

Independent Oversight Review of the Y-12 Implementation Verification Review Processes



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Table of Contents

1.0 Purpose.....	1
2.0 Background.....	1
3.0 Scope.....	1
4.0 Results	2
5.0 Conclusions	10
6.0 Noteworthy Practices and Opportunities for Improvement	11
7.0 Follow-up Items.....	12
Appendix A: Supplemental Information.....	A-1
Appendix B: Documents Reviewed, Interviews, and Observations	B-1

Acronyms

AMOM	Assistant Manager for Operations Management
CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
CRAD	Criteria, Review and Approach Document
DOE	U.S. Department of Energy
FR	Facility Representative
FRAM	Functions, Responsibilities and Authorities Manual
FY	Fiscal Year
HSS	Office of Health, Safety and Security
IVR	Implementation Verification Review
LCO	Limiting Condition of Operation
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NP	Noteworthy Practice
OFI	Opportunity for Improvement
SAC	Specific Administrative Control
SSC	Structure, System, or Component
SSO	Safety System Oversight
TSR	Technical Safety Requirement
VSS	Vital Safety System
Y-12	Y-12 National Security Complex
YSO	Y-12 Site Office

Independent Oversight Review of the Y-12 Implementation Verification Review Processes

1.0 PURPOSE

This report documents the independent review of implementation verification review (IVR) processes at the Y-12 National Security Complex (Y-12) conducted by the Office of Enforcement and Oversight (Independent Oversight, Office of Safety and Emergency Management Evaluations), within the Office of Health, Safety and Security (HSS). The review was performed from March 12 - 30, 2012, and was carried out within the broader context of an ongoing program of assessments of the execution of IVRs at U.S. Department of Energy (DOE) sites with hazard category 1, 2, and 3 nuclear facilities. The overall purpose of these Independent Oversight reviews is to evaluate the processes and methods used for verifying and re-verifying the implementation of new or substantially revised safety basis hazard controls. The objective of this review was to evaluate the extent to which the site management and operating contractor, B&W Y-12, a partnership of Babcock & Wilcox and Bechtel Corporation, and the Y-12 Site Office (YSO) have developed and employed appropriate implementation verification methods.

2.0 BACKGROUND

Subpart B of Title 10 Code of Federal Regulations (CFR) 830.201, *Performance of Work*, states, “A contractor must perform work in accordance with the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility and, in particular, with the hazard controls that ensure adequate protection of workers, the public, and the environment.” In addition, 10 CFR 830, Subpart A, *Quality Assurance Requirements*, establishes requirements for conducting activities that may affect safety at these facilities, including performing work in accordance with hazard controls, using approved instructions or procedures, conducting tests and inspections of items and processes, and independently assessing the adequacy of work performance.

In February 2008, the Defense Nuclear Facilities Safety Board requested that DOE evaluate the need to conduct “independent validations on a recurring basis” to ensure that facility equipment, procedures, and personnel training related to safety basis controls have not degraded over time. In response, the Department conducted an evaluation that led to the conclusion that the existing requirements for implementation of safety controls and DOE policy for oversight of the implementation of nuclear safety requirements were appropriate. The evaluation also concluded that Departmental directives contained no explicit requirement to validate safety basis hazard controls, so the Department committed to develop guidance on the validation of safety controls and to add that guidance to its directives.

A DOE working group developed a “best practices guide” for the independent validation of safety basis controls. In November 2010, the guidance for performing IVRs was incorporated in DOE Guide 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements*, Appendix D, *Performance of Implementation Verification Reviews (IVRs) of Safety Basis Controls*.

3.0 SCOPE

At Y-12, YSO provides onsite management, day-to-day oversight, and surveillance of B&W Y-12, as well as operations and support for accomplishing DOE and National Nuclear Security Administration (NNSA) strategic and long-term general goals. For this review, Independent Oversight assessed the

establishment and execution of both B&W Y-12 and YSO processes and activities for verifying the implementation of changes to safety basis hazard controls. This scope was consistent with completion of Objectives 1 and 2 in the HSS Criteria Review and Approach Document (CRAD) HSS CRAD 45-39, Rev. 1, *Implementation Verification Review of Safety Basis Hazard Controls: Inspection Criteria, Activities, and Lines of Inquiry*. The objectives were to determine whether:

- Processes have been established that provide assurance that safety basis hazard controls are maintained and hazard control changes are correctly implemented.
- B&W Y-12 and YSO have developed and implemented appropriate methods for performing IVRs or similar reviews.
- The performance of the contractor IVR assessment adequately evaluates the implementation of safety basis hazard controls.

The review was accomplished by assessing the documentation that establishes and governs the B&W Y-12 and YSO IVR processes (for example, work instructions, procedures, forms, checklists, IVR plans and reports, and assessment reports), reviewing completed documentation, and interviewing key personnel responsible for developing and executing the associated practices. Independent Oversight also performed a shadow review of a contractor IVR.

4.0 RESULTS

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

B&W Y-12

Independent Oversight reviewed the procedures and processes that B&W Y-12 has established to implement and maintain the safety basis hazard controls at Y-12. The review was conducted to determine whether these processes and/or procedures include an independent IVR or similar process for examining the implementation of new or revised safety basis documents. The review also assessed these processes and procedures to determine whether they contain an appropriate level of planning and formality for re-verification of safety basis hazard controls and for verification of the implementation of safety basis requirements prior to the startup of new or modified facilities with new or revised safety basis documents.

Through Y14-190, *Safety Basis Implementation/Deactivation Process*, B&W Y-12 has defined the roles, responsibilities, and processes for implementing new or revised safety basis documents, including independent IVRs performed by the Readiness Assurance Group within the Production Facilities Department. The Y14-190 procedure includes a requirement to perform IVRs prior to declaring readiness for a startup or restart readiness review. The process includes the development and implementation of a graded safety basis implementation plan and IVR plan of action by the responsible facility operations manager. The procedure contains an adequate level of instruction, along with templates and checklists, to guide the development and execution of the plans. It also contains detailed instructions for planning, performing, and reporting the IVR, including templates for the IVR implementation plan and the subsequent report. The implementation plan template addresses the objectives, criteria, and review approach necessary to implement the plan of action. The IVRs generally address four objectives: verify safety basis requirements are incorporated in facility documents, verify facility personnel are knowledgeable of safety basis requirements, verify safety basis requirements have been implemented, and verify key assumptions in the safety basis are adequately protected by the facility documents. A change to the procedure last year moved the review of key assumptions to earlier in the safety basis submittal,

review, and approval process. Overall, the procedure, process, and supporting documents provide a strong foundation for implementing safety basis hazard controls at the facilities. Notably, the procedure requires completion of a baseline IVR and periodic, every three to five years, re-verification (re-baseline) of safety basis hazard controls. (See Section 6, NP-1)

B&W Y-12 also has a manual, Y15-190, *Readiness Manual*, that provides detailed instructions and supporting documentation for implementing the requirements of the DOE startup and restart order, DOE Order 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*. The manual addresses the actions necessary to achieve readiness and to verify readiness, and contains instructions for developing readiness reviews using a graded approach, including operational readiness reviews and three levels of readiness assessment. The two lowest levels of readiness assessments are conducted using a checklist approach, while the third level of readiness assessment and the operational readiness review require formal plans of action and implementation plans. The readiness process incorporates the IVR process, allowing the scope of the readiness review to be modified based on whether or not an IVR has been completed, and contains sufficient guidance to ensure that implementation of safety basis hazard controls is verified prior to startup or restart.

In addition to processes for formal IVRs and readiness assessments and reviews, B&W Y-12 has established and implemented other processes that provide ongoing assurance that safety basis controls are implemented as part of their contractor assurance system. The contractor assurance system description and implementing procedures provide for planning and performance of management assessments by individual production and support organizations and for independent assessments performed by the institutional Performance Assurance organization. B&W Y-12 management is required to identify, plan, and conduct formal self-assessments of performance in executing their processes and activities to ensure company and DOE management expectations and requirements are met and to identify improvement opportunities. The independent assessment program includes specific topical assessments, triennial cross-functional team facility evaluations, and independent surveillances. Facility evaluations typically include assessment of processes and activities with safety basis elements such as facility (nuclear) safety, vital safety systems (VSSs), configuration management, fire protection, operations, and criticality safety. Annual schedules for management and independent assessments are developed using a structured risk-based review process that identifies mandatory assessments and considers past performance, areas of risk, and vulnerabilities. Formal plans, including CRADs or checklists, are required to be developed to provide structure and focus in conducting the assessments.

In addition to the formal, scheduled management assessments, Engineering and Production Facilities Departments are to conduct supplementary evaluation activities including surveillances, management walk-arounds, inspections, and other less formal oversight techniques. A formal program description and implementing procedures define the designation of VSSs and responsible system engineers and their responsibilities for system walkdowns and assessments, as required by DOE directives. Additional less formal oversight activities related to safety basis elements include enhanced floor surveillance and the senior supervisory watch programs.

Process and performance problems identified during these assessment activities are managed in accordance with a formal issues management program that provides a risk prioritized means to correct deficiencies and implement needed improvements, and provides data for trend analysis of performance.

Y-12 Site Office

Independent Oversight reviewed YSO processes to determine whether the processes adequately assess the contractor's implementation of new and revised safety basis documents, and provide sufficient

information to confirm the ongoing effectiveness of contractor processes for the implementation of safety basis requirements.

YSO-5.4, *Startup and Restart of Nuclear Facilities at Y-12*, establishes the YSO processes for oversight of both IVRs and readiness reviews. Roles and responsibilities are clearly delineated, including the responsibility of the Assistant Manager for Operations Management (AMOM) to determine whether an independent YSO IVR will be conducted following approval of a safety basis change and the responsibilities of the IVR team leader. The procedure provides general information for the conduct of YSO IVRs, including reference to a generic IVR review plan, and a note indicates that selected portions of the procedure may be invoked for an IVR. The YSO manual for startup and restart, YSO-M-5.4, *Manual for Startup and Restart of Operations Activities and Facilities at Y-12*, provides detailed instructions for the planning and conduct of readiness reviews. The process includes routine oversight assessments during the contractor preparations for the review, along with a readiness verification review to accompany the contractor's "readiness to proceed" memorandum. The manual defines an IVR as a review that is similar to a readiness assessment (with the four objectives discussed above), though it does not include specific directions for performing an IVR. The manual provides flow diagrams of the process with detailed steps provided for each block in the diagram and includes links to samples for the plan of action and implementation plan. Overall, the procedure and manual provide a good foundation for startup and restart activities and establish adequate expectations and guidance for the conduct of IVRs, and guidance for determination of who should perform the reviews, but YSO-M -5.4 does not provide complete specific criteria for making or documenting the rationale for the decision to perform or not perform a DOE evaluation of the contractor's IVR and the type (shadow or independent) of review if one is conducted. (See Section 6, OFI-1)

In addition to oversight of the startup and IVR processes, YSO has established a requirement for the contractor to conduct IVRs. The requirement is established through contractor requirements document YSO-CRD-03-01, *Startup and Restart of Operations, Activities, and Facilities at Y-12, Including Safety Basis Document Implementation*. The document requires the contractor to conduct independent (of the facility) IVRs for safety basis changes using an IVR implementation plan. It specifies the use of the safety basis implementation plan and plan of action and also defines the four objectives that are to be used by B&W Y-12 in conducting the IVR. (See Section 6, NP-3)

NNSA provides direction for assessments of safety class and safety significant structures, systems, and components (SSCs) through SD 226.1A, *NNSA Line Oversight and Contractor Assurance Supplemental Directive*, which includes direction for site offices to perform assessments of nuclear safety. Assessments are to be sufficient to validate the continuing effectiveness of Technical Safety Requirements (TSRs) on an annual basis. Each safety class SSC is to be assessed every three years; safety significant SSCs every five years; and safety management programs every five years. Appendix D of DOE Guide 423.1A provides guidance for performing initial IVRs and IVRs following safety basis changes. The guide recommends re-verification of safety controls that are susceptible to the effects of the degradation of human knowledge (e.g., procedural controls) every three years and controls dependent on hardware functionality every five years.

YSO-M 411.1-1C, *Functions, Responsibilities and Authorities Manual (FRAM)*, assigns, in part, responsibility for day-to-day oversight of nuclear and criticality safety, chemical safety, configuration management, and fire protection to the Assistant Manager for Engineering, Safety and Environment. These responsibilities specifically include the duties of safety system oversight (SSO) personnel in oversight of VSSs. The FRAM assigns responsibility for day-to-day oversight of operations, with emphasis on nuclear facility operations and specifically startup and restart of facilities and operations, to the AMOM. Operations Management oversight is primarily performed by trained and qualified Facility Representatives (FRs) whose responsibilities are defined in a site office procedure to include the

evaluation of nuclear safety through verification of required safety basis controls and participation in readiness reviews and authorization basis document reviews.

The requirements for planning, scheduling, performing, and reporting YSO oversight and self-assessment activities and management of resulting issues are delineated in a suite of site office procedures, including specific requirements for SSO activities and for oversight of the Y-12 engineering program. The YSO assessment program is administered by the Performance Assurance Manager. The assessment program includes an “enhanced oversight model” that incorporates the results of a structured, periodic analysis of contractor assurance system data and trends to tailor the annual oversight plan based on risk and contractor performance. A detailed master assessment plan is developed based on this review process that establishes the planned number of oversight hours for each of 27 functional areas and associated sub-areas. A master assessment schedule is developed with organizational input and known information about external assessments, based on the master assessment plan, to reflect the specific assessment type, responsibility, and performance timeframe. Various types of assessment are included in the oversight program, with defined levels of planning, effort, and reporting formality. These assessment types range from informal walkthroughs to formal team assessments with assessment plans and CRADs. The results of assessment activities, including reports and associated issues, are documented by team leaders or performers into an electronic information management system called Pegasus which also serves as the tool for management of identified deficiencies and weaknesses to resolution.

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

Independent Oversight reviewed the B&W Y-12 and YSO IVR oversight methods to determine whether they adequately address the implementation of safety basis hazard controls. The review also examined whether the review criteria and approaches are appropriately tailored to the hazard controls being verified and sufficient for the scope of the review, and whether the review activities are sufficiently well documented (per procedures) to support the conclusions of the review.

B&W Y-12

Independent Oversight reviewed a sample of completed IVR plans and reports and observed the performance of an IVR at Building 9204-2. B&W Y-12 began conducting IVRs in 2004 under a standing order and completed baseline IVRs for each of its nuclear facilities in 2004 and 2005. IVRs are generally conducted by small teams of qualified individuals (often a single, experienced individual) from the Readiness Assurance Group. The IVR implementation plans followed the template provided in the governing procedure; addressed the scope, breadth, and depth of the review; and included lines of inquiry for each of the objectives and criterion. The criteria and lines of inquiry were appropriately documented and in some cases (for example, an IVR at Building 9212 conducted in 2011), were specifically tailored to the changes in the safety basis documents. The criteria include verification that any conditions of approval are implemented. The completed IVR reports also followed the template provided in the procedure, including an executive summary, list of findings, and discussion of results for each objective. The discussion of the review activities is sufficient to provide an understanding of the review approaches and to validate the conclusions and findings of the reviewers. The reports also provide evidence that the reviews are detailed and critical, and consistently identify items requiring correction by facility personnel.

The site readiness review process also addresses the implementation of safety basis hazard controls and incorporates IVRs into the process. Independent Oversight reviewed a small sample of implementation plans and reports for completed readiness assessments and found that both the plans and reports were complete and well documented using established formats. The implementation plans are appropriately graded, and the scope and breadth of the reviews were commensurate with the magnitude of the startups

or restarts. The implementation plans used review of the IVR results to address (at least in part) the implementation of safety basis controls. The readiness assessment reports are well written, providing evidence of the review methods and supporting the conclusions of the reviewers.

In the safety basis implementation process procedure, B&W Y-12 has established a noteworthy expectation to re-baseline the safety basis hazard controls every three to five years. Review of completed IVRs indicated that a number of IVRs have been completed to support annual updates and revisions of the safety basis documents and introduction of new processes. Also, B&W Y-12 completed a re-baseline of the safety basis at Building 9204-2 in 2009. Nonetheless, a number of facilities have not had a re-baseline completed within the five-year timeframe. New baselines for these facilities are scheduled to be completed this year. (See Section 6, OFI-2)

Independent Oversight observed the performance of an IVR for an annual update (revision 9) to the safety basis documents at Building 9204-2. The IVR was conducted by two experienced individuals from the Readiness Assurance Group using the facility's plan of action and a detailed implementation plan. The implementation plan adequately discussed the scope and depth of the review and included objectives, criteria, and lines of inquiry, which were appropriately tailored to the safety basis revisions. The IVR, which was conducted over a two-day period, included a walkthrough of the facility, document reviews, informal drill (targeted to a specific change), and group interview, and sufficiently addressed the assessment plan. The performance demonstration provided good feedback on the effectiveness of training on the recent changes. The assessors demonstrated an appropriate degree of rigor during performance of the review, and the results of the IVR are properly documented in the final report. Three findings and three observations were identified and properly categorized. During the IVR, Independent Oversight noted that some operating procedures include the potential to align or re-align the oxygen monitors without performing independent verification that the monitors are returned to or left in an operational alignment. (See Section 6, OFI-3)

In addition to formal IVRs, the Production Facilities and Quality Assurance Departments periodically perform assessments involving the implementation of safety basis controls. For example, the facility evaluation of the 9215 complex in March 2012 included evaluations of fire protection surveillances and system walk downs; evaluation of the criticality safety program; reviews of the implementation of the VSS program; evaluation of the facility safety program; and a compliance audit of facility TSRs including Limiting Conditions of Operation (LCOs), surveillance requirements, administrative and specific administrative controls (SACs), and design features. This evaluation also included the conduct of an IVR re-baseline. The facility evaluation of Highly Enriched Uranium Manufacturing Facility/Strategic Nuclear Material and Safe Secure Transport, Type-E Vehicles in June 2011 included evaluations of configuration management, fire protection (including surveillances), and facility safety including compliance with TSRs. Facility evaluation reports reviewed by Independent Oversight evidenced rigorous and comprehensive evaluation activities and identification of issues for correction and performance improvement. In March 2011, the Production Facilities Department conducted a management assessment to investigate the history, causes, and similarities of five separate reportable mode-change-related TSR violations in the 9212, 9215, and 9204-2E facilities, identifying six recommendations for improving performance and avoiding recurrence. The B&W Y-12 Engineering Department management assessment schedules for fiscal year (FY) 2010 through FY 2012 did not reflect any assessments of safety basis control element implementation. (See Section 6, OFI-4)

Examples of other B&W Y-12 safety basis implementation assessment activities include a Production Facilities management assessment of the readiness assurance program restart tracking system implementation in February 2011 and the VSS program in August 2010. In December 2009, Production Facilities conducted a management assessment of the preventive maintenance and surveillance of a detector in the Criticality Accident Alarm System (CAAS) that identified deficiencies in the "step-by-

step” procedure and implementation of that procedure. These deficiencies included: incorrect documentation of steps already completed, incorrect sequence of steps, electricians who knowingly performed additional necessary steps that were not specified in the procedure, and failure of the electricians to stop performance of the activity when the procedure deficiencies were identified. The Quality Assurance Department conducted management assessments of the implementation of daily and weekly surveillances in Building 9995 (analytical chemistry) in 2010 and 2011, identifying findings and observations for performance improvement in both. Review of the March 2012 senior supervisory watch trend report reflected several observation activities related to entering and exiting LCOs and other operating limits, and identification of a discrepancy between a surveillance procedure and the preventive maintenance procedure. Although the assessments were thorough, a significant weakness with issues management was noted by the HSS team with respect to the CAAS maintenance and surveillance assessment. In this assessment, the assessors failed to fully evaluate the use of a deficient procedure (e.g., determining/citing prior use of this procedure) and actually identified as a "positive observation" the professional, experienced, knowledgeable, competent, and “well qualified” electricians. While the HSS team recognizes this issue as a single event, the apparent use of a flawed procedure by the electricians and the acceptance by the assessors based on the skill of the craft indicated to the HSS team that some potential weakness may exist in the standards applied to the assessment of conduct of operations and work control processes.

In February 2012, the Production Facilities Department conducted a management assessment of the effectiveness of implementation of the IVR process. The assessment included review of the process procedures and completed IVR reports, observation of a scheduled IVR, and interviews with responsible personnel. The assessment included a formal implementation plan and is well documented, but does not indicate that an IVR was observed. This assessment adequately examined the IVR process and did not identify any major issues deficiencies. The management assessment identified an apparent repetitive failure to use B&W Y-12 form UNC-20773 *Surveillance Requirements Implementation Worksheet* referenced by procedure Y14-190 stating “Facility Operations Managers implementing new or modified safety basis controls that require surveillances must use UCN-20773 to determine the time of the baseline surveillance”. This apparent failure to use form UCN-20773 was assessed to determine whether the issue constituted a deficiency, but review of Y14-190, found that Appendix E, which invokes the use of the form, is intended to be guidance and is not a requirement.

Y-12 Site Office

Independent Oversight reviewed the YSO master assessment plans and schedules for FYs 2010, 2011, and 2012, and found that they reflected substantial assessment activity related to safety basis control implementation. Independent Oversight also reviewed the FY 2011 reports on contractor performance (i.e., contract performance assurance metrics) for engineering, nuclear safety, and operations management that were used as feedback to the “enhanced oversight” analysis for assessment planning.

YSO conducts a variety of oversight activities related to the implementation of safety basis controls, including direct conduct of independent IVRs, shadowing of contractor IVRs, conduct of operational readiness reviews, and shadowing of contractor readiness reviews. YSO SSO personnel also shadow contractor system engineer VSS walk downs, and FRs shadow TSR surveillance performance and verification of the implementation of SACs. SSO engineers perform numerous (dozens annually) shadow assessments of contractor system engineer VSS walk down inspections, and FRs perform numerous (dozens annually) shadow assessments or document reviews of performance and implementation of TSR surveillances and SACs. Most of the assessments were appropriately conducted by inspecting field conditions and witnessing work activities to verify contractor performance rather than performing document reviews. Although YSO has conducted a number of oversight activities related to safety basis

hazard control implementation (including shadowing B&W Y-12 IVRs), the site office has not recently performed an independent IVR or evaluation of the B&W Y-12 IVR program. (See Section 6, OFI-5)

In 2009, at the direction of NNSA Headquarters, YSO and B&W Y-12 (Performance Assurance) conducted an assessment of a sample of ten of the approximately 50 Y-12 facility SACs using NNSA-developed CRADs. YSO engineers and FRs have also conducted several assessments of individual SACs in 2010 and 2011, and recently completed an assessment of the effectiveness of the contractor's implementation of SACs in Building 9212 (with assistance from the NNSA Nuclear Safety Support Division).

In November 2011, YSO engaged the Independent reviewers from the Nevada Site Office to conduct an independent assessment of the YSO SSO program. This review identified several deficiencies and weaknesses in the implementation of this program, including weaknesses in the use of the VSS checklist and the level of detail in assessment reports, which were also noted by Independent Oversight. The Engineering, Safety and Environment organization is currently developing a formal action plan to strengthen performance of this oversight function.

In general, YSO oversight reports adequately documented the activity proportional to the type and complexity of the evaluation. However, in some cases, reports lacked sufficient detail to support conclusions or conclusions were not sufficiently described. Criteria/guidance for scoring contractor VSS walk downs is insufficient to ensure consistent grading between evaluators. In some reports, the criteria used to perform the evaluation were not clearly identified, and sometimes concerns, observations, or opportunities for improvement (OFIs) identified in the narrative were not always sufficiently described to facilitate contractor evaluation and action. (See Section 6, OFI-6)

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

B&W Y-12

Independent Oversight observed the contractor review and implementation process to assure that the process verifies that safety SSCs maintain their ability to function as described in the safety basis documentation.

During the IVR, the contractor team appropriately identified that contrary to the guidance in DOE-G-423.1-1A, TSR LCO 3.1 does not include verification of an operable flow path as a requirement for an operable fire suppression system. The TSR bases statement for the LCO of the fire suppression systems indicates that proper system alignment is required for operability to ensure that water is available to suppress the fire and that this alignment is verified through completion of the main drain test and the inspector's flow test. The Readiness Assurance Group had previously identified this as a site wide issue concerning the adequacy of current TSR surveillance test requirements in demonstrating operability of the safety significant wet pipe fire suppression system.

Independent Oversight reviewed the facility TSRs, as well as the surveillance, test, and inspection procedures implementing the safety basis hazard controls, and concurs with this issue, first identified by the Readiness Assurance Group in a mid-2011 IVR, and offers further clarification of the requirement. The TSR surveillance requirements for the fire suppression system require that a main drain test be performed semi-annually and that the inspectors test valve be opened to verify water flow through the system (refer to surveillance requirements 4.1.2 and 4.1.3). The LCO for fire suppression systems, found in Section 3.1, *Bases for TSR*, states that system alignment is required for operability to ensure that "water

is available to suppress the fire.” Although surveillance requirements 4.1.2 and 4.1.3 are valid requirements extracted from National Fire Protection Association (NFPA) 25, *Water-Based Fire Protection Systems*, these requirements are not intended by NFPA for the stated purpose of demonstrating an open flow path. Because the fire suppression system configuration includes various branch isolation valves, successful completion of surveillance tests 4.1.2 and 4.1.3 would not reveal a closed branch isolation valve. Consistent with requirements in NFPA 25, a satisfactory drain test (that is, one that reflects the results of previous tests) does not necessarily indicate an unobstructed passage and does not prove that all valves in the upstream flow of water are fully opened. NFPA also states that performance of drain tests is not a substitute for a valve check on 100 percent of the fire protection system valves. (See Section 6, W/DEF-1)

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.

Independent Oversight reviewed the implementation of training and qualification programs for a sample of the 9204-2 facility personnel and for YSO personnel with responsibilities for implementation and oversight of the implementation of safety basis controls, respectively.

B&W Y-12

An electronic system of assigning and tracking training requirements and completion is managed based on job positions, classifications, and facility access. Assignments are based on the use of the training impact evaluation form. A review of the computer-based safety basis course material (“Safety Basis Awareness for 9204-2” and “9204-2 Safety Basis 300”) indicated the training program adequately addressed the existing SACs, TSR, and SSC requirements as well as the annual changes in the safety basis. (See section 6, NP-2) Review of a sample of the individual qualifications cards indicated that appropriate job positions are receiving adequate training for implementation and maintenance of the safety basis. However, during demonstration of the off normal response conditions, the contractor IVR team identified that some personnel did not take action for termination of hot work until prompted by the shift technical advisor. While it is apparent that the training system addresses the key changes to the safety basis and that key individuals received appropriate training, it is uncertain that the application of that training was universally effective. (See Section 6, OFI-7)

Y-12 Site Office

The Independent Oversight team reviewed a variety of documents supporting the technical qualification system for YSO personnel including: YSO-2.1, *Y-12 Site Office Operating Procedures Manual*; the *Y-12 Site Office Technical Qualification Program Standard*; and the *Y-12 Site Office Facility Representative Qualification Standard*. The technical qualification program documents for the YSO FRs indicated a mature, comprehensive, training system that includes sufficient facility-specific knowledge, skills, and abilities to assure they can provide oversight of the facility safety basis. Interviews with several FRs and SSOs indicated that they were knowledgeable of the specific safety basis requirements of the facilities. Tours of the facility clearly indicated that the FRs and SSOs were knowledgeable of the operations and conditions in the facility.

5.0 CONCLUSIONS

B&W Y-12

B&W Y-12 has procedures and processes in place that adequately define the methods for implementing safety basis documents. The IVR procedure implements an appropriate level of planning and formality for the IVR process and is integrated with the startup and restart procedure. Notably, procedures require periodic re-verification of the implementation of safety basis hazard controls. B&W Y-12 has adequately implemented the IVR processes through an independent organization. The IVR plans were tailored to the scope of the specific changes to hazard controls identified in the safety basis. IVRs are coupled with readiness reviews that are also appropriately planned, conducted, and documented. Responsible personnel are familiar with and experienced in applying the processes and methods for conducting IVRs, as demonstrated in the observed IVR. The contractor IVR shadowed by the HSS assessment team appropriately verified that changes to administrative and operating procedures adequately implemented changes to the TSR requirements. The Readiness Assurance Group also identified an issue with the lack of establishment of an operable flow path in performing fire suppression systems surveillances. This issue, which potentially affects a number of site facilities, should be addressed and resolved in a timely manner.

The IVR process is supplemented by a number of other assessments that involve safety basis hazard control implementation. B&W Y-12 organizations plan, schedule, and conduct independent and management assessments of the implementation of safety basis controls for Y-12 nuclear facilities. Rigorous facility evaluations conducted by independent teams of multi-functional subject matter experts include assessments of many aspects of safety basis control implementation. Topical areas in facility evaluations include fire protection and CAAS surveillances and system walk downs; reviews of the implementation of the VSS program; appraisals of the facility safety program; and assessments of facility TSRs including LCOs, surveillance requirements, administrative and SACs, and design features. The Production Facilities and Quality Assurance Departments conduct periodic management assessments of TSR surveillances and routine VSS walkdowns, and recently conducted reviews of the VSS oversight (system engineer) program and the readiness review tracking system. Although initial baseline IVR reviews have been performed for all facilities that were reviewed, the process to “re-baseline” all safety basis controls does not appear to have been fully implemented.

Y-12 Site Office

YSO uses appropriate written procedures that establish a method for oversight of IVRs and facility and process startups and restarts. Particularly, YSO has established a contractual requirement for the contractor to perform IVRs. The integrated assessment program provides a foundation for oversight of the implementation of safety basis hazard controls, including oversight of IVR processes. YSO has executed a generally comprehensive and rigorous program of oversight activities to assess the implementation of safety basis controls in Y-12 nuclear facilities. SSO engineers perform numerous independent and shadow awareness assessments of B&W Y-12 system engineer inspections of VSSs and IVRs, and FRs perform numerous operational awareness activities, including independent assessments and shadowing of contractor performance for TSR surveillances, SACs and design features, and readiness assessments. Although limited in number, YSO has conducted some team assessments and self-assessments of safety basis control implementation elements, such as reviews of Y-12 SAC implementation and the YSO SSO program. The self-assessment of the SSO program identified several deficiencies and weaknesses in performance, and YSO is currently developing and implementing improvement actions. During the review, Independent Oversight identified some OFIs in the YSO oversight processes. YSO has not conducted an independent IVR since 2005 or assessed the contractor’s IVR program (i.e., reviewed the effectiveness of the program rather than shadowing specific IVRs) and

does not have a structured method to ensure the contractor periodically re-verifies safety basis control implementation. While most YSO assessment activities are adequately documented, the level of detail in reports was not always sufficient to be fully effective in communicating the scope, criteria, activities, results, and basis for conclusions of the review activity.

6.0 NOTEWORTHY PRACTICES AND OPPORTUNITIES FOR IMPROVEMENT

During the review, Independent Oversight identified several issues, which are characterized in accordance with YSO-3.3, *YSO Assessment Processes*. YSO identifies “issues” as a generic term for any problem or condition (i.e., strength, observation, weakness, or deficiency) significant enough to be reported, tracked, and trended for use in continuous improvement activities. Deficiencies are problems or conditions that do not meet specified requirements and represent either a systemic failure to establish and/or implement an adequate program or control, or a significant failure that could result in unacceptable impact on the safety of personnel, the facility, the general public, or the environment. A weakness is a problem or condition that does not meet specified requirements but does not currently meet the definition of a deficiency, and can also include significant OFIs. Finally, an observation is an issue that warrants appropriate documentation, but by itself does not rise to the level of significance as a weakness or deficiency.

According to Independent Oversight protocols, OFIs “are suggestions offered by the Independent Oversight appraisal team that may assist line management in identifying options and potential solutions to various issues identified during the conduct of the appraisal.” OFIs are not mandatory and do not require formal resolution by management through the corrective action process.

During the review, Independent Oversight identified three noteworthy practices (NPs).

B&W Y-12

NP-1: B&W Y-12 has established a goal to re-baseline the safety basis hazard controls every three to five years through conduct of an IVR.

NP-2: B&W Y-12 has established and implemented a computer-based system for assigning and tracking completion of required training based on the position description and facility access. The computerized annual refresher training Safety Basis 300 course for the facility included a complete cross walk of all credited safety basis controls and highlighted the changes from the previous safety basis documents.

Y-12 Site Office

NP-3: YSO includes a contractor requirements document in the B&W Y-12 contract that contains a requirement for the contractor to develop and implement an IVR process to validate the implementation of all significant changes to safety basis documentation.

During the review, Independent Oversight identified one deficiency/weakness that requires further attention.

B&W Y-12

W/DEF-1: As identified in the B&W Y-12 IVR, the currently implemented, the surveillance tests for LCO 3.1 do not adequately confirm system operability, because a complete fire suppression system valve alignment check is needed to demonstrate that a fully open flow path exists including branch lines to all hazard areas and that the system is operable.

During the review, Independent Oversight identified several OFIs, which closely match the definition of observations in the YSO assessment procedure.

B&W Y-12

OFI-2: Establish and execute a structured process for assessments and IVR activities to periodically re-baseline the safety basis hazard controls. Consider using a formalized matrix of credited SACs, LCOs, and TSRs (e.g., to guide the re-baseline process).

OFI-3: Consider reviewing the facility operating procedures at Building 9204-2 to identify opportunities to incorporate independent verification where necessary to ensure safety significant equipment (monitoring instrumentation) will be aligned properly (to appropriate scale settings) to perform its intended safety function.

OFI-4: The Engineering Department should consider including periodic management assessments of the adequacy and implementation of safety basis controls.

OFI-7: Occasional application of the walk-through drill scenarios for off normal conditions, similar to the one initiated by the IVR team, may enhance the universal and practical effectiveness of the CBT based training.

Y-12 Site Office

OFI-1: Consider establishing criteria to guide the decision on whether to conduct an independent DOE IVR or shadow the contractor IVR, and document the rationale for the decision (e.g., in Pegasus).

OFI-5: Consider periodic performance of an independent DOE IVR and/or assessment of the contractor's IVR program to ensure the continued effectiveness of the IVR process.

OFI-6: Ensure that assessment activity reports consistently document and communicate the scope, criteria, activities performed, issues identified, and overall results of the oversight activity. Consider specific formal (i.e., using a formal checklist of criteria) quality reviews of at least a sample of reports by functional area leads with feedback to originators and management, and trend results to monitor improvement progress.

7.0 FOLLOW-UP ITEMS

Independent Oversight will follow up on any corrective actions determined necessary by YSO resulting from this assessment and resolution of the issue relating to the fire suppression systems valve lineup as part of its normal operational awareness activities under the site lead program.

Appendix A Supplemental Information

Dates of Review

Onsite Review: March 12-15, 2012
 March 27-29, 2012

Office of Health, Safety and Security Management

Glenn S. Podonsky, Chief Health, Safety and Security Officer
William A. Eckroade, Principal Deputy Chief for Mission Support Operations
John S. Boulden III, Director, Office of Enforcement and Oversight
Thomas R. Staker, Deputy Director for Oversight
William E. Miller, Deputy Director, Office of Safety and Emergency Management Evaluations

Quality Review Board

William Eckroade
John Boulden
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William Miller
Michael Kilpatrick
George Armstrong
Robert Nelson

Independent Oversight Site Lead

Timothy Mengers

Independent Oversight Reviewers

Timothy Mengers – Lead
Robert Compton
David Odland
Joseph Panchison

Appendix B

Documents Reviewed, Interviews, and Observations

Documents Reviewed

- Approximately 50 individual YSO reports of SSO and FR assessments of VSS, TSRs, and SAC implementation activities.
- ASM-920402E-GB04-0001, Readiness Assessment Final Report for the Startup of the Integrated Glovebox System Operations in Building 9204-2E (NA-YSO-BWXTY12-2007-005), Rev. 0, 10/10
- B&W Y-12 MA-PFD-10-1, *Management Assessment of Y52-45-MAE-203, Preventive Maintenance and Surveillance of the NMC GA-6 Detector as Implemented by Facilities Infrastructure, and Services Division*, 12/14/2009
- B&W Y-12 DAC-FPD-920402-A005 Revision 2 dated 12/20/2011, Dryer/Mold Loading Area Sprinkler System Hydraulic Analysis
- B&W Y-12 DAC-FPD-920402-A006 Revision 0 dated 10/19/2005, Building 9204-2 Low Energy X-Ray Facility Sprinkler System Hydraulic Analysis
- B&W Y-12 DAC-FPD-921500-A007 Revision 2 dated 12/3/2008, Pipe Schedule Calculation for 9215 and 9204-2E Sprinkler Systems
- B&W Y-12 Facility Evaluation IA-11-007, *FE, HEUMF/SNM and SST-E Vehicles*, 6/14/11
- B&W Y-12 Facility Evaluation IA-12-003 (Draft), *9215 Complex (PF) Facility Evaluation*, March 2012
- B&W Y-12 FHA-FH-FPD-920402-A001 000 03, Revision 3 dated 8/18/2011, Fire Hazards Analysis, Building 9204-2
- B&W Y-12 FHA-FH-FPD-920402-A001 000 05, Revision 3 dated 8/18/2011, Fire Hazards Analysis, Building 9204-2E
- B&W Y-12 MA-12-PFD-01, *Production Facilities Department Y14-190, Safety Basis Implementation/Deactivation Process Management Assessment*, February 2012
- B&W Y-12 MA-OPI-10-001, *Management Assessment of B&W Y-112 Vital Safety Systems in Production Facilities*, 8/23/10
- B&W Y-12 MA-PFD-2011-RA-RRTS-001, Management Assessment, *Readiness Assurance Programs Readiness Restart Tracking System (RRTS) Implementation in Production Facilities*, February 2011
- B&W Y-12 QA-MA-AC-2010-1, *Analytical Chemistry Organization Management Assessment of Operational Limits and Surveillance Requirements/TSR 2nd Quarter 2010*, February 2010
- B&W Y-12 QA-MA-AC-2011-6, *2011 SAR/TSR Management Assessment*, 6/28/2011
- B&W Y-12 RP 02-F-00, *Senior Supervisory Watch Baseline Trend Report*, 3/12/12
- B&W Y-12 RP 9212-F-0008, Review Report, *9212 Mode Change TSR Violations*, March 2011
- B&W Y-12 Standing Order, *Evaluation of Vital Safety System Reliability*, January 28, 09
- Draft YSO Assessment Report, *Specific Administrative Control Implementation*, March 2012
- MA-12-PFD-01, Y14-190, *Safety Basis Implementation/Deactivation Process*, Management Assessment, 2/12
- Management Assessment Schedules for the Engineering and Production Facilities Organizations for FY-2010, FY2011, and FY2012
- NA-1 SD-226.1A, *NNSA Line Oversight and Contractor Assurance System Supplemental Directive*, 10/17/08
- NA-YSO-BWXTY12-2010-016, Lithium Metal Production – Cell 7, 3/11
- NA-YSO-BWXTY12-2010-26, Startup of Additional QE Environmental Chamber, EC-204, 10/11

- PLN-920402E-F-0015, Implementation Plan for Level II Readiness Assessment for the Startup of the Quality Evaluation IGBS Operations in Building 9204-2E (NA-YSO-NWXTY12-2007-005), Rev. 0, 9/10
- PLN-920402E-F-0021, Implementation Validation Review Implementation Plan for the 9204-02E DCN-05 Update to the Building 9204-02E Safety Analysis Report and DCN-02 Update to the 9204-02E Technical Safety Requirements, Rev. 0, 1/11
- PLN-920402-F-0003, Implementation Validation Review Implementation Plan for the 9204-2 Safety Analysis Report Y/SM-SAR-005, Rev. 8 and Technical Safety Requirements Y/SM-TSR-005, Rev. 8, Rev. 0, 11/10
- PLN-920402-F-0009, Safety Basis Implementation Plan and Implementation Validation Review Plan of Action for the Building 92-4-2 Safety Analysis Report Y/SM-SAR-005, Rev. 9 and Technical Safety Requirements Y/SM-TSR-005, Rev. 9 (U), Rev. 1, 2/12
- PLN-920402-F-0011-000-00, Implementation Validation Review Implementation Plan for the 9204-2 Safety Analysis Report Y/SM-SAR-005, Rev. 9 and Technical Safety Requirements Y/SM-TSR-005, Rev. 9, Rev. 0, 2/12
- PLN-9212-F-0024-000-00, Implementation Validation Review Implementation Plan for Revision 4 of the Safety Analysis Report for the 9212 Complex and Revision 7 of the Technical Safety Requirements for the 9212 Complex, Rev. 0, 5/11
- PLN-9212-F-0028, Contractor Readiness Review Implementation Plan for the Startup of Production Microwave Caster Operations, 9/11
- PLN-9212-F-0030 000 00, Implementation Validation Review Implementation Plan for DCN 11 and 23 to the Safety Analysis Report for the 9212 Complex Rev. 4 and DCN 04 to the Technical Safety Requirements for the 9212 Complex Rev. 7 – Production Microwave Caster (U), Rev. 0, 7/11
- PLN-9215-F-0012 000 00, Implementation Validation Review Implementation Plan for the 9215 Complex, Revision 8 to Y/MA-7886 and Y/MA-7887, Rev. 0, 4/11
- RP 9212-MWV-0001 000 00, Final Report for the Startup of Production Microwave Caster Operations in Building 9212 (NA-YSO-BWXTY12-2008-012), 10/11
- RP-920402E-F-0018, Implementation Validation Review Implementation Report for the 9204-02E Safety Analysis Report and DCN-02 Update to the 9204-02E Technical Safety Requirements, 1/11
- RP-920402-F-0005, Implementation Validation Review Report for the 9204-2 Safety Analysis Report Y/SM-SAR-005, Rev. 8 and Technical Safety Requirements Y/SM-TSR-005, Rev. 8, Rev. 0, 12/10
- RP-920402-F-0010-000-00, Implementation Validation Review Report for Revision 9 to the Safety Analysis Report and Revision 9 to the Technical Safety Requirements for the 9204-2 Facility, 4/12
- RP-9212-F-0012-000-00, Implementation Validation Review Report for Revision 4 of the Safety Analysis Report for the 9212 Complex and Revision 7 of the Technical Safety Requirements for the 9212 Complex, Rev. 0, 6/11
- RP-9212-F-0016 000 00, Implementation Validation Review Report for DCN 11 and 23 to the Safety Analysis Report for the 9212 Complex Rev. 4 and DCN 04 to the Technical Safety Requirements for the 9212 Complex Rev. 7 – Production Microwave Caster (U), 7/11
- RP-9212-F-0029 000 00, Implementation Validation Review Report for Rev. 5 of the Safety Analysis Report for the 9212 Complex and Rev. 8 of the Technical Safety Requirements for the 9212 Complex (Objective 4), Rev. 0, 1/12
- RP-9215-F-0008 000 00, Implementation Validation Review Implementation Report for the 9215 Complex, Revision 8 to Y/MA-7886 and Y/MA-7887, Rev. 0, 5/11
- UCN-20773, Surveillance Requirements Implementation Sheet, 8/06
- UCN-21050, Standard Operations Checklist, 8/09
- UCN-21468, Safety Basis Management Self-Assessment Checklist, 7/05
- Y/EN-7581, *Criteria for Walkdowns to Assess Material Condition and Aging Issues Associated With Vital Safety Systems (VSS)*, December 2002

- Y/PFD-432, Implementation Validation Review Implementation Plan for Revision 7 of the 9204-2 SAR and Revision 7 of the 9204-2 TSR, Rev. 0, 8/09
- Y/PFD-462, Implementation Validation Review Report for Y/SM-TSR-005, Rev. 7 and Y/SM-SAR-005, Rev. 7 for Building 9204-2, Rev. 0, 10/09
- Y/SM-TSR-005, Technical Safety Requirements for the 9204-2 Facility, Rev. 9, 9/11
- Y-12 Fire Protection Survey, 9206 to 9212 Complex, Oakridge TN, December 1987
- Y12-052, *Operational Readiness Policy*, Rev. 9/21/10
- Y14-001, Conduct of Operations Manual, 9/19/11
- Y14-190, *Safety Basis Implementation/Deactivation Process*, 5/5/11
- Y15-190, *Readiness Manual*, 9/23/10
- Y15-312, *Issues Management Process*, Rev. 10/2/11
- Y15-902, *Management Assessment*, Revised 9/30/09
- Y15-903, *Independent Assessment Program*, Rev. 10/5/10
- Y15-906PD, *Contractor Assurance System Program Description*, Rev. 1/31/11
- Y17-002PD, *Conduct of Engineering Program Description*, 1/21/10
- Y17-017PD, *Vital Safety System Engineer Program Description*, Rev. 5/18/11
- Y17-018, *Identifying and Updating Vital Safety System and System Engineer Designations*, Rev. 1/31/11
- Y17-019, *Walkdowns to Assess Configuration Management, Material Condition, and Aging Issues Associated with Vital Safety Systems*, Rev. 3/24/10
- Y70-163, *Assessments of Nuclear Criticality Safety Program Activities*, Revised 12/16/10
- Y74-800, Facility Safety Program, 2/11
- Y74-802, *Safety Basis Documents for Nuclear and PSM/RMP Facilities*, Revised 12/17/10
- YSO Engineering and Nuclear Safety FY2011 contractor Performance Evaluation Plan input
- YSO Master Assessment Schedules for FY2010, FY2011, and FY2012
- YSO REP-AB-4/28/2009-85100, *Assessment of Y-12 Specific Administrative Controls (SAC) Using NNSA-HQ CRAD*, 4/28/2009
- YSO Self-Assessment Report on the Y-12 Safety System Oversight Program, November 2011
- YSO Work Planning and Execution (Operations Management) FY2011 contractor Performance Evaluation Plan input
- YSO-1.6, *Facility Representative Program*, Rev. 12
- YSO-1.9, *Assessment Planning and Scheduling*, Rev. 13
- YSO-3.2, *Assessment Reporting and Issues Management*, Rev. 14
- YSO-3.3, *YSO Assessment Processes*, Rev. 7
- YSO-4.20, *Review of Safety Basis Documentation*, Rev. 6
- YSO-5.4, *Startup and Restart of Nuclear Facilities at Y-12*, Rev. 10, 10/10
- YSO-7.4, *YSO Engineering Oversight Program*, Rev. 5
- YSO-9.2, *Performance of Assessments*, Rev. 3
- YSO-9/8, *Performance Summary*, Rev. 4
- YSO-CRD-03-01, *Startup and Restart of Operations, Activities, and Facilities at Y-12, Including Safety Basis Document Implementation*, Rev. 6, 9/10
- YSO-M 411.1-1C, *Functions, Responsibilities, and Authorities Manual (FRAM)*, Rev. 10
- YSO-M-5.4, *Manual for Startup and Restart of Operations, Activities & Facilities at Y-12*, Rev. 1, 10/07
- YSO-SBL-01, *Safety Basis List for the Y-12 Complex*, Rev. 2012-06, 3/12
- YSO-2.1, *Y-12 Site Office Operating Procedures Manual*
- *Y-12 Site Office Technical Qualification Program Standard*
- *Y-12 Site Office Facility Representative Qualification Standard.*

Interviews

- YSO Performance Assurance Manager
- YSO Assistant Manager, Engineering, Safety and Environment
- YSO Lead Operations Engineer and Acting Assistant Manager, Operations Management
- YSO Nuclear Safety Team Lead
- YSO SSO Lead Engineer
- YSO Metal Processes SSO Engineer
- YSO Chemistry SSO Engineer
- YSO 9402-2 Facility Representative
- B&W Y-12 Facility Programs Manager
- B&W Y-12 Performance Assurance Manager
- B&W Y-12 Independent Assessments Manager
- B&W Y-12 Readiness Assurance Manager
- B&W Y-12 Safety Basis Review and Validation Lead
- B&W Y-12 Senior Readiness Lead

Observations

- Building 9204-2 IVR