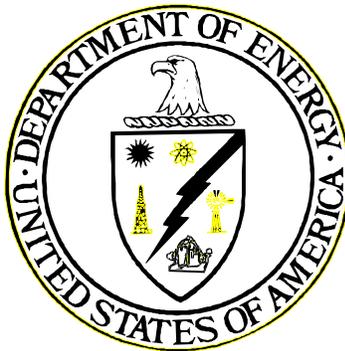


**OFFICE OF OVERSIGHT
REVIEW OF NUCLEAR CRITICALITY SAFETY**

**FIELD REPORT FOR THE
SAVANNAH RIVER SITE
FB-LINE AND H-AREA OUTSIDE TANKS**



January 2000

**Office of Oversight
Environment, Safety and Health
U.S. Department of Energy
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ACRONYMS

ANS	American Nuclear Society
ANSI	American National Standards Institute
CSE	Criticality Safety Evaluation
DOE	Department of Energy
EH	Office of Environment, Safety and Health
NCS	Nuclear Criticality Safety
SRO	Savannah River Operations Office
SRS	Savannah River Site
WSMS	Westinghouse Safety Management Solutions
WSRC	Westinghouse Savannah River Company

OFFICE OF OVERSIGHT TERMINOLOGY

Noteworthy Practice: An innovative approach or practice related to environment, safety, and health systems, programs, processes, or projects that have proven effective in improving safety management systems and performance, and could be a valuable source of information and lessons learned for other DOE sites.

Positive Attribute: A management system, process, or work practice that demonstrates an effective approach, a positive trend/initiative, or a significant improvement over past performance.

Safety Issue: A condition of concern that could have an adverse impact on the environment, safety, or health of the site, its workers, and/or the public. Safety issues require formal resolution and tracking by line management in accordance with DOE Order 414.1A, *Quality Assurance*.

Weakness: A deficiency in a management system, process, or activity that warrants management attention and corrective action but does not require a formal corrective action plan or tracking under the provisions of DOE Order 414.1A.

Opportunity for Improvement: Suggestions offered by the Office of Oversight appraisal team that may assist line management in identifying options and potential solutions to various issues identified during the conduct of the Oversight appraisal.

EXECUTIVE SUMMARY

In November 1999, the Deputy Secretary of Energy directed a series of actions to strengthen Department of Energy (DOE) nuclear criticality safety (NCS) programs. As one of those actions, a team of criticality safety experts from DOE Headquarters and the field conducted a high-level review at the Savannah River Site (SRS) and four other DOE sites. The review was led by the Office of Oversight, within the Office of Environment, Safety and Health. The purposes of this review were: (1) to identify any immediate problems and related corrective actions, and (2) to determine whether the operations and criticality safety risks at these facilities are well understood, analyzed, and controlled. The review focused on selected SRS facilities (i.e., the FB-line and H-Area outside tanks) that process solutions of fissile materials, because solutions represent the greatest risk of a criticality accident. The Oversight team observed field implementation of selected operations but did not perform a comprehensive review of implementation of requirements.

Although some weaknesses were identified, the Oversight team did not identify any conditions that presented an immediate risk of a criticality accident involving fissile solutions at the SRS facilities reviewed. The NCS program elements of criticality safety evaluations and controls, work control, change control, and line management oversight are in place and provide assurance that the criticality safety risks at these two facilities are properly controlled. These four program elements meet the intent of applicable DOE requirements and national standards.

Some aspects of the nuclear criticality safety program at SRS are notably effective. For example, Savannah River Operations Office personnel are actively involved in managing the NCS program and are performing assessments and reviews. In addition, the contractor is developing a new policy/procedure to link procedural nuclear safety controls directly to authorization basis documents. This new approach has the potential to reduce the multiple and overlapping nuclear safety controls within procedures.

The Oversight team did not identify any issues that require a formal corrective action plan. However, five weaknesses in the application of specific elements of the requirements were identified. The most significant weakness is the inefficient and complicated system of documents used to develop and implement NCS controls. The process is difficult for operators to understand and efficiently implement. Table ES-1 summarizes the suggested opportunities for improvement.

Table ES-1.
Summary of Opportunities for Improvement

Opportunities for Improvement

- Streamline and enhance the SRS system of documents used to implement criticality safety controls.
- Ensure that adequate independent technical reviews are performed, including reviews of Westinghouse Safety Management Solutions criticality safety evaluations by Westinghouse Savannah River Company utilizing competent criticality safety engineers.
- Increase the interaction between operators and NCS staff to foster operators' participation in development of NCS controls and to facilitate NCS staff familiarization with the processes being analyzed.
- Ensure that criticality safety engineers who perform criticality safety evaluations have first-hand experience with the facilities and processes being analyzed.

OFFICE OF OVERSIGHT REVIEW OF NUCLEAR CRITICALITY SAFETY FIELD REPORT FOR THE SAVANNAH RIVER FB-LINE AND H-AREA OUTSIDE TANKS

1.0 INTRODUCTION

The Department of Energy (DOE) Office of Oversight, within the DOE Office of Environment, Safety and Health (EH), conducted a review of selected aspects of the nuclear criticality safety (NCS) program at the Savannah River Site (SRS). The Oversight review of SRS was one portion of a broader DOE initiative to improve nuclear criticality safety, as directed by the Deputy Secretary of Energy in his November 3, 1999, memorandum entitled “Nuclear Criticality Self-Improvement Initiative.” One of the provisions of the Deputy Secretary’s memorandum was a review of key facilities at five sites (the other sites were the Y-12 Plant, Los Alamos National Laboratory, the Hanford Plutonium Finishing Plant, and the Rocky Flats Environmental Technology Site) by a team of criticality safety experts led by the EH Office of Oversight.

The review was conducted December 13-15, 1999, by an eight-person team composed of NCS experts from DOE Headquarters and field offices. Appendix A provides additional information on the composition of the review team.

Consistent with the direction provided by the Deputy Secretary, the purpose of this review is twofold: (1) to identify any immediate problems and related corrective actions, and (2) to determine whether the operations and criticality safety risks at these facilities are well understood, analyzed, and controlled. The Oversight team focused on four key nuclear criticality safety program elements as applied to selected fissile material operations.

The four key nuclear criticality safety elements reviewed were: criticality safety evaluations and controls, work control, change control, and line-management oversight. The criteria for each of these areas were provided by the Deputy Secretary and were derived from the national consensus standard American National Standards Institute (ANSI)/American Nuclear Society (ANS)-8.19, which is required by DOE Order 420.1, *Facility Safety*, and from DOE Policy 450.5, *Line Environment, Safety and Health Oversight*. Appendix B presents the evaluation criteria for the four criticality safety elements.

The SRS facilities reviewed included the FB-Line and the H-Area outside tanks. Fissile nuclear materials operations at these facilities involve processing, handling, and storage of solutions of fissile materials. Criticality accidents typically involve safety management system breakdowns impacting fissile solution processing. Of the 22 known criticality accidents involving fissile material processing, 21 have involved solutions, including the most recently publicized accident in Tokai-mura, Japan.

The common causes of criticality accidents that have occurred to date have been failure to perform a criticality safety evaluation (CSE) for a process; undetected process and system changes; failure to develop, review, and approve operating procedures; absence of effective worker training; and failure to conform to established procedures and limits. No criticality accident has occurred as a result of a faulty

calculation of reactivity, and no known criticality accident has involved storage or transport of fissile material.

The NCS review of the Savannah River FB-Line and H-Area outside storage tanks was conducted according to Oversight protocols and procedures, including the validation of data throughout all stages of the process. The Oversight team toured fissile solution handling and processing operations in FB-Line and the H-Area external storage tanks. The review team interviewed DOE Savannah River Operations Office (SRO), Westinghouse Savannah River Company (WSRC), and Westinghouse Safety Management Solutions (WSMS) personnel, including DOE Facility Representatives and contractor personnel with responsibility for NCS, audits and assessments, work planning and control, configuration management, and authorization basis. The Oversight team reviewed a representative sample of operational criticality safety controls (e.g., criticality safety limits summarized in postings and stated in operating procedures), work controls (e.g., other procedural and administrative controls governing normal work tasks, including maintenance, that affect criticality safety), change controls, and audit/self-assessment practices. Selected CSEs and other documents that form the basis for these controls and practices were also reviewed.

This Oversight review focused exclusively on criticality safety aspects of FB-Line and the H-Area external storage tanks. Consequently, the review does not constitute an assessment of the overall NCS program in relation to the requirements of the ANSI/ANS standards and DOE Order 420.1, *Facility Safety*. The elements of ANSI/ANS Standard 8.19 were applied to only those specific processes selected for review. Further, the Oversight team had only limited opportunity to observe actual work in progress during the field visit because the review was conducted according to an accelerated schedule and because few operations were ongoing during the period of the review. The review therefore focused primarily on interviews, documentation, records, and observation of the work place.

NCS work at the SRS is contracted to WSMS personnel through a sole-source contract. WSMS is a wholly-owned subsidiary of WSRC. Interviews with WSRC staff indicate satisfaction with this arrangement.

2.0 RESULTS

The Oversight team noted two positive attributes and four weaknesses in the application of specific elements of the requirements. No issues were identified that require a formal corrective action plan in accordance with DOE Order 414.1A, *Quality Assurance*.

2.1 Positive Attributes

1. SRO personnel are actively involved in managing the NCS program.

SRO has one of the strongest DOE field office NCS programs. Several SRO individuals are involved in monitoring all aspects of the program. One of these individuals serves as the focal point for criticality safety. This individual is on schedule to complete the qualification requirements in accordance with the applicable Federal Qualification Standard. SRO NCS personnel maintain sufficient knowledge of program activities to make informed decisions about resources and evaluate contractor performance against established performance criteria. Reviews and assessments of the contractor NCS program are being performed and documented. However, external criticality safety expertise is not utilized to augment the SRO capability. Finally, SRO reviews contractor CSEs because they are currently part of the formal authorization basis for the facility. Plans are underway to remove CSEs from the authorization basis which is more in line with best practices at other DOE sites.

2. WSRC is developing a new policy/procedure to link procedural nuclear safety controls directly to authorization basis documents.

The group responsible for implementation of the Linking Document Database is working on a new procedure to annotate the nuclear safety controls within the procedures. These annotations indicate the specific authorization basis documents that provide the basis for these controls. The procedure is currently in draft and deals mostly with the process of labeling nuclear safety controls within procedures. However, the planned approach provides a good mechanism for linking actual controls to approved safety analysis documents and has the potential to reduce the multiple and duplicative nuclear safety controls within procedures. Appropriate focus can then be applied to the most crucial controls.

2.2 Weaknesses

Although not requiring a separate, formal response in accordance with DOE Order 414.1A, the following weaknesses warrant management attention and appropriate corrective actions. In discussions with the Office of Oversight, the site has agreed to include these weaknesses in their site self-assessment, which is a required element under the Deputy Secretary's NCS self-improvement initiative. The site will track the weakness and corresponding corrective actions in site-level corrective action tracking systems.

1. The system of documents used to develop and implement NCS controls is complicated and inefficient.

The process for developing CSEs, nuclear criticality safety supplements, double contingency analyses, procedural steps, and postings is not efficient and is difficult for operations personnel to understand and implement. A collaborative process between the NCS staff and operations is used to impose margins of conservatism throughout the process of developing controls that are implemented in procedures. The rationale for the margin of safety is not documented in many cases. For example, the postings contain different (higher) limits than the procedures that operators follow. Most NCS postings are one page. However, some postings are detailed, lengthy, procedure-like documents that are rarely used by operators. The current practice of relying on the double contingency analysis (which is derived from the CSE but is not comprehensive) instead of the CSE could result in a failure to identify criticality hazards. Such failures could occur because crucial safety assumptions made by the NCS staff when the criticality safety limits (documented in the CSE) were developed are not being considered. Under the present system, the multiple NCS controls within procedures can dilute the importance of the CSE-based controls.

2. WSRC does not use qualified criticality safety engineers to conduct technical reviews of CSEs provided by WSMS.

The WSRC program manager expressed satisfaction with the technical quality of the WSMS evaluations based on the WSMS quality assurance process. However, WSRC does not perform any verification by qualified and competent criticality safety engineers, even on a limited sampling basis, of the technical accuracy of the WSMS evaluations. For example, the Oversight team identified some questionable items in a CSE published in 1996. Although most of these items were easily resolved in conversations with the WSMS NCS analysts, an independent WSRC review could have caught and clarified these items before the final CSE was issued.

The contractor conducts periodic NCS program reviews but has not used outside expertise within the last three years. The use of outside expertise can add a valuable external perspective to reviews and significantly strengthen the criticality safety program. In addition, the cross-fertilization of ideas and experience and direct transfer of lessons learned benefits NCS programs across DOE.

3. There is insufficient interaction between operators and the NCS staff.

NCS personnel perform several important functions but are not sufficiently involved with operations. The NCS staff reviews operating procedures that involve starred NCS steps, and they occasionally attend plan-of-the-day meetings. However, interviews revealed that NCS personnel rarely observe operations or attend pre-job briefs. Regular, informal interactions with operators and tours of facility operations are essential to mentoring and qualifying junior members of the WSMS NCS staff. In addition, there is insufficient operator involvement with the NCS staff in the development of NCS controls. The Engineering organization prepares an informational summary sheet each morning, which the NCS staff reviews. Usually the Shift Technical Engineer or Nuclear Safety Specialist handles deviations from an NCS procedure step, but the NCS staff is always involved when deviations from a posting occur. This involvement is needed because posted limits are generally much higher than limits in procedures, and thus the margin of safety is less. The existence of different limits, combined with the relatively small amount of time that the NCS staff interacts with operators, can lead to misunderstandings and operational errors.

4. Some backup criticality safety engineers are not familiar with facilities and operations.

Only a few criticality safety engineers had detailed knowledge of plant facilities and operations. Some new engineers primarily perform evaluations from their office and have not seen the operations or equipment they were analyzing. In some operational areas, only one criticality safety engineer is assigned to monitor floor operations. Conversely, at FB-Line, where the potential for accidental criticality is the greatest, WSRC has assigned a group of specially trained and designated operators (Nuclear Safety Specialists) to monitor compliance with criticality safety limits around the clock. This is an example of applying a graded approach to criticality safety that partially mitigates the weakness in the criticality safety engineers' knowledge of facilities.

3.0 CONCLUSIONS AND OPPORTUNITIES FOR IMPROVEMENT

Based on the Oversight review, there are no imminent criticality safety hazards at the SRS facilities reviewed. The NCS program elements that were reviewed (i.e., criticality safety evaluations and controls, work control, change control, and line management oversight) are in place and provide assurance that the criticality safety risks at these two SRS facilities are properly controlled. These four program elements meet the intent of applicable requirements of Section 4.3 of DOE Order 420.1, ANSI/ANS-8.19, and DOE Policy 450.5.

No Safety Issues were identified that require a formal corrective action plan. However, four weaknesses in the application of specific elements of the requirements were identified. The following Opportunities for Improvement should be considered to address the identified weaknesses.

<p>1. Streamline and enhance the SRS system of documents used to implement criticality safety controls (see Weakness #1).</p>
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- Simplify the process for developing and implementing NCS controls to ensure that the CSE is a self-contained safety basis document that forms the foundation for development of all controls.
- Ensure that controls developed from the CSE are traceable to the CSE and easy for the operators to understand, and that they implement and facilitate safe, efficient operations.

2. Ensure that adequate independent technical reviews are performed, including reviews of WSMS CSEs by WSRC utilizing competent criticality safety engineers (see Weakness #2).

- Assign WSRC senior criticality safety staff members to review CSEs, possibly using a selective sampling approach.
- Implement a periodic WSRC NCS self-assessment program that utilizes external expertise.
- Arrange to use external expertise periodically to complement the efforts of SRO NCS staff.

1. Increase the interaction between operators and NCS staff to foster operators' participation in development of NCS controls and to facilitate NCS staff familiarization with the processes being analyzed (see Weakness #3).

- Change the CSE development process to require that operators participate in the entire CSE process, including derivation and implementation of controls.
- Change the CSE development process to require facility walkdowns by the NCS staff to increase the amount of time the NCS staff spends in the facility walking down processes and interacting with operators.

4. Ensure that criticality safety engineers who perform CSEs have first-hand experience with the facilities and processes being analyzed (see Weakness #4).

- Establish and implement processes to ensure that less-experienced NCS staff become familiar with facilities, operations, and operators. Such processes are needed to ensure that the existing staff has adequate depth and that backups are available and also to ensure continuity of expertise in the future.

APPENDIX A

TEAM COMPOSITION

The team membership, composition, and responsibilities are as follows:

Deputy Assistant Secretary for Oversight

S. David Stadler, Ph.D.

Associate Deputy Assistant Secretary for Oversight

Raymond Hardwick

Team Leader

Jerry McKamy, Ph.D.

Management Advisor to the Team

Ed Blackwood

Line Management Oversight Subgroup

Adolf Garcia

Jim Felty

Work and Change Control Subgroup

Bill Weaver

Gypsy Tweed

Criticality Safety Evaluations and Controls Subgroup

Steve Payne, Ph.D.

Ivon Fergus

Communications and Support

Cynthia D. Dorsey

Quality Review Board

Raymond Hardwick

Frank Russo

Tom Staker

Tom Davis

APPENDIX B

EVALUATION CRITERIA

INTRODUCTION

This appendix presents the evaluation criteria used in this Oversight review. It also presents the lines of inquiry (i.e., the specific areas of focus within each criterion) that correspond to each of the criteria. The criteria and lines of inquiry are presented for each of the four safety management areas reviewed by Oversight:

1. Criticality safety evaluations and controls
2. Work control
3. Change control
4. Line-management oversight.

Most of the evaluation criteria and lines of inquiry (i.e., Criteria 1.1 through 4.4) for this Oversight review apply primarily to the contractors that implement NCS programs at DOE sites. These criteria and lines of inquiry were derived from the consensus standard ANSI/ANS-8.19, which is established as a DOE requirement by provisions of DOE Order 420.1.

Certain criteria (i.e., Criteria 4.5 through 4.10) apply only to the DOE operations office and site office. The criteria and lines of inquiry that apply to DOE organizational elements were extracted from DOE Policy 450.5, *Line Environment, Safety and Health Oversight*.

CRITICALITY SAFETY EVALUATION AND CONTROLS

1.1 Criterion: Before starting a new operation with fissile materials or before an existing operation is changed, it shall be determined that the entire process will be subcritical under both normal and credible abnormal conditions. (ANSI/ANS-8.19, Section 8.1)

Lines of Inquiry:

- Criticality safety evaluations shall conform to the requirements of ANSI/ANS-8.1, “Nuclear Criticality Safety in Operation with Fissionable Material Outside Reactors.”
- The NCS staff, responsible operations personnel, and responsible support engineering personnel jointly develop contingencies.
- All credible process upsets are considered and are either controlled or dispositioned appropriately. NCS staff familiar with the facility and operations under consideration perform the criticality safety evaluations. The NCS staff works as a team with operations to develop credible accident scenarios and controls.

1.2 Criterion: The nuclear criticality safety evaluation shall determine and explicitly identify the controlled parameters and their associated limits upon which nuclear criticality safety depends. (ANSI/ANS-8.19, Section 8.2)

Lines of Inquiry:

- Controls are developed in the criticality safety evaluation for each contingency.
- Controlled parameters, contingencies, and credited barriers are explicitly documented.

1.3 Criterion: The nuclear criticality safety evaluation shall be documented with sufficient detail, clarity, and lack of ambiguity to allow independent judgment of results. (ANSI/ANS-8.19, Section 8.3)

Lines of Inquiry:

- The CSEs contain a system/process description with enough detail for an independent reviewer to understand the system/process sufficiently to judge the results of the criticality safety analysis. The criticality safety evaluations conform to DOE-STD-3007-93, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities*.
- All assumptions are fully documented in the criticality safety evaluation.
- The criticality safety evaluation can be read and understood by the line supervision.

1.4 Criterion: Before starting operation, there shall be an independent assessment that confirms the adequacy of the nuclear criticality safety evaluation. (ANSI/ANS-8.19, Section 8.4)

Lines of Inquiry:

- All criticality safety evaluations receive an independent technical peer review before approval for use.
- There is a process for confirming that all credited engineered features of a system or process are in place and meet the specifications anticipated by the evaluation prior to starting operations.

1.5 Criterion: Procedures shall include those controls and limits significant to the nuclear criticality safety of the operation. (ANSI/ANS-8.19, Section 7.2)

Lines of Inquiry:

- Criticality controls are included in operating procedures.
- The criticality controls are clearly identified as important to safety.

1.6 Criterion: Procedures should be supplemented by posted nuclear criticality safety limits or limits incorporated in operating check lists or flow sheets. (ANSI/ANS-8.19, Section 7.6)

Lines of Inquiry:

- Criticality safety postings are easy to understand by operators.
- Postings contain only information controlled by the operator performing the task.
- The relationship of controls in postings to controls in procedures is clear.
- Postings are easy to read from normal operator positions at the workstation.
- Operations personnel and NCS staff validate draft criticality postings and controls prior to implementation.

CHANGE CONTROL PRACTICES

2.1 Criterion: Supervisors shall verify compliance with nuclear criticality safety specifications for new or modified equipment before its use. Verification may be based on inspection reports or other features of the quality control system. (ANSI/ANS-8.19, Section 5.5).

Lines of Inquiry:

- There are procedures or mechanisms in place and effective to ensure that modifications to equipment and/or processes results in a review of the applicable CSEs-procedure-posting set prior to implementing the modification.
- There is a process for ensuring that no new or modified operation is started until all applicable verification steps have been performed which includes presence of approved CSEs, postings, procedures and that no criticality infraction will result from startup.
- A process is in place to verify that as-built equipment and processes conform to the configuration anticipated in the CSE.
- Maintenance work orders that have the potential to impact criticality safety are reviewed by the NCS Staff and an Unreviewed Safety Question Determination (USQD) is performed prior to performing the maintenance tasks.

2.2 Criterion: Active procedures shall be reviewed periodically by supervision. (ANSI/ANS-8.19, Section 7.4)

Lines of Inquiry:

- Procedures are periodically reviewed.
- The NCS staff periodically participates in reviews of active operating procedures.
- The Authorization Basis (Safety Analysis Report, basis for interim operations, etc.) is reviewed periodically by the NCS staff for changes that potentially impact nuclear criticality safety.

2.3 Criterion: New or revised procedures impacting nuclear criticality safety shall be reviewed by the nuclear criticality safety staff. (ANSI/ANS-8.19, Section 7.5)

Lines of Inquiry:

- New or revised procedures are reviewed by the NCS staff.
- Proposed changes to the Authorization Basis (Safety Analysis Report, basis for interim operations, etc.) affecting nuclear criticality safety are reviewed by the NCS staff.

WORK CONTROL PRACTICES

3.1 Criterion: Each supervisor shall provide training and shall require that the personnel under his supervision have an understanding of procedures and safety considerations such that they may be expected to perform their functions without undue risk. Records of training activities and verification of personnel understanding shall be maintained. (ANSI/ANS-8.19, Section 5.3)

Lines of Inquiry:

- At a minimum, operators receive criticality safety training in accordance with ANSI/ANS-8.20, “Nuclear Criticality Safety Training.”
- Supervisors provide job specific training on procedures.
- Pre-job briefs cover criticality controls specific to the operations at hand.
- Plan-of-the-day meetings address criticality safety related topics like work restrictions due to criticality safety infractions, availability of new procedures and postings, need for NCS staff participation, results of recent criticality safety assessments/surveillances, etc.
- Supervisors maintain training records for their personnel.
- Supervisors and operators can answer questions about the basic criticality controls for their operations.
- Supervisors can generally describe the contingencies and controls for the contingencies for their operations, including credited engineered features and key facility assumptions, if any.

3.2 Criterion: Supervisors shall develop or participate in the development of written procedures applicable to the operations under their control. Maintenance of these procedures to reflect changes in operation shall be a continuing supervisory responsibility. (ANSI/ANS-8.19, Section 5.4)

Lines of Inquiry:

- All fissile material handling operations are performed according to approved procedures.
- Operations personnel or supervision are involved in developing procedures.
- There is a mechanism to assure that only current, approved procedures, CSEs, and postings are used for operations.
- The line program supervisor has a formalized process that authorizes work only after all NCS requirements have been met subsequent to modifications of the existing set of controls/procedures.
- There is a mechanism to ensure that Operational Safety Requirement (OSR) related controls and requirements in procedures or postings are not changed without proper analysis by the NCS staff and approval by management.
- USQDs are performed for all procedure modifications.

3.3 Criterion: The nuclear criticality safety staff shall provide technical guidance for the design of equipment and processes and for the development of operating procedures. (ANSI/ANS-8.19, Section 6.1).

Lines of Inquiry:

- The NCS staff provides design input for all new or modified equipment.
- The NCS staff reviews all operating procedures involving fissile materials.
- The NCS staff reviews and concurs on final equipment and process designs.
- The NCS staff reviews maintenance work orders that potentially affect criticality safety.

3.4 Criterion: The NCS staff shall maintain familiarity with all operations within the organization requiring nuclear criticality safety controls. (ANSI/ANS-8.19, Section 6.4)

Lines of Inquiry:

- The NCS staff observes fissile material handling and processing operations regularly.
- The NCS staff attends operations planning meetings for new or restarted processes.
- The NCS staff has access to, and familiarity with, fissile material operating procedures.
- The NCS staff attends pre-job briefs and plan-of-the-day meetings when it is appropriate.
- The NCS staff maintains familiarity with reports of deviations from expected process conditions even if these deviations do not result in a criticality infraction.

OVERSIGHT, AUDIT AND SELF-ASSESSMENT PRACTICES

4.1 Criterion: Management shall periodically participate in auditing the overall effectiveness of the nuclear criticality safety program. (ANSI/ANS-8.19, Section 4.6)

Lines of Inquiry:

- Contractor management participates in review teams or committees that assess facility criticality safety programs.

- Contractor program/facility management routinely audits operations for compliance with criticality safety requirements. Contractor performs NCS management self-assessments of their criticality safety staff and program.

4.2 Criterion: Management may use consultants and nuclear criticality safety committees in achieving the objectives of the nuclear criticality safety program. (ANSI/ANS-8.19, Section 4.7)

Lines of Inquiry:

- Management utilizes a nuclear criticality safety committee to assist in monitoring and improving the criticality safety program.
- Nuclear criticality safety committees report directly to senior management.
- Personnel interviews indicate that findings from the nuclear criticality safety committee, or equivalent, are entered into a tracking database and corrective actions are tracked through implementation.
- Outside consultants are utilized to provide an independent viewpoint on the overall criticality safety program.

4.3 Criterion: The [NCS] staff shall conduct or participate in audits of criticality safety practices and compliance with procedures as directed by management. (ANSI/ANS-8.19, Section 6.6)

Lines of Inquiry:

- The NCS staff participates in periodic audits of operations and procedures.
- The results of audits are shared among the NCS staff.
- The results of audits are reported to appropriate facility management.
- Corrective actions are developed for opportunities for improvement.

4.4 Criterion: Operations shall be reviewed frequently (at least annually) to ascertain that procedures are being followed and that process conditions have not been altered so as to affect the nuclear criticality safety evaluation. (ANSI/ANS-8.19, Section 7.8)

Lines of Inquiry:

- All operations are reviewed at least annually.
- Annual reviews determine that procedures are being followed.
- Audits and reviews monitor the configuration of the facility and processes which could adversely affect criticality safety, such as movements of criticality detectors, installation of new equipment, inoperable emergency annunciators, etc.
- Personnel with NCS experience and knowledge of the operations perform the reviews.
- The reviews examine CSEs to verify that changes to the process have not compromised criticality safety.
- The results of the review are reported to senior management as well as facility and program management.
- Opportunities for improvement and proposed corrective actions are documented and tracked to closure.
- Procedures are in place to ensure that changes to process equipment over time do not degrade compliance with criticality safety controls.
- Annual reviews are conducted of facilities and operations where it has been determined that criticality is not credible but that contain more than a minimum critical mass of fissile material and/or that still require criticality safety controls.

4.5 Criterion: DOE must acquire and maintain sufficient knowledge of program activities in order to make informed decisions on criticality safety resources for these activities. (DOE Policy 450.5, Policy section)

Lines of Inquiry:

- Routine meetings are held with contractor NCS management.
- Periodic meetings are held with DOE contractor operations management.
- The DOE NCS Program Manager reviews budget requests made by contractor NCS management.
- The DOE NCS Program Manager reviews budget requests made by contractor operations management.
- The DOE NCS Program Manager has input to the DOE site budget process.

4.6 Criterion: DOE maintains operational awareness of contractor work activities, typically through DOE line managers and staff such as Facility Representatives and criticality safety subject matter experts. (DOE Policy 450.5, paragraph 2a)

Lines of Inquiry:

- The DOE NCS Program Manager and Facility Representatives work closely on NCS-related issues in the field.
- The DOE NCS Program Manager routinely spends time in the field performing walkdowns and interacting with Operations.
- The DOE NCS Program Manager reviews contractor occurrence reports related to criticality safety programs.

4.7 Criterion: DOE reviews performance against formally established criticality safety performance measures, performance indicators, and contractor self-assessments. (DOE Policy 450.5, paragraph 2b)

Lines of Inquiry:

- Performance measures are established for the contractor NCS program.
- Progress on the performance measures is routinely reported to DOE.
- Contractor NCS self-assessments are reviewed by the DOE NCS Program Manager.
- The NCS Program Manager provides reports and feedback on contractor self-assessments to senior DOE site management.

4.8 Criterion: DOE performs criticality safety reviews and assessments in support of required readiness assessments, Operational Readiness Reviews, Safety Management System documentation and onsite verification reviews, and authorization basis documents including CSEs. (DOE Policy 450.5, paragraph 2c)

Lines of Inquiry:

- The DOE NCS Program Manager participates in readiness assessments, Operational Readiness Reviews, and Integrated Safety Management reviews when necessary.
- The DOE NCS Program Manager participates in the review and approval of facility NCS-related authorization basis documents (e.g., Safety Analysis Reports, Bases for Interim Operations, Unreviewed Safety Questions, and Technical Safety Requirements).
- The DOE NCS Program Manager reviews a sample of contractor CSEs on a routine basis.

4.9 Criterion: DOE performs periodic appraisals of the contractor criticality safety program, including for-cause criticality safety reviews, as necessary. (DOE Policy 450.5, paragraph 2d)

Lines of Inquiry:

- Surveillances of facility criticality safety programs and controls are incorporated into the Field Office assessment plan.
- Appraisals and reviews are documented.
- Corrective actions are tracked to closure.
- The DOE NCS Program Manager performs assessments of the contractor criticality safety program in accordance with a documented plan.
- Outside DOE NCS subject matter experts are occasionally utilized to assist with reviews to provide independent feedback.

4.10 Criterion: DOE has a designated focal point for coordinating criticality safety oversight activities. (DOE Policy 450.5, paragraph 2)

Lines of Inquiry:

- The DOE field office has designated a single NCS focal point (i.e., NCS Program Manager).
- The DOE NCS Program Manager has been qualified by completing the requirements in the Federal NCS Qualification Standard.
- The DOE NCS Program Manager routinely meets with an Assistant Field Office Manager responsible for NCS.
- The DOE NCS Program Manager represents the single point of contact on NCS issues for the contractor.
- The DOE NCS Program Manager represents the field office on the Criticality Safety Coordinating Team (CSCT).