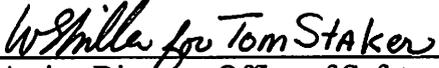
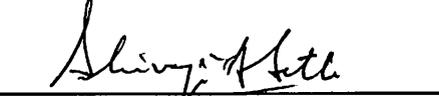


U.S. Department of Energy	Subject: Implementation Verification Review of Safety Basis Hazard Controls: Inspection Criteria, Activities and Lines of Inquiry	HS: HSS CRAD 45-39 Rev: 1 Eff. Date: July 20, 2011
Office of Safety and Emergency Management Evaluations	 Acting Director, Office of Safety and Emergency Management Evaluations  Date: 7/20/2011	
Criteria Review and Approach Document	 Criteria Lead, SHIVAJI S. SETH  Date: 7/20/11	

## 1.0 PURPOSE

Within the Office of Health, Safety and Security, 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 site 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 site operations. Integral to this is our commitment to enhance our program. We continue to make Criteria Review and Approach Documents (CRAD) available for use by DOE line and contractor assessment personnel in developing and implementing effective DOE oversight, contractor self-assessment, and corrective action processes; the current revision is available at <http://www.hss.energy.gov/IndepOversight/ESHE/docs.html>

The focus of this CRAD is on evaluating processes for managing, conducting, and overseeing Implementation Verification Reviews (IVRs) or similar processes, which independently confirm proper implementation of safety basis hazard controls that ensure adequate protection of workers, the public, and the environment. IVRs or similar processes are intended to ensure that the safety basis requirements of 10 CFR 830.201 ("perform work in accordance with ...the hazard controls"); partial requirements 10 CFR 830.204 ("define the process for maintaining hazard controls current at all times and controlling their use"); 10 CFR 205 ("obtain DOE approval of technical safety

requirements and any change to technical safety requirements”); and 10 CFR 830 Subpart A (Quality Assurance Requirements) are met for work conducted at Hazard Category 1, 2, and 3 nuclear facilities. For the Office of Environmental Management and the National Nuclear Security Administration (NNSA), a March 19, 2009, Memorandum, *Best Practices Guide for the Conduct of Independent Validation Review of Safety Basis Implementation*, provides the expectation that each site will compare the practices outlined in the best practices guide to current site processes and revise these processes if appropriate. The best practices guide for IVRs is currently provided in DOE G 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements*, Appendix D, *Performance of Implementation Verification Reviews (IVRs) of Safety Basis Controls*. The CRAD is designed to evaluate the site’s IVR or similar processes and methods and their implementation.

## **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 Director of the Office of Safety and Emergency Management Evaluations on (301) 903-5392.

## **Implementation Verification Review Inspection Criteria, Inspection Activities, and Lines of Inquiry**

**Background:** The Implementation Verification Review (IVR) inspection will evaluate the effectiveness of processes for independently verifying and re-verifying implementation of the safety basis hazard controls at the site's nuclear facilities and associated site office oversight methodology. The inspection will consist of an evaluation of the procedures and processes that establish the IVR or similar process, as well as an evaluation of IVR or similar processes implementation and oversight. Review of implementation at a site may include any or all of the following activities:

- Shadowing or observation of contractor and/or site office personnel during conduct of an IVR or similar type activity;
- Review of documentation of completed IVR or similar activities; and
- Independent review of safety basis hazard control implementation.

The scope of the inspection activities at each site will be designed to meet the overall objectives of the inspection plan for an IVR or similar type activities, and the inspection criteria, activities, and lines of inquiry are, therefore, intended to be tailored to the site-specific review objectives.

The following provides an overview of the typical objectives, criteria, activities, and lines of inquiry that will be used to conduct the review. Part I provides the objectives, criteria, and lines of inquiry to evaluate the contractor and site office IVR or similar processes for verification and re-verification of hazard controls. Part II contains the objectives, criteria, and lines of inquiry to evaluate the contractor and site office IVR or similar activities, or to conduct an independent evaluation of the implementation of safety basis hazard controls.

## **Part I: Review of Processes**

**Objective 1: Processes have been established that provide assurance that safety basis hazard controls are maintained and hazard control changes are correctly implemented.**

### **Inspection Criteria:**

- Contractor processes and/or procedures for implementing changes to the facility safety basis hazard controls include an IVR or similar process graded to the evaluated significance of the changes.
- Contractor processes and/or procedures include re-verification of safety basis hazard controls at periodic intervals.
- Contractor processes for startup of a new or modified facility that include new or revised safety basis documents incorporate IVR or similar activities into contractor readiness activities, which are considered in the site office oversight processes for confirming readiness.
- Contractor processes and procedures include an appropriate level of planning and formality in the preparation for and conduct of IVRs or similar activities (consistent with normal site practices).
- DOE/NNSA line oversight processes provide information to confirm the efficacy of contractor processes.

### **Inspection Activities:**

- Review the contractor processes and/or procedures for managing IVRs or similar activities.
- Review the contractor and site office processes and/or procedures for managing changes to the facility safety bases hazard controls.
- Review contractor procedures for implementation of the contractor assurance system and system engineer program.
- Review the site office procedures for line management, facility, and safety system oversight.
- Review the contractor and site office procedures for startup and restart of facilities.
- Review past and current schedules of startup and restart of facilities, revisions to safety basis documents (with respect to changes in hazard controls), contractor assessments, and site office assessments.
- Review those contractor and site office processes and/or procedures for conducting assessments that govern IVR or similar review activities.

### **Lines of Inquiry:**

- Is the IVR or similar process established and used to support the verification and re-verification that safety basis hazard controls are or remain in place?

- Do contractor procedures or processes require the completion of an IVR or similar activities for achieving readiness when changes are made to the facility's safety basis hazard controls?
- When changes are made to safety basis documents affecting hazard controls, do site office procedures require participation in the contractor IVR (or similar review) or otherwise provide oversight of the process?
- Do contractor procedures provide for the use of a documented, appropriately graded approach to the IVR or a similar process (e.g., review plan and CRAD used for major changes to safety basis hazard controls versus those used for minor changes)?
- Do the contractor assurance system and other internal procedures provide for periodic re-verification of implementation of the safety basis hazard controls?
- Do site office oversight processes and/or procedures provide for periodic re-verification of implementation of the safety basis hazard controls?
- Is the IVR or similar process or procedure used to support the declaration of contractor readiness for startup or restart of new or modified facilities that include new or revised safety basis hazard controls?
- Do site office procedures for startup and restart include review and evaluation of the contractor's IVR or similar process, performance of an independent IVR or similar process by site office staff, or a combination of oversight and independent assessment?
- Do past and current startup and restart and assessment schedules demonstrate that the site's safety basis hazard controls are periodically re-verified through a combination of contractor and/or site office assessments?
- Are contractor and site office IVRs or similar review activities conducted in accordance with general site-specific assessment procedures or with a procedure developed specifically for this process?
- Does the contractor IVR or similar procedure or process require development of a formal plan when appropriate; for example, for a major safety basis change?
- Are contractor instructions provided for the selection of the team leader and team members and for documentation of their independence, training and qualification?
- Are contractor instructions provided for the documentation, review and approval of the completed IVR or similar activities?
- Does the site office readiness procedure include a review of the contractor's completed IVR or similar activities as part of its startup oversight of a facility with a new or revised safety basis?

**Objective 2: The contractor and site office have developed and implemented appropriate methods for performing IVRs or similar reviews.**

**Inspection Criteria:**

- Contractor and site office verification methods adequately address the implementation of hazard controls through safety structures, systems and components (SSCs), design features, specific administrative controls, procedures, and training and qualification of facility personnel.

- Contractor and site office verification methods adequately address implementation of any conditions of approval in the safety evaluation report or approval letter for the safety basis.
- Contractor and site office Review criteria and approaches are appropriately tailored to the hazard controls being verified and sufficient for the scope of the review.
- Contractor results of IVR or similar activities and site office oversight review activities are sufficiently well documented (per procedures) to support the conclusions of the review.

**Inspection Activities:**

- Review contractor IVR (or similar type activities) and site office oversight IVR (or similar type) review plans.
- Review the results of the contractor's completed IVR (or similar type) activities.
- Review the contractor and site office reports for completed activities related to implementation of new or modified safety basis hazard controls (along with any related supporting documentation).
- Review the results of site office assessments of contractor IVR (or similar type) activities and line oversight IVR (or similar type) activities (facility representative, safety system oversight, startup reports, or site office assessments).

**Lines of Inquiry:**

- Do IVR (or similar type) activities include safety SSCs/design features, procedures, and training as appropriate to the scope and depth of the safety basis hazard controls (or revision to the safety basis hazard controls)?
- Do IVR (or similar type) activities specifically include verification that conditions of approval, when specified, are satisfactorily implemented?
- If a graded approach was used to complete the IVR (or similar type) activity, was the approach justified and of sufficient scope and depth?
- Were the team leaders and support staff sufficiently independent and technically qualified to provide assurance of their ability to effectively evaluate the hazard controls?
- When used, did the IVR (or similar type) plan adequately describe the expectations for the review; for example, scope, depth, methods of evaluation, schedule and documentation?
- Did the contractor or site office adequately execute the IVR (or similar type) plan as written and approved?
- Are the results of IVR (or similar type) activities documented sufficiently to support the conclusions of the reviewers (both contractor and site office)?

Note: Use the Part II IVR objectives and criteria to evaluate the conduct and results of the contractor and site office IVR (or similar type) verification and re-verification activities as they are being performed or to conduct an independent evaluation of the implementation of safety basis hazards control.

## Part II: Review of Implementation

**Objective 3: Contractor IVRs or similar reviews and site office oversight activities are sufficient to verify that safety basis hazard controls have been effectively incorporated into implementing administrative and operating procedures and work control documents.**

### Inspection Criteria:

- Procedures required to implement the TSRs and other hazard controls are adequately written, reviewed, approved, controlled and maintained.
- Contractor administrative procedures appropriately control the scheduling and performance of surveillance tests, IST and ISI activities, and surveillances required by TSRs.
- Contractor processes and procedures adequately ensure that surveillance test and inspection results are appropriately evaluated and corrective actions identified, as necessary, and completed in a timely manner.
- Limiting Conditions for Operation (LCOs) and supporting Surveillance Requirements (SRs) and acceptance criteria are consistent with the safety basis.
- Operating procedures for safety basis hazard controls are written to adequately maintain facility operations within the approved safety basis.

### Inspection Activities:

- Review the facility's administrative procedures governing scheduling and performance of surveillance tests and inspections.
- Review the facility's surveillance, test, and inspection procedures implementing safety basis hazard controls.
- Observe the scheduled surveillances, tests and inspections and/or conduct tabletop interviews of personnel who perform these activities.
- Review the facility's operating procedures; including normal, abnormal and emergency procedures.
- Review the contractor's procedures and processes for scheduling and conducting surveillances, tests, and inspections.
- Review the schedule of completed (past two years) and planned (current year) surveillances, tests, and inspections.
- If feasible, observe the implementation of administrative and operating procedures or conduct interviews of personnel using the facility's procedures.

### Lines of Inquiry:

- Do the reviews conducted by the contractor and/or site office personnel address the procedures sufficiently to verify procedures adequately implement TSRs and maintain the safety basis?
- Do facility procedures ensure the facility is operated within the operating basis (for example, entry into/exit from LCOs, authorization of surveillance and inspections, evaluation of surveillance tests for safety system operability)? How is the configuration of these procedures maintained?

- What controls prevent exceeding the time allowed in the actions associated with LCOs? How are out-of-tolerance conditions addressed?
- Do the observations made during practical exercises, walk-down, and/or tabletop interviews indicate that procedures can be executed as written by trained facility personnel?
- Do procedures manage surveillance and IST/ISI activities sufficiently to ensure inspections and tests are scheduled, performed in accordance with safety basis and TSR requirements, and demonstrate continued operability of the SSC?
- Do administrative procedures and processes ensure that surveillance, test, and inspection results are appropriately evaluated and corrective actions identified, as necessary, and completed in a timely manner?
- Are surveillances, tests, and inspections required by TSRs or other DSA commitments and assumptions being appropriately managed and controlled by the contractor's administrative programs for scheduling and conducting the activities?
- Are surveillance tests and inspections complete and up to date?
- Are procedures in place to implement the specific administrative controls (SACs) identified in the TSR Administrative Controls?
- Do procedures provide sufficient instructions to ensure that administrative controls in the safety basis are effectively implemented (for example, storage locations and limitations, controls over material-at-risk, combustible loading, etc.)?
- Do administrative procedures address the use and control of measurement and test equipment (e.g., instruments) as necessary to ensure instruments used for surveillance and inspection testing procedure are properly calibrated and operable?
- Are procedures in place to implement the specific aspects of the facility or site safety management programs that are identified in the safety basis hazard controls and TSRs?

**Objective 4: Contractor IVR or similar processes and site office oversight activities are sufficient to verify that safety SSCs and design features, as installed, inspected, and maintained as described in the safety basis documentation.**

**Inspection Criteria:**

- Configuration control and installation processes ensure that safety SSCs/design features match the design documents, including design calculations, design descriptions, and design drawings.
- Physical changes associated with the safety basis change have been made and tested under a rigorous installation and startup test process to verify operability in accordance with the design basis.
- Safety basis (TSR) defined surveillance tests and inspections necessary to ensure continued operability of the safety SSCs and design features are adequately performed and documented.
- Surveillance requirement acceptance criteria are consistent with the safety basis and are adequately documented in approved instructions.
- Where appropriate, safety basis and design documents specify in-service tests (IST) and in-service inspections (ISI) for the design features.

- Surveillance, test, and inspection procedures are executable and adequate to demonstrate the continued operability of safety SSCs/design features.
- Contactor procedures and processes ensure surveillance tests and inspections are properly scheduled and conducted using approved procedures.
- Contractor procedures and processes ensure that surveillance test and inspection results are appropriately evaluated and corrective actions identified, as necessary, and completed in a timely manner.
- Site Office oversight activities adequately verify that hazard controls configuration, initial testing and installation, and surveillance tests are effectively implemented, performed and the results are adequately documented and evaluated.

**Inspection Activities:**

- Review design and installation documentation, when appropriate, of selected safety SSCs/design features and modifications.
- Conduct a walk-down of the SSC to compare the installed system modifications to its design documents and drawings.
- Review the facility's surveillance, test, and inspection procedures implementing safety basis hazard controls.
- Observe the scheduled surveillances, tests and inspections and/or conduct tabletop interviews of personnel who perform these activities.
- Review the procedures or instructions for conducting surveillance tests and inspections.
- Observe performance or walk down a sample of the surveillance test procedures with facility personnel.
- Review the records of (selected) completed surveillance tests and inspections, and of any related follow-up activities.
- Review applicable oversight surveillance and assessment reports prepared by the site office staff.
- Review the facility's surveillance, test, and inspection procedures for implementing TSRs.

**Lines of Inquiry:**

- Does the (observed, if possible,) review conducted by the contractor or site office personnel sufficiently address the safety basis hazard controls and changes thereto, as described in the safety basis and design change documents, to verify safety SSCs/design features are maintained in accordance with the safety basis?
- Does the walk-down indicate the safety SSC/design feature is installed in accordance with the safety basis and design documents?
- For new installations, does documented evidence support the conclusion that the safety SSC/design feature was correctly installed, inspected, and tested (if appropriate) to verify operability prior to startup?
- Do surveillance tests correctly test and verify assumptions and functional requirements identified in the safety basis?
- Are the acceptance criteria for surveillances, tests, and inspections documented appropriately in procedures or work instructions?

- Are the surveillance test and inspection procedures and instructions of sufficient detail (including limits, precautions, prerequisite conditions, calibrated measuring and test equipment, acceptance criteria, qualified personnel, etc.) to verify the continued operability of the safety SSC/design feature, as described in the TSRs?
- Do the results of the surveillance tests and inspections provide sufficiently documented evidence of the continued operability of the safety SSC/design feature?
- Are discrepancies, when identified, clearly described and documented, and are facility managers promptly notified of the discrepancies?
- Are identified discrepancies with the implementation of safety basis hazard controls formally evaluated and corrective actions initiated and completed when appropriate?

**Objective 5: Contractor IVR or similar processes and site office oversight activities are sufficient to verify that specific administrative controls (SACs) are implemented such that they adequately meet the functional requirements and expectations of the safety basis.**

#### **Inspection Criteria:**

- SAC implementing procedures have been prepared, reviewed, and approved to implement the functional requirements identified in the safety basis.
- SAC implementing procedures can be executed as written within the time frames and under the expected conditions in the safety basis.
- SAC implementing procedures demonstrate that the SAC is capable of accomplishing its safety functions and continues to meet applicable SAC requirements and performance criteria.
- SAC procedures are prepared, reviewed, approved, and controlled using an approved document control process.
- Facility personnel are trained and knowledgeable in the SAC implementing procedures.
- New SACs have been validated and verified in accordance with the guidance in DOE-STD-1186-2004.
- Site office oversight activities adequately verify SACs are correctly implemented as described in the safety analysis.

#### **Inspection Activities:**

- Review the scope, depth and results of the assessments of SACs by the contractor and/or site office staff.
- Review a sample of selected SACs from the facility's safety basis.
- Observe performance, conduct tabletop walkthroughs, and/or conduct site walk-downs of the SAC procedures to verify procedures can be executed to meet TSRs.
- Review a sample of SAC implementing procedures.
- Review the administrative procedures governing the preparation, review, approval and control of SAC implementing procedures.
- Review implementing mechanisms and tools, such as postings, charts, instruments, electronic databases, to ensure that required SAC support equipment and supplies are available.

- Review documentation of the validation and verification of SACs in a new or revised safety basis.

**Lines of Inquiry:**

- Does the (observed, if possible,) review conducted by the contractor or site office personnel address the SAC sufficiently to verify its ability to meet the intended safety function, as described in the safety basis?
- Does the procedure performance, tabletop walkthrough or walk-down indicate the SAC can be executed using the procedure(s) as written?
- Does the procedure performance, tabletop walkthrough or walk-down provide evidence that required supporting equipment is available, as necessary, to execute the SAC procedure?
- Are limits, precautions, system and test prerequisite conditions, data required, acceptance criteria and independent verification elements included in surveillance procedures for SACs?
- Are appropriate data recording provisions included or referenced and used to record surveillance results?
- Does the procedure performance, tabletop walkthrough or walk-down indicate that facility operators are familiar with and capable of procedure implementation?
- Do the SAC implementing procedure task(s) adequately implement the safety basis functional requirements (giving consideration to the level of difficulty, operator training, available indication, equipment design, facility conditions, and required timeliness)?
- Do SAC implementing procedures make appropriate use of human factors principles; such as independent verification, positive feedback, lockouts, etc.?
- Are the training and qualification and re-training requirements for personnel executing the SAC procedure specified?
- Do administrative procedures ensure that the document preparation and revision processes adequately incorporate controls such as verification and validation, document control, and unreviewed safety question review?
- Does the document revision process incorporate reviews to determine the need for training and/or required reading for document changes?
- If measuring and test equipment and supplies are necessary to implement the SAC procedures, are periodic tests and inspections conducted to ensure the equipment and supplies are maintained, available, operable, and calibrated?
- Does component labeling or posting support the accurate, timely execution of the SAC procedures?
- Do the SAC procedures include provisions for listing discrepancies?
- Do the SAC procedures require timely notification to facility management about any discrepancy that could impact performance of the SAC and/or facility operability?
- Does the validation and verification documentation demonstrate that the new or revised SAC procedure will meet the functional requirements identified in the new or revised safety basis?

**Objective 6: Contractor personnel working at the facility are adequately trained and qualified to implement and maintain the safety basis hazard controls, and the site office**

**personnel are sufficiently trained and knowledgeable to provide oversight of safety basis hazard control implementation.**

**Inspection Criteria:**

- A formal training and qualification program is established, documented and implemented for contractor personnel conducting the range of safety basis hazard controls implementation tasks at the nuclear facility.
- The contractor training and qualification program is based on an appropriate level of analysis for each position responsible for a safety basis hazard controls related activity or task.
- Contractor training and practical exercises are appropriately scheduled and conducted with consideration given to the difficulty, importance and frequency of performance of safety basis hazard controls related tasks.
- Training of contractor personnel has been performed and documented to the latest revision of the facility safety basis and its implementing work instructions.
- Site office personnel providing oversight of the implementation of safety basis hazard controls have appropriate training and qualification, and are sufficiently knowledgeable of the current safety basis of the facility and the hazard controls to be implemented.

**Inspection Activity:**

- Review the description and governing documents for the training and qualification program for the contractor and/or site office.
- Review the materials used to design and develop the training and qualification program for personnel performing safety basis implementation activities, especially TSR surveillance, tests, and inspection tasks for the contractor.
- Review the training and practical exercise schedules for the previous two years and the current year for the contractor.
- Attend a training lesson and/or (operational) practical exercise for a safety basis implementation; for example a SAC implementing procedure for the contractor.
- Review a sample of training and qualification records for personnel working at the facility.
- Review a sample of completed practical exercise critiques for the contractor.
- Review site office documents demonstrating knowledge and capability of the site office personnel to adequately review and verify safety basis hazards control implementation; for example, personnel training and qualification records, safety basis review and evaluation reports, oversight surveillance activity records and assessment reports.

**Lines of Inquiry:**

- Does the review conducted by the contractor or site office personnel confirm that the scope and depth of the implemented training and qualification program is adequate to support the safety basis hazard controls implementation tasks?
- Is the training and qualification program conducted in accordance with the site's training program plan?
- Does the training and qualification program include all personnel that perform safety-related tasks at the facility, including those not specifically assigned to the facility?

- Is the training and qualification program based on an appropriate level of analysis of the safety-related tasks at the facility?
- Has the analysis been updated to reflect changes in the facility's safety basis; for example, revisions to the TSRs to add SACs?
- Are training lessons and practical exercises scheduled in accordance with the requirements of the training plan and training analysis?
- Does the schedule reflect the difficulty, importance and frequency of the tasks so that training and practical exercises support maintenance of proficiency by the responsible persons?
- Are training lessons and practical exercises conducted as scheduled?
- Do training lessons and practical exercises contain sufficient learning objectives to ensure that personnel will maintain the required knowledge and skills?
- Is training conducted as described in the lesson plan or practical exercise scenario?
- Do training and qualification records accurately reflect the training status of personnel at the facility?
- Are practical exercise critiques adequately documented?
- Do practical exercise critiques contain mechanisms for identifying follow-up items or actions and means to enter these into a corrective action process?
- Does performance during tabletop interviews and facility walkthroughs demonstrate that operators have adequate knowledge of the facility's latest safety basis revision?
- Have operators and facility personnel been trained and are they knowledgeable of the purpose and function of any new safety basis hazard controls and their relation to the safety basis?
- Do table-top exercises of credible scenarios involving use of the safety basis hazard controls indicate adequate knowledge of proper response to the scenarios?
- Do the site office safety basis review and oversight activities (e.g., safety evaluation report preparation, facility safety system surveillances) and training records indicate that personnel involved in safety basis control implementation verification are sufficiently knowledgeable of the latest revision of the safety basis and the hazard controls being implemented?