizations that do work and with other NNSA sites. Issues, OFIs, and NPs should be appropriately discussed in the "Review Results/Comments" column of the tables. Issues should be listed in the executive summary.

There are some criteria (such as 4-8 concerning updates to documents and 5-3 concerning actions taken to improve work processes in response to feedback and lessons learned information) for which a determination as to whether the criteria have been met or not cannot be made for some time after the work activity being assessed has been completed. In these cases, TBD can be entered in the "Criteria Met (Yes/No)" column. The assessment report should not be held up pending completion of these items. In these cases, follow-up reviews should be performed within a reasonable time frame to determine if the criteria were met or not and the assessment report should be revised accordingly.

Tailoring

The assessment criteria and guidelines herein have been developed for application to specific work activities (e.g., a specific process or research evolution, preventive maintenance, corrective maintenance, etc.). It is recognized that in some cases criteria may not apply, or it may be necessary to adapt the assessment criteria and guidelines to address those aspects determined to be appropriate for the scope of work being assessed. A graded approach is intended to be applied to the assessment criteria where appropriate (for example, maintenance work on a new piece of equipment would not be able to take

advantage of prior work experience on that piece of equipment; as another example, a team approach to hazards identification and analysis would likely not be necessary for simple, routine, non-hazardous work that only requires skill-of-the-craft to complete). The tailoring process is intended to ensure that the assessments are conducted in accordance with criteria and guidelines that are appropriate and applicable to each specific situation. Where it is determined a criterion is not applicable, "N/A" should be entered into the "Criteria Met (Yes/No)" column with a brief explanation provided in the "Review Results/Comments" column of the table.

Engineering judgment must be used in application of the criteria during the assessment. In general, it is not expected that the criteria would need to be altered, i.e., grading simply determines if the criteria are applicable or not to the work activity being assessed. However, for application to certain sites or facilities with either minimal hazards, or with unique or more severe hazards, the criteria may be overly conservative, or be insufficient (not stringent/rigorous enough). The criteria should be modified as appropriate for these applications.

Assessor Qualifications

- The assessor(s) should be experienced in assessment methods and techniques, and have demonstrated capability in performing safety related assessments.
- The assessor(s) should not be in the line organization of the facility at which the work is performed, and should be independent of the work planning and control process for the scope of work being assessed.
- Collectively, the assessor(s) should be qualified technical experts in the areas of work planning and control, ISM, QA, and have demonstrated knowledge and expertise in the type of work being assessed.
- Assessors can be Federal employees, site contractor or subcontractor experts, and can be from any DOE field site or headquarters office or their contractors or subcontractors.

The value of having a work planner, work supervisor, responsible manager, or other key individual with activity level work planning and control responsibilities participate in the assessment for developmental purposes should be considered. This individual must be completely independent of the work activity being assessed, and would primarily function as an observer.

Work Process Improvement and Continued Long-Term Excellence

The goals of using this CRAD are to: 1) determine the current status of activity level work planning and control process implementation on the floor where work is being performed relative to effective incorporation of ISM and QA; 2) to drive needed improvement through the implementation of corrective actions to resolve identified weaknesses and deficiencies; and 3) to promote and ensure continued excellence over time through its repeated routine application. The results of the application of this CRAD to the different organizations that perform work at a site over time should be analyzed collectively to identify common weaknesses and areas in need of improvement that might not be apparent from the review of the results of individual assessments.

The assessment criteria are largely derived from ISM and QA requirements, and have been selected based on their use in providing an accurate indication of the effectiveness of incorporation of ISM and QA into activity level work planning, control, and execution. Sites may wish to include additional criteria believed to add value toward improving activity level work processes (e.g., to collect information indicative of whether activity level work expectations or goals are being met).

The adequacy of work planning and control processes at DOE sites has become a focus area over the past year. The Department's Implementation Plan for DNFSB Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, states that improvement in reliability and consistency of work planning and work control performance at the activity level is needed, and that the current ISM system contains minimal expectations, and no explicit requirements, at any level to routinely assess the implementation of work planning and work control processes at the activity level. As a result, several initiatives are underway that involve assessing activity level work planning and control processes (such as mandatory ISMS re-verifications and development of a work control CRAD for inclusion in the DOE Oversight Manual being developed by EH). The results of using this CRAD should be used where appropriate to fulfill the assessment requirements of these other efforts. Unnecessary repeat or duplicate assessment efforts should be avoided.

**Assessment Report
Activity Level Work Planning and Control Process
Incorporation of Integrated Safety Management (ISM)
and Quality Assurance (QA) Principles**

NNSA Site: _____ **Facility:** _____

Assessment Date(s): _____

Work Activity Assessed:

Assessment conducted by:

1. **Name:** _____ **Organization:**

Phone number: _____ **e-mail address:** _____

2. **Name:** _____ **Organization:**

Phone number: _____ **e-mail address:** _____

Executive Summary:

1. Define Scope of Work

Objective:

The scope of work is described in sufficient detail to allow the work planning process to identify hazards associated with the work and to develop necessary schedules, priorities, and work instructions.

Criteria:

- 1-1. The work to be accomplished, condition to be achieved, problem being corrected, and/or expected outcome are clearly documented.
- 1-2. The specific tasks necessary to accomplish the scope of work are identified/discernible.
- 1-3. Work scope boundaries/limits are clearly identified.
- 1-4. Conditions under which the work must be performed are clearly identified.
- 1-5. Systems, equipment, structures, components, and documents impacted/affected by the work are identified.
- 1-6. Applicable standards and requirements, safety basis information (including TSRs), and design basis information (including manufacturer's recommendations) are identified and used during work planning.
- 1-7. Applicable prior work history information, including feedback and lessons learned information from previous or similar work, is used during work planning.
- 1-8. Acceptance criteria are established for conclusively determining whether the work is accomplished successfully, and has not caused other problems or deficiencies.
- 1-9. Work planners understand and appreciate the need to completely and accurately define the work scope so that subsequent planning activities are effective in ensuring worker safety.

Review Approach:

Review statements of work from the work request system and work package to determine the work scope.

Interview the work requestor and assigned work planner to determine if there is a mutual understanding of the work scope, required tasks, and work conditions. Determine if the importance of thoroughly defining the scope of work as the first step in ensuring that work is conducted safely is understood and appreciated.

Review relevant standards and requirements, and safety basis, design basis, and work history information (including feedback and lessons-learned) to determine if they were appropriately considered during the work planning process.

Review the work package and related documents to determine if the equipment and documents affected by the work are identified, and whether the acceptance criteria used to confirm successful completion of the work is consistent with performance criteria and expectations documented in facility safety and design documents and related procedures.

Review Criteria No.	Criteria Met? (Yes/No)	Review Results/Comments
1-1		
1-2		
1-3		
1-4		
1-5		
1-6		
1-7		
1-8		
1-9		

2. Identify and Analyze Hazards

Objective:

All hazards that could potentially adversely impact workers, the public, the environment, the facility and its equipment, or the NNSA mission are documented and analyzed for severity/significance.

Criteria:

- 2-1. Personnel involved in work planning activities have the appropriate technical and operational backgrounds and expertise given the work to be performed and the hazards associated with the work. Subject Matter Experts (SMEs) and system engineers (SEs) are used where appropriate.
- 2-2. Personnel involved in work planning activities have been trained in ISM and the work planning and control process, including the systematic identification and analysis of hazards, and understand how their roles and responsibilities contribute to ensuring the safe and reliable accomplishment of work.
- 2-3. The synergy/interaction of a team approach is used where appropriate to systematically identify and analyze the work hazards and their significance.
- 2-4. Workers are involved in hazard identification where possible.
- 2-5. Walkdowns are used where appropriate to identify hazards associated with both the work tasks and the work environment.
- 2-6. Over-reliance on AJHA tools, permits, generic work documents, etc. is not used as a substitute for thorough hazard evaluation and analysis.
- 2-7. Hazard analysis considers “what if” scenarios and error-likely situations to determine if additional protective measures are appropriate.
- 2-8. The hazards, and their potential consequences to workers, the public, and the environment, for the scope of work being assessed have been adequately identified, quantified, and documented.
- 2-9. Work planning effectively coordinates work activities with those who may impact or be impacted by the work so that the combined effect of ongoing work activities is understood, and adverse or undesirable impacts from work activities are avoided.

Review Approach:

Interview the work planner and subject matter experts (SMEs) used to identify and analyze hazards associated with the work to determine if they collectively have appropriate technical expertise for the work activity being planned. Determine if work planners are trained and knowledgeable on ISM, the work planning and control process, and how they function within the process to help ensure effective implementation of ISM at the work activity level. Determine if work planning activities included proper coordination with those that could impact or be impacted by the work, and if workers were adequately involved in the process.

Observe hazards analysis team meetings and review associated documentation to determine if hazards were systematically and thoroughly identified, analyzed, and documented (including consideration of “what if” scenarios and error-likely situations) to allow for proper identification of needed controls. Verify that AJHA tools, permits, or generic work documents were not relied on in lieu of thorough and systematic hazards analysis.

Observe walk-downs of the job site (or perform an independent walk-down if appropriate) and review the documented results of the job site walk-down to determine if hazards associated with the work environment were adequately identified and documented.

Review Criteria No.	Criteria Met? (Yes/No)	Review Results/Comments
2-1		
2-2		
2-3		
2-4		
2-5		
2-6		
2-7		
2-8		
2-9		

3. Implement Controls

Objective:

Controls are implemented that effectively protect against identified hazards.

Criteria:

- 3-1. A hierarchy of controls methodology is employed that first seeks to eliminate the hazards, then to reduce the level of hazards, and finally to control the hazards - first through the use of engineered controls, then through administrative controls, and lastly through PPE.
- 3-2. Appropriate controls are identified for all hazards associated with the work activity. Unnecessary controls are avoided.
- 3-3. Hazard controls are analyzed collectively to ensure selection of an optimum set that do not conflict with each other or introduce additional hazards.
- 3-4. The hazards and controls are clearly identified in the work package.
- 3-5. Hazard controls are adequately designed, implemented, and remain in effect as long as the hazards pose a health or safety threat.
- 3-6. Written work instructions include necessary prerequisites, features, controls, warnings, precautions, hold points, independent verifications, notifications, announcements, etc. to ensure worker safety, protection of critical equipment, and continuity of operations.

Review Approach:

Interview the work planner and hazard analysis team members to find out whether the work hazards were reviewed for possible elimination or reduction (e.g., through alternate work methods, more optimum facility conditions, etc.), and whether an appropriate hierarchy of controls methodology was applied for remaining hazards that could not be eliminated or reduced. Special attention should be given to ensuring that the use of engineered controls was appropriately considered, especially for repeat/routine work. Verify that engineered controls are designed, procured and implemented in accordance with applicable quality assurance criteria.

Interview the work planner and hazard analysis team members, and review the controls selected to determine if the selected controls were reviewed collectively as a set to ensure they provide adequate protection, do not interfere with each other, and do not create additional hazards.

Review the work package and associated instructions and procedures to determine if controls are adequately identified and implemented to ensure the protection of workers and critical facility processes and equipment.

Review Criteria No.	Criteria Met? (Yes/No)	Review Results/Comments
3-1		
3-2		
3-3		
3-4		
3-5		
3-6		

4. Perform Work Safely Within Controls

Objective:

Work is conducted diligently in accordance with approved work instructions and within established controls.

Criteria:

- 4-1. Work is formally scheduled and integrated (e.g., Plan-of-the-Day meetings) with other ongoing work activities, and is formally authorized to proceed by the responsible line manager.

- 4-2. Readiness to conduct work is confirmed, including verification that field conditions are as expected (i.e., have not changed since planning and hazards analysis activities), and that tools, materials, parts, and support is ready and available.
- 4-3. Pre-job briefings are conducted as appropriate to ensure that work, hazards, and controls are adequately understood by workers and first line supervisors.
- 4-4. Workers are trained and qualified.
- 4-5. Workers and work supervisors understand ISM requirements and expectations, and their associated responsibilities, for ensuring that work is performed safely in the field/on the floor. Workers understand what to do if unexpected, unusual/abnormal, or threatening conditions are encountered, and how to stop or pause work if necessary.
- 4-6. Workers strictly adhere to procedures, take appropriate actions in response to unexpected circumstances or conditions, and adequately document and record observations and actions, including as-found and as-left conditions, unexpected circumstances or conditions encountered (e.g., unplanned alarms, abnormal or unplanned equipment behavior or response, unexpected data or indications/display values, or other discrepancies) and actions taken, opportunities for improvement, and other feedback and lessons-learned information.
- 4-7. The acceptability of work products and outcomes is verified (e.g., post-work tests and inspections), and the work is formally accepted by the requestor/owner/user.
- 4-8. Work documents are closed out in a timely manner, including updates of affected documents (e.g., Master Equipment Lists, training materials, procedures, drawings, load lists, safety basis and design basis documents).

Review Approach:

Observe activities and review records related to confirmation of readiness to proceed with scheduled work activities, including the pre-job briefing, to determine if the work has been properly authorized, that workers are adequately trained, and that workers and first line supervisors are knowledgeable of the work activities and requirements (including expected outcomes), documentation requirements, and response to unexpected circumstances or conditions. Determine if field conditions were verified not to have changed since the work was planned.

Interview workers and first line supervisors to determine if they are knowledgeable of the hazards associated with the work and the controls provided for their protection. Verify that workers and work supervisors understand ISM requirements and expectations, and their associated responsibilities, including monitoring of work activities to ensure conformance with safety and quality expectations (supervisors) and need to maintain a positive, questioning attitude with respect to the safety of work activities and surrounding conditions (workers).

Observe work in progress to determine if work package instructions and procedures are followed verbatim, and whether actions taken in response to any unexpected circumstances or conditions encountered are appropriate.

Review work package records and documentation to determine if all required information is properly recorded, including documentation of problems, unexpected circumstances, conditions, or results, opportunities for improvement, and other feedback and lessons-learned information.

Review documents affected by the work, e.g., Master Equipment Lists (MELs), training materials, procedures, drawings, load lists, System Design Descriptions (SDDs), etc. to verify they are being updated in a timely manner and are consistent with the actual facility physical installation and associated requirements.

Review Criteria No.	Criteria Met? (Yes/No)	Review Results/Comments
4-1		
4-2		
4-3		
4-4		
4-5		
4-6		
4-7		
4-8		

5. Feedback and Improvement

Objective:

The work planning and control process is routinely critiqued as part of doing work, and opportunities for improvement are adequately documented to allow for effective disposition by the feedback and improvement process.

Criteria:

- 5-1. Post-job reviews are conducted to obtain feedback, both good and bad, for use in making process improvements.
- 5-2. Feedback and lessons learned information is adequately documented (recorded in logs, databases, etc.), and forwarded to the appropriate individuals/organizations for analysis and dispositioning.
- 5-3. Appropriate action is taken in response to feedback and lessons learned information, the rationale for the action taken is documented, and the action is discussed with the individuals that provided the information for closure.

Review Approach:

Observe the post-job review/critique to determine if lessons-learned information and other information that could result in improvements in either the specific work tasks or the work planning and control process are adequately discussed, documented, and entered into the feedback and improvement process database for tracking and disposition.

Determine if the actions taken in response to feedback and lessons learned information are effective in improving activity level work planning and control processes and/or work performance, and if the rationale for the actions is documented and discussed with the individual(s) who provided the information.

Review Criteria No.	Criteria Met? (Yes/No)	Review Results/Comments
5-1		
5-2		
5-3		

Continuation Form	
Review Criteria No.	Review Results/Comments

Training and Qualification of Work Planners

A work planner is anyone who, as a part of planning activity level work, performs the following functions: ensures that the scope of work being performed is adequately defined; confirms that hazards associated with the work and the work environment have been identified and analyzed to determine the controls that must be implemented to ensure worker safety; determines applicable work process requirements (i.e., applies the appropriate graded approach for the work being planned); breaks down work activities into discrete steps/tasks; establishes acceptance criteria for work performed; develops technical work documents; and provides input to the scheduling process (sequencing and timing, and resources such as personnel, tools, materials, support, training, etc.). Work planners are expected to be trained and qualified in the following areas:

1. Integrated Safety Management (ISM) Core Functions and Guiding Principles, and Quality Assurance Criteria;
2. The roles, responsibilities, authorities, and accountabilities of interfacing organizations;
3. Applicable work management system(s) - i.e., types of work performed, processes used, tools, software, work package content, how to apply lessons learned, etc.;
4. Hazard Identification and Analysis, and how to incorporate controls into work instructions;
5. How to apply applicable requirements, standards, permits, regulations, etc. to work planning (includes use of subject matter experts and system engineers);
6. How and When to Conduct Walk-downs; and
7. Effective Communications and Technical Writing

ISM - Management on the Floor Interaction with Workers

Implement periodic/routine management observation of work activities and interaction with workers in the field/on the floor that focuses on effective implementation of Integrated Safety Management (ISM) core functions and guiding principles. The process that implements this action should include the following attributes:

1. Participation of all levels of management in organizations that support the integration of safety into work activities;
2. Managers have a sound understanding of the site's implementing work planning and execution processes as described in its ISM System description;
3. Documentation of the process and its implementation, including the establishment of clear expectations and performance measures by senior management;
4. Interaction with workers in a coaching relationship to encourage positive behaviors and to discern opportunities for improvement;
5. Observes all phases of work (e.g., requests, planning, execution, and/or critique) and verifies appropriate worker involvement;
6. Results are documented, and are an input to the site assurance systems; and
7. Metrics are used to measure ISM process effectiveness.

<p style="text-align: center;">NNSA _____ Site Office Action Plan for Improving Activity Level Work Planning and Control Processes DNFSB Recommendation 2004-1 Implementation Plan Commitment # 23</p>				
Commitments		Planned Completion Date	Responsible Individual and Point of Contact	
No.	Planned Action		Site Office	Contractor
1	Review existing site work planning and control processes against the "attributes" from Attachment 1, <i>Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance</i> , identify any gaps, and identify corrective actions to eliminate the gaps;			
2	Review existing site work planning and control processes against the best practices and guidance from Attachment 1, <i>Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance</i> , identify areas for improvement, and take appropriate actions;			
3a	Institutionalize the Appendix B CRAD (<i>Assessment Criteria and Guidelines for Performing Assessments of the Effectiveness of Incorporation of Integrated Safety Management and Quality Assurance Principles Into Activity Level Work Planning and Control at NNSA Sites</i>) from Attachment 1, <i>Activity Level Work Planning and Control Processes - Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance</i> , so that activity level work is routinely assessed by the site offices and contractors for all contractor organizations that perform work;	April 30, 2006		
3b	Complete first assessment using the Appendix B CRAD.	April 30, 2006		
3c	Complete second assessment using the Appendix B CRAD.	July 31, 2006		
3d	Determine remaining assessments to be conducted for the year and develop schedule for performing the assessments.	August 31, 2006		
4	Confirm that work planners are adequately trained and qualified to the criteria/expectations defined in Attachment 2, <i>Training and Qualification of Work Planners</i> , or for those work planners who are not qualified, identify dates by which they will be qualified;			
5	Implement periodic/routine management observation of work activities and interaction with workers in the field/on the floor in accordance with the criteria/expectations defined in Attachment 3, <i>ISM - Management on the Floor Interaction with Workers</i> ;			
6	Document how the above actions will flowdown to ensure the adequacy of work performed by subcontractors, and how adequate implementation by subcontractors is verified.			