U.S. Department of Energy Office of Independent Oversight Criteria Review and Approach Document	Subject: Criticality Safety Controls Implementation Inspection Criteria, Approach, and Lines of Inquiry Director, Office of ES&H Evaluations Date: 10/26/09 Criteria Lead, Criticality Safety Controls Implementation Date: 10/23/09	HS: HSS CRAD 64-18 Rev: 0 Eff. Date: 10/23/2009 Page 1 of 5

1.0 PURPOSE

Within the Office of Independent Oversight, the Office of Environment, Safety and Health (ES&H) Evaluations' mission is to assess the effectiveness of those environment, safety, and health systems and practices used by field organizations in implementing Integrated Safety Management and to provide clear, concise, and independent evaluations of performance in protecting our workers, the public, and the environment from the hazards associated with Department of Energy (DOE) activities and sites. A key to success is the rigor and comprehensiveness of our process; and as with any process, we continually strive to improve and provide additional value and insight to field operations. Integral to this is our commitment to enhance our program. Therefore, we have developed Criticality Safety Controls Implementation Inspection Criteria, Approach, and Lines of Inquiry for internal use, which we are also making available on this Web page for use by DOE line and contractor assessment personnel in developing and implementing effective DOE oversight and contractor self-assessments and corrective action processes.

2.0 APPLICABILITY

The following Inspection Criteria document is approved for use by the Office of ES&H Evaluations.

3.0 FEEDBACK

Comments and suggestions for improvements on these Inspection Criteria, Approach, and Lines of Inquiry can be directed to the Director of the Office of ES&H Evaluations on (301) 903-5392.

Criticality Safety Controls Implementation
Inspection Criteria, Approach, and Lines of Inquiry

Introduction: DOE has set expectations for implementing criticality safety controls that are selected to provide preventive and/or mitigative functions for specific potential accident scenarios. There are additional expectations for criticality safety controls that are also designated as Specific Administrative Controls (SACs) (see HSS CRAD 64-32). Also, in instances when the review addresses functionality and operability of structures, systems, and components (SSCs) of nuclear facilities specifically required for criticality safety per the facility's documented safety analysis (DSA), see HSS CRAD 64-11. The following provides a set of criteria and typical activities with representative lines of inquiry to assess criticality control implementation as an integral part of the review of the core functions and implementation of integrated safety management.

Inspection Criteria:

- Criticality safety controls are crafted using sound engineering/scientific principles (e.g., defense in depth, conservative design margins, human factors engineering) and appropriate standards, including the American National Standards Institute/American Nuclear Society (ANSI/ANS) Series 8 Standards, as applicable. [DOE 420.1B, Chapter III, 3.a(4)(b), 3.b(2), 3.b.5, III.3.a(4)(b), ANSI/ANS 8.1, 4.2, 4.3.3, DOE-STD-3007-1993, II.d.3]
- Technical, functional, and performance requirements for criticality safety controls are specified in criticality safety documents. These documents identify and describe the safety functions and are effectively translated into procedures and workspace postings. [DOE 420.1B, Chapter III, 3.b(2), ANSI/ANS 8.1., 4.1.3 and 4.1.4, and ANSI/ANS 8.19, 7.2, 7.6, 8.2, and 8.3]
- The adequacy of criticality safety controls is confirmed by individuals or groups other than those who performed the work. Such confirmation, as well as activities ensuring that the technical basis for the controls is adequate, is completed before the start of operations. The adequacy determination considers that no single credible event or failure can result in a criticality. [DOE 420.1B; Chapter III, 3.b(2) and 3.a.(2); ANSI/ANS 8.19, 8.4; ANSI/ANS 8.1, 4.3.4 and 4.3.6]
- The effects of changes to criticality safety requirements or conditions to which they apply are reviewed and understood before the start of operations. [DOE 420.1B, Chapter III, 3.b(2), ANSI/ANS 8.19, 8.2 and 8.4]
- Management organizational structures and systems provide assurance that criticality safety controls are implemented and are being maintained such that they will fully and reliably perform their safety functions over the life of the facility. [DOE 420.1B, Chapter III, 3.a(4)(c) and (d), 3.b(2), ANSI/ANS 8.1, 4.1.1, 4.1.5, 4.1.6, ANSI/ANS 8.19 4.5, 4.6, and 4.7, DOE-STD-1158]
- Criticality safety controls are robust and meet the Double Contingency Principle or DOE has granted a specific exemption which incorporates the foregoing criteria. [DOE 420.1B, Chapter III, 3.b(4), 3.b(2), ANSI/ANS 8.1, 4.1.1, 4.2.2, ANSI/ANS 8.19, 4.2]
- Criticality safety controls and how they are implemented are adequately communicated to workers via training, statements in procedures, workplace postings and other operator aids as appropriate. The need for materials labeling and other identifiers used to prevent criticality is

understood and are adequate; i.e., workers may readily verify limit compliance. [DOE 420.1B, Chapter III 3.b(2), ANSI/ANS 8.1, 4.1.1, 4.1.3, 4.1.4, ANSI/ANS 8.19, 5.3, 7.6, and 9.4, ANSI/ANS 8.20, 6.1 and 6.2]

- Support activities to ensure that limits are not exceeded are adequate, and involved personnel are aware of the potential consequences due to erroneous data or actions. [DOE 420.1B, Chapter III, 3.b(6), Chapter III, 3.b(2) and 3.b(7), ANSI/ANS 8.1 4.1.1, ANSI/ANS 8.19, 7.6]
- Non-adherences to controls are investigated, corrected, and documented. Additionally, cases where controls are discovered to be confusing or inadequately understood are resolved whether or not an actual non-adherence occurs. [DOE 420.1B, Chapter III 3.b(2), ANSI/ANS 8.19, 7.7]
- Planned response to criticality accidents is adequate and evacuation drills and other activities verify workers understand and can execute their responsibilities during a response to a criticality alarm. Accidental alarms and miscommunications are minimized. [DOE 420.1B, Chapter III 3.b(2), ANSI/ANS 8.1, 4.1.1, 4.17, ANSI/ANS 8.3, 4.5.1, 4.5.2, 5.4, 6.1, 6.2, and 6.4 – 6.7, ANSI/ANS 8.19 5.3, and 10.2 – 10.6, ANSI/ANS 8.20, 7.4.1]

Inspection Activities:

- Review operations procedures and criticality safety postings as well as associated operator aids and the supporting criticality safety evaluations for the selected criticality safety controls and a sample of records, including a walkthrough of procedures with appropriate facility personnel (e.g., operations personnel, criticality safety engineers, criticality safety officers).
- Review supporting procedures relating to this sample of controls which determine the values of the item being controlled or which cause alarms or other useful indications if the respective limit is, or is about to be exceeded, and a sample of records, including a walkthrough of such procedures with appropriate facility personnel (e.g., Chemistry Laboratory, Material Control and Accountability (MC&A), Non-Destructive Analysis (NDA), Maintenance, and Fire Protection personnel.)
- Review training on how and why to comply with the selected criticality safety controls, including how to determine values of items being controlled and how to operate and calibrate systems that give alarms or other useful indications when limits are exceeded, and a sample of the respective training records, including measures to ensure that certified fissionable materials handlers perform work with fissionable materials and associated systems, equipment, and materials.
- Verify, by walkdown or other means, that installed instrumentation and control and support equipment required to ensure ongoing implementation of selected criticality safety controls and proper emergency responses will function under credible accident/event conditions.
- Perform interviews and work observations as applicable to verify that the selected criticality controls have been effectively implemented and are reliable and robust. This includes interviewing a sample of all personnel granted unescorted access to affected facility areas as well as a sample of personnel involved in implementation, e.g., assigned fissionable materials handlers, their supervisors, criticality safety officers, and criticality safety engineers. Additionally, verify by document reviews, interviews, and workplace simulations that responses to alarms and unwanted events, etc., are conducive to avoiding infractions and errors during an emergency response.

- Perform interviews and work observations of personnel in support organizations as applicable to verify that selected criticality controls are not exceeded, equipment is calibrated, and alarms and indications regarding exceeding limits or evacuation are operational, e.g., Chemistry Laboratory, MC&A, NDA, Maintenance, and Fire Protection personnel.
- Review records relating to infractions or violations of selected criticality safety controls, any trends, and resultant analyses and corrective actions designed to prevent or minimize repeat infractions. Additionally, review records relating to lesser deviations of these controls that may indicate insufficient diligence.
- Review contractor assessment activity schedules and assessment results for independent, management, and other self-assessments and external reviews/inspections (including DOE Site Office) of implementation for the selected controls.

Inspection Lines of Inquiry:

- Within the scope of the review, do the criticality safety evaluations provide the basis for safety requirements and functions of selected criticality safety controls, which is consistent with the logic and assumptions presented?
- Do the criticality safety evaluations identify the appropriate performance criteria necessary to provide reasonable assurance that selected criticality safety control functional requirements will be met?
- Do the criticality safety evaluations identify and describe the selected criticality safety control safety functions?
- Do the criticality safety evaluations for selected criticality safety controls appropriately reflect assumptions of facility configuration and human performance of safety functions, operational parameters, and key programmatic elements?
- Are operations personnel knowledgeable, trained, and able to satisfactorily perform or respond to operational, abnormal response, and emergency procedures for selected criticality safety controls, as applicable, including responses to criticality accident alarms?
- Are support personnel knowledgeable, trained, and able to satisfactorily perform their respective duties regarding selected criticality safety controls and emergency response, as applicable?
- Is access to work areas controlled such that personnel who are not sufficiently trained will be assisted in the event of an emergency and are prevented from causing an infraction or emergency?
- Do the respective procedures and postings cite applicable criticality safety requirements in user-friendly terms?
- Are limits, precautions, system prerequisite conditions, data required, acceptance criteria, and independent verification elements included in the respective procedures for criticality safety controls?
- Are appropriate data recording provisions included or referenced, and used to record operational data?
- Do the respective procedures include provisions for listing discrepancies?
- Do the respective procedures require timely notification to facility management about any discrepancy that could impact performance of selected criticality safety controls?
- Do appropriate personnel (e.g., operations, criticality safety engineers, criticality safety officers, etc.) review such results and take appropriate action?

- Are responses to deviations, infractions, and violations of criticality safety controls adequate? Is the frequency of such events reasonably minimal? Does management stress positive reinforcement, i.e., so that personnel are not reluctant to self-report?
- Are analyses and corrective actions, including schedules for completion, designed to prevent or minimize repeat infractions or lesser deviations of selected controls reasonable, i.e., demonstrate a graded approach to safety and reflect due diligence?
- Is timely closeout of infraction corrective action(s) the norm? Are completion date extensions reasonable?
- Is there sufficient coordination among various contractor internal organizations regarding implementing selected controls and verifying that their underlying assumptions remain valid?
- Are criticality accident alarm systems functional and do workers understand what to do if an alarm occurs?
- Do evacuation drills, i.e., plans, critiques and other associated documents, indicate adequate compliance with requirements regarding (simulated) emergency conditions?
- Review records of false alarms and means to prevent them.
- Have rigorous assessments of criticality safety control developmental processes and their implementation, including simulated responses to emergencies been performed by the contractor and DOE site office and appropriate corrective actions implemented, where appropriate? Do contractor self-assessments meet the intent of DOE-STD-1158 regarding the implementation of the selected controls?