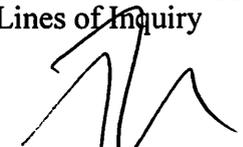


<p>U.S. Department of Energy</p> <p>Office of Safety and Emergency Management Evaluations</p> <p>Criteria Review and Approach Document</p>	<p>Subject: Review of Safety Basis Development for the Y-12 National Security Complex Uranium Processing Facility Inspection Criteria, Approach, and Lines of Inquiry</p>  <p>Acting Director, Office of Safety and Emergency Management Evaluations</p> <p>Date: 10/11/12</p>  <p>Criteria Lead, Review of Safety Basis Development for the Y-12 National Security Complex Uranium Processing Facility</p> <p>Date: 10/11/12</p>	<p>HS: HSS CRAD 45-55 Rev: 0 Eff. Date: 10/11/2012</p> <p>Page 1 of 6</p>
--------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

1.0 PURPOSE

Within the Office of Health, Safety and Security (HSS), the Office of Safety and Emergency Management Evaluations' (HS-45) mission is to assess the effectiveness of those environment, safety and health systems and practices used by field organizations in implementing Integrated Safety Management (ISM) 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. We continue to make them available for use by DOE line and contractor assessment personnel in developing and implementing effective DOE oversight and contractor self-assessment and corrective action processes; the current revision is available at http://www.hss.doe.gov/indepoversight/safety_emergencymgt/guidance.html.

2.0 APPLICABILITY

The following Inspection Criteria document is approved for use by the Office of Safety and Emergency Management Evaluations.

3.0 FEEDBACK

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

Review of Safety Basis Development for the Y-12 National Security Complex Uranium Processing Facility

OBJECTIVES AND SCOPE

The review will consider selected aspects of the development of safety basis for the Uranium Processing Facility (UPF) to assess the extent to which safety is integrated into the design of the UPF in accordance with DOE directives; in particular, DOE Order 420.1B, DOE-STD-1189, and DOE-STD-3009. The principal safety basis related documents that have been developed at the present stage of UPF design and construction include the safety design strategy and the preliminary safety design report (PSDR). These are supported by the UPF safety design criteria, hazard analyses, accident analyses, consequence studies, system design descriptions, and various other design supporting documents. The review will sample information from these documents in the following broad areas:

- Hazards and accident analyses; hazard controls, including safety structures, systems, and components (SSCs) and specific administrative controls (SACs).
- Translation of hazard controls into safety SSC design and functional requirements and performance criteria.
- Safety basis development process controls to assure protection of safety basis commitments, safety margins, safety SSC characteristics and assumptions; for example, process controls related to fire suppression, ventilation, confinement, criticality safety, and other selected aspects.

REVIEW CRITERIA AND LINES OF INQUIRY

1. Hazards and Accident Analyses

Criteria: Hazards analyses are consistent with the DOE safe harbor methodologies; and they provide systematic and complete results for the selected hazards/accidents, consistent with the current design stage, to facilitate developing controls and their design and functional requirements.

Sample Lines of Inquiry

- Does the hazards analysis include explicit description or reference to the material at risk (MAR), chemical or radiological, potentially affected in the selected hazard scenarios?
- Does the hazard scenario description appropriately describe the mechanisms that lead to the release of hazardous material?
- Does the hazards analysis describe the effect of postulated events on major facility SSCs that could release energy or radioactive/hazardous material?
- Are the selected hazards/accidents conservatively assigned likelihood and consequence?
- Does the hazards analysis comprehensively identify and address hazards associated with facility processes and work activities, as well as natural phenomena and man-made external hazards?
- Are potential beyond design basis accidents identified and the need for their evaluation considered?

- Is the postulated hazardous material release described with respect to each type of potential receptor: facility worker, collocated worker, and offsite individuals?
- Does the hazards analysis identify preventive and mitigative features/controls for the spectrum of events examined using a proper hierarchy?
- Are the results of hazards evaluation summarized to identify significant defense-in-depth and worker safety features, hazard controls, including safety-significant SSCs, SACs, and elements of safety management programs?
- Does the selection of hazard controls appropriately follow the principles associated with the hierarchy of controls?
- Does the hazard analysis identify dominant accident scenarios through ranking or an equivalent structure?
- Does the hazards analysis use appropriate parameters to establish and evaluate representative, bounding, and unique accidents?
- Is the accident analysis methodology adequate to conservatively assess dose or exposure at receptor locations representing onsite workers and the public?
- Are all pertinent assumptions (e.g., hazardous material inventory, airborne release fraction, and damage ratio) established as part of consequence determination so that technical basis exists for parameters of interest?
- Are the consequences of postulated accidents appropriately compared with the Evaluation Guideline and evaluated to classify safety SSCs and SACs?

2. Safety Structures, Systems, and Components (SSCs)

Criteria: The basis for the design, functional, and performance requirements of selected safety SSCs to prevent or mitigate the postulated accidents is adequately defined and described.

Sample Lines of Inquiry:

- Are the safety-class and safety-significant SSCs identified and described consistent with the logic presented in the hazard and accident analyses?
- Is the required functional classification of an SSC (e.g., safety-class or safety-significant) based on a proper assessment of the unmitigated accident consequence?
- Are the general requirements for safety SSCs (e.g., conservative design features, design against single-point failure, environmental qualification, safe failure modes) appropriately specified?
- Are codes and standards appropriately specified and tailored, as necessary, based on functional classification and safety function?

- Are safety functions and the design and functional requirements for safety SSCs defined with clarity, and are they consistent with the bases derived in the hazard and accident analyses? Specifically, for each safety SSC, does the safety basis document:
 - Identify safety functions to be performed or maintained by safety SSCs, consistent with the hazard and accident analyses, in the normal, abnormal, or accident conditions postulated?
 - Identify functional and design requirements (e.g., to address non-ambient environmental stresses, or to withstand seismic and other natural phenomena)?
 - Identify the performance criteria necessary to provide reasonable assurance that SSC functional requirements will be met (e.g., surveillance, maintenance, specific operational response, requisite operator training and qualifications)?
 - Identify and designate as safety SSC the support systems on which safety SSCs rely to perform or maintain safety functions?
 - Provide for requiring TSR coverage for safety SSCs/SACs?
- Are the boundaries and interface points of safety SSCs (relevant to their safety function), including the support systems, clearly defined?
- Do system evaluations provide evidence that the safety functions can be performed when called upon?

3. Specific Administrative Controls (SACs)

Criteria: The SACs are adequate to prevent or mitigate the hazards/accidents for which they were identified; and the safety document satisfactorily provides the rationale and basis for determining the safety SACs and their required functions.

Sample Lines of Inquiry:

- Is there adequate rationale for controlling the identified hazard through an SAC instead of an SSC?
- Are the SACs identified and described consistent with the logic presented in the hazard and accident analyses?
- Are safety functions for SACs defined with clarity and are they consistent with the bases derived in the hazard and accident analyses?
- Do the functional requirements and evaluations of SAC provisions provide evidence that the required safety functions can be performed when called upon?
- Are the controls of the SACs relevant to future TSR development clearly defined?

4. Derivation of Technical Safety Requirements (TSRs)

Criteria: The TSR controls derive from the significant preventive and mitigative features identified in the hazard and accident analyses, and the safety basis document provides sufficient bases for determining that these controls for the safety SSCs, SACs or safety management programs, as appropriate, will ensure that they perform their required functions.

Sample Lines of Inquiry:

- Are identified TSR controls adequate to preserve the functional and administrative requirements necessary to ensure protection of workers, the public, and the environment, as identified in the hazard and accident analyses?
- Is there sufficient information provided to identify what all the safety limits, limiting control settings, and limiting conditions for operation, will be needed to support the facility TSR documentation?
- Have passive SSCs been designated as design features when appropriate?
- Is there adequate documented explanation for any safety SSCs/SACs or other safety features that will not be provided TSR controls coverage?
- Have the facility operational modes (e.g., startup, operation, shutdown) relevant to derivation of TSRs been adequately defined; for example, such that the status of safety SSCs/SACs can be distinctively defined or that multiple structural segments of the facility considered?
- Have the assumptions requiring TSR coverage and the bases for deriving TSRs been identified and described in the safety basis document?
- Is the logic for the derivation consistent with the logic and assumptions presented in the analyses?
- Are the bases for deriving safety limits, limiting control settings, limiting conditions for operation, surveillance requirements, administrative controls, and specific administrative controls provided and technically accurate?
- Are the facility design aspects necessary to implement the identified surveillance requirements (e.g., instrumentation, equipment access) adequately identified?