

Volume I Summary Report

Inspection of
Environment, Safety,
and Health Programs
at the



Y-12 National Security Complex



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Table of Contents

1.0 INTRODUCTION	1
2.0 POSITIVE ATTRIBUTES	3
3.0 WEAKNESSES	7
4.0 SUMMARY ASSESSMENT	11
5.0 CONCLUSIONS	15
6.0 RATINGS	16
APPENDIX A - SUPPLEMENTAL INFORMATION	17
APPENDIX B - SITE-SPECIFIC FINDINGS	19

Abbreviations Used in This Report

AHA	Activity Hazards Analysis
AJHA	Automated Job Hazards Analysis
ASC	Accountable Steam Condensate
BWXT	BWXT Y-12 LLC
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DV	Dry Vacuum
ECP	Employee Concerns Program
ES&H	Environment, Safety, and Health
ISM	Integrated Safety Management
ISO	International Organization for Standardization
NNSA	National Nuclear Security Administration
OA	Office of Independent Oversight and Performance Assurance
OSHA	Occupational Safety and Health Administration
OSR	Operational Safety Requirement
RWP	Radiological Work Permit
TBIS	Technical Basis Index Summary
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination
YSO	Y-12 Site Office
Y-12	Y-12 National Security Complex

OVERSIGHT

The U.S. Department of Energy (DOE) Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health (ES&H) programs at the DOE Y-12 National Security Complex (Y-12) during August and September 2005. The inspection was performed by the OA Office of Environment, Safety and Health Evaluations. OA reports to the Director of the Office of Security and Safety Performance Assurance, who reports directly to the Secretary of Energy.



Y-12 Aerial View

Within DOE, the National Nuclear Security Administration (NNSA), Office of the Deputy Administrator for Defense Programs, has line management responsibility for Y-12. NNSA provides programmatic direction and funding for stockpile stewardship, facility infrastructure activities, and ES&H program implementation for Y-12. At the site level, line management responsibility for Y-12 operations and safety falls under the Y-12 Site Office (YSO). The NNSA Service Center is responsible for providing ES&H technical support and administrative support services to YSO in several areas (e.g., legal, human resources, employee concerns program [ECP], and training) in accordance with support agreements. Some of these support services are in the process of being transitioned to the NNSA Service Center from the Oak Ridge Operations Office, which

previously had responsibility for supporting Y-12. Y-12 is managed and operated by BWXT Y-12 LLC (BWXT).

The primary mission of Y-12 is to support the Department's nuclear weapons stockpile maintenance program. Y-12 also supports DOE and other Federal agencies in various aspects of testing and development, nonproliferation, and technology transfer. Y-12 stockpile maintenance activities include production/rework of nuclear weapons components, quality evaluations and surveillance of nuclear weapons components, secure storage of special nuclear material, and various other nuclear weapons-related activities.

Potential hazards that need to be effectively controlled at Y-12 include exposure to radiation, radiological contamination, hazardous chemicals, and various physical hazards associated with facility operations (e.g., machine operations and high-voltage electrical equipment). Radiological materials and hazardous chemicals are present in various forms at Y-12.

The purpose of this OA inspection was to assess the effectiveness of ES&H programs at Y-12 as implemented by BWXT and YSO. OA used a selective sampling approach to evaluate a representative sample of activities at Y-12, including:

- NNSA implementation of the core functions of integrated safety management (ISM) for selected activities, including operations at an Enriched Uranium facility, maintenance, the glovebox relocation project, and construction. OA focused primarily on implementation of ISM at the facility and activity/task levels.
- BWXT and NNSA/YSO feedback and continuous improvement systems, as applied to Y-12.
- Essential safety systems, with primary emphasis on engineering and configuration management; surveillance, testing, and

maintenance; and operations of the safety-class fire protection system and safety-significant systems for preventing a criticality at an Enriched Uranium facility.

- YSO and BWXT effectiveness in managing and implementing selected aspects of the ES&H program that OA has identified as focus areas, including the status of implementation of an environmental management system; chronic beryllium disease prevention program; hoisting and rigging; and safety system oversight. OA selects focus areas—areas that warrant increased attention across the DOE complex—based on a review of operating events and inspection results. Because Y-12 is in the middle of an important effort to transition to a new documented safety analysis, OA also reviewed the status of Y-12 efforts to enhance its safety basis documentation. Although these topics are not individually rated, the results of focus area reviews are considered in the evaluation of ISM core functions.

Sections 2 and 3 provide a discussion of the key positive attributes and weaknesses identified during this review. Section 4 provides a summary assessment of

the effectiveness of the major ISM elements that were reviewed. Section 5 provides OA's conclusions regarding the overall effectiveness of NNSA/YSO and BWXT management of the ES&H programs, and Section 6 presents the ratings assigned during this review. Appendix A provides supplemental information, including team composition, and Appendix B identifies the specific findings that require corrective action and follow-up.

Volume II of this report provides four technical appendices (C through F) containing detailed results of the OA review. Appendix C provides the results of the review of the application of the core functions of ISM for work activities. Appendix D presents the results of the review of feedback and continuous improvement processes and management systems. Appendix E presents the results of the review of essential safety system functionality, and Appendix F presents the results of the review of safety management of the selected focus areas. For each of these areas, OA identified opportunities for improvement for consideration by NNSA and contractor management. The opportunities for improvement are listed at the end of each appendix so that they can be considered in context of the status of the areas reviewed.

Several positive attributes were identified in ES&H implementation during work activities and with essential safety systems at Y-12. In addition, the environmental management system and chronic beryllium disease prevention program are effectively designed and implemented.

At both the project and work activity levels, the glovebox relocation project is well defined and planned, and is effectively managed to ensure that project ES&H milestones are achieved. At the project and facility level, work scopes are described in a number of documents, such as the project execution plan, the system requirements document, the project-specific preliminary safety analysis, work breakdown structures, and detailed project schedules. At the activity level, step-by-step maintenance job requests are supplemented by as-built piping and instrument drawings developed specifically for this project. The detailed planning facilitates effective identification and implementation of hazard controls during each work activity. Planning for the relocation of the glovebox to a different facility included the construction of a full-scale mock-up of the glovebox, which was moved to the new location using the same procedures and techniques (e.g., critical lifts) that will be used for the actual move. The full-scale mock-up enhanced safety by enabling project personnel to better understand potential safety hazards and exercise the appropriate hazard controls before performing the task.

The training matrix that is used in conjunction with automated job hazards analyses (AJHAs) for construction work is a noteworthy practice for identifying training requirements. The matrix clearly identifies individuals requiring training and clearly describes the required training. To communicate requirements, a table is attached to each construction AJHA that clearly defines training requirements for each planned activity. In addition, the flowdown of requirements to construction subcontractors has improved since the 2003 OA inspection, and the AJHA process is being used

effectively for controlling work on direct-hire construction projects.

BWXT has made improvements in maintenance work controls. The new *Integrated Work Control Manual* provides a systematic approach to performing maintenance work safely and efficiently. The manual clearly maps the maintenance planning process into an ISM framework and helps focus the work package on the needs of the worker to accomplish the work safely. The manual clearly establishes roles and responsibilities for all personnel involved with maintenance planning and conduct. In addition, effective standard procedures have been developed and implemented for excavation and penetrations, electrical safety, confined space entry, and elevated work, including work on ladders and scaffolding, and include specific requirements for qualifications, inspections, and personal protective equipment.

BWXT has a mature radiological control program that includes a comprehensive set of management requirements and technical basis documents, and is supported by personnel that have established good working relationships with line organizations. Many elements of Y-12's radiation protection program (including administrative, dosimetry, field operations and instrumentation-related health physics implementing procedures, work instructions, and technical basis documents) are among the more mature and comprehensive within the DOE complex. To compensate for a facility design that is not intended to contain all radioactivity with engineering controls, the Y-12 Radiological Control organization appropriately conducts radiological air monitoring and routine and special bioassays to evaluate potential internal exposures, control intakes, and assign internal doses. Interaction and interface between Radiological Control and Operations personnel in an Enriched Uranium facility is excellent, contributing to the safety of work activities.

YSO and BWXT have aggressively pursued establishment of an environmental management system. YSO has been actively involved in the implementation of the environmental

management system, including establishment of appropriate award fee incentives for environmental performance objectives. Based on ISO 14001 core elements, BWXT has fully integrated its environmental management system within the framework of the Y-12 ISM system. As a result, Y-12's ISM system adequately includes environmental management system requirements and identifies the environmental documents that must be followed to ensure that environmental requirements are achieved. In addition, BWXT has an effective pollution prevention program that has contributed to Y-12 receiving several awards, including a Best-In-Class award from the Secretary for innovative roadway paving applications, and recognition from NNSA/YSO for excellence in pollution prevention activities.



Y-12 Process Equipment

BWXT has made important improvements in its programs for ensuring configuration management of safety systems, and the safety systems reviewed at an Enriched Uranium facility were generally well designed, tested, and operated. Following OA's 2003 evaluation, BWXT made numerous improvements in its design engineering and configuration management programs. BWXT currently has an extensive and comprehensive set of conduct of engineering procedures, which are appropriate for promoting effective design and configuration control of nuclear facilities. Further, BWXT has significantly improved its unreviewed safety question (USQ) procedure, and is making concerted efforts to improve the quality of USQ reviews. Required testing and surveillances are being performed

on time to provide confidence that the systems will function if needed during an emergency. Operators are well trained and capable of performing their duties.

BWXT has established and implemented effective independent assessment and system engineer programs. Independent assessments are identified, prioritized, scheduled, planned, and performed using structured processes that result in numerous, rigorous evaluations of a broad range of safety programs and performance. Independent assessment topics include sitewide programs and issues as well as targeted activities and processes in specific organizations or functional areas. These assessments, managed by qualified and certified team leaders and selected team members from Quality Assurance and other site organizations, are identifying substantive issues for resolution and good practices. BWXT also has a mature system engineer program, which is supporting many activities to maintain configuration management of safety systems. BWXT has effectively institutionalized periodic, detailed evaluations of safety systems, which use a team of well-qualified personnel and have resulted in improvements in safety system functionality.

BWXT has established three activity-level work observation programs for identifying unsafe conditions and work practices and deficient processes, which provide real-time performance feedback to workers and supervision. The Behavior-Based Safety, Enhanced Floor Surveillance, and Conduct of Operations Representative programs focus the attention of trained and qualified observers, coworkers, supervisors, managers, and subject matter experts directly on field work activities, the point of greatest risk of injuries, exposures, or operational events. In addition to the one-on-one feedback and mentoring and the resulting safe work behavior improvements, these programs facilitate and encourage feedback to supervisors and management on barriers to safer and more efficient work performance.

The YSO oversight program is mature and improving. Y-12 uses an integrated office management solution (Pegasus) that has greatly improved YSO's programs for documentation of operational awareness information, issues management, staff tasking, correspondence tracking, assessment scheduling, corrective action tracking, and internal performance indicators. Pegasus is also used effectively to improve efficiency and promote accountability of YSO staff. The YSO Technical Qualification Program is a mature, efficient, and

effective program, and the Facility Representative Program is mature and effective. YSO has a noteworthy program that requires Facility Representatives and subject matter experts to meet specific goals for field time in facilities and has good

methods for tracking and reporting individual performance. YSO has a safety system oversight program that meets DOE expectations and has been effectively implemented. YSO oversight activities are generally well documented and effectively performed.

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Although many aspects of the Y-12 ISM program are effective, weaknesses were identified in implementation of work control processes, radiological work permits, configuration management for safety systems, and analysis of the technical bases for safety system parameters. There also are weaknesses in the BWXT issues management system.

BWXT line organizations and construction contractors have not implemented work control processes with sufficient rigor to ensure effective identification and analysis of activity/task-specific hazards and associated controls, and effective communication of the controls to workers. The work control processes used at Y-12 include the AJHA (the primary mechanism to perform and document task- or activity-level hazards analyses) and activity hazards analysis (used by some subcontractors). While these processes are generally adequate, weaknesses in implementation of the work control process were evident in all four types of work activities reviewed on this inspection: programmatic work, maintenance, relocation project activities, and construction activities. In addition, the weaknesses in implementation of the work control process were evident in several different Y-12 organizations. Similar concerns were evident in the 2003 OA inspection, but corrective actions have not been comprehensive or sufficiently effective. The weaknesses in implementation of the AJHA process have resulted in hazards to workers not being sufficiently analyzed and controlled. Also, potential hazards associated with contamination on some glovebox components and resident facility storage of hazardous materials in a construction area have not been sufficiently identified and analyzed. While the processes are generally sound, BWXT lacks an effective mechanism to ensure that certain controls (i.e., those not included in procedures) such as engineering controls, training, postings, and other administrative controls, are implemented.

Maintenance work is not always clearly defined or correctly categorized, resulting in insufficient analysis of hazards and some hazards not being adequately identified and

analyzed prior to work authorization. The new *Integrated Work Control Manual* provides a systematic approach to performing maintenance work safely and efficiently. However, the manual is not being fully utilized and effectively implemented. Details of the specific tasks to be performed are not consistently defined and used as a basis for subsequent hazards analysis. In addition, skill-of-the-craft standards are not adequately defined for planners to consistently determine whether work can be performed as minor work. In some cases, work is being incorrectly identified as minor work rather than complex work. The AJHA process is not used for minor maintenance, and minor maintenance constitutes a significant majority of the work performed. Therefore, hazards are not always systematically identified and analyzed for work incorrectly considered to be minor work.

Some DOE requirements are not effectively implemented by construction contractors. BWXT uses subcontractors for some of the construction projects at Y-12, and other construction projects are performed by contractors that contract directly with NNSA. BWXT work control processes have not been effective in ensuring compliance with contract safety requirements that are more restrictive than corresponding Occupational Safety and Health Administration (OSHA) requirements. Some requirements are not well understood or effectively enforced. In general, construction contractors understand and follow most OSHA safety requirements but are less familiar and less compliant with contract requirements that are more restrictive than corresponding requirements in OSHA regulations. For example, the noise level at which hearing protection is required by construction subcontracts is more conservative than that specified by OSHA, resulting in situations where hearing protection is not worn when required. For NNSA contractors, some tasks identified in safety plans are described in broad terms without sufficient detail to support effective identification of associated hazards and controls. The insufficient specificity in task identification likely contributed

to deficiencies in identification of hazards and controls (e.g., heat stress and silica exposure) in a number of cases.

Line management and radiological control personnel have not fully implemented radiological hazards analysis processes and have not developed radiological work permits with sufficient clarity to ensure that radiological controls are specified, are tailored to individual activities, and can be implemented. Although many aspects of the radiation protection program are effective, radiological hazards analysis activities, including the radiological work permit request form process, were not being implemented in accordance with established BWXT requirements for ensuring an adequate understanding of work scope before preparing and assigning permits. Some of the deficiencies result from lack of rigor in implementing procedural requirements, reliance on an expert-based approach, or staff members' belief that their process knowledge and/or familiarity gained from experience is sufficient. In addition, radiological work permit work descriptions are too generic, and controls are not effectively tailored to the specific work being performed, such that they can be followed as written. Further, there is no systematic mechanism to ensure that specified controls, such as briefings, are implemented before work is started.

BWXT has not applied the appropriate rigor, formality, and attention to detail in establishing and documenting the technical bases for important safety system parameters, such as operational safety requirement limits. Two important operational safety requirement limits for the fire protection system (the minimum required sprinkler water pressure value and the dry pipe sprinkler air pressure range value) at an Enriched Uranium facility do not have a well-documented basis. Furthermore, the operational safety requirement for the accountable steam condensate system isolation time (which is designed to prevent a criticality accident in case of a process malfunction) does not have an appropriate technical basis and may be non-conservative.

BWXT has not adequately implemented some of its design change, USQ, and preventive maintenance processes. BWXT did not effectively implement its design change process to ensure that the technical basis index summary for the accountable steam condensate system remained current. A recent design change for the dry vacuum system to downgrade the safety classification was not adequately justified to ensure that system safety functions were maintained.

BWXT did not adequately implement its USQ procedure for performing USQ screenings and determinations for several proposed changes at an Enriched Uranium facility and did not adequately implement its work planning, control, and execution process to ensure that a USQ determination was valid at the time the associated facility change was implemented. BWXT has not adequately established the technical basis for and implemented preventive maintenance on some safety-grade components in the dry vacuum and accountable steam condensate systems to ensure their reliability.



Y-12 Site

BWXT has not established or implemented a fully effective issues management program that captures all safety process and performance issues, regardless of the source, and that provides consistent evaluation and resolution with appropriate recurrence controls. Safety issues identified by internal and external independent assessments and reportable events and nuclear safety non-compliances are generally rigorously managed to closure. However, safety process and performance deficiencies, including adverse trends, from other sources are not required by procedures to be managed using the institutional processes or tracking tool. In other cases, significance screening is required by procedures, such as for non-reportable event critiques and management assessments, but the required screenings are often not performed, classification of issue significance is not conservative, or categorized findings are not put into the tracking system as required. Some previously identified process and performance deficiencies, such as inadequacies in hazards analysis and controls and critique issue management, have not been effectively addressed and have been closed

prematurely. The documentation and investigation of some occupational injuries and exposures involving work planning and control deficiencies have not been adequately performed to identify root and contributing causes and implement effective recurrence controls.

The ECP for YSO does not meet some requirements of DOE Order 442.1A, *Employee Concerns Program*. Historically, the Oak Ridge Operations Office managed an ECP that encompassed YSO and the Y-12 Site. Recently, the NNSA Service

Center was assigned responsibility for supporting the ECP for YSO; however, the Service Center does not currently provide all the needed support. Currently, the ECP for YSO has weaknesses in processes, training, investigative files, and assessments. The YSO manager has directed YSO to establish a fully compliant, stand-alone ECP at Y-12, which will be maintained until the Service Center capability is online and demonstrates the ability to assume the responsibilities for handling employee concerns.

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4.0 Summary Assessment

The following paragraphs provide a summary assessment of the YSO and BWXT activities that were evaluated by OA during this inspection. Additional details relevant to the evaluated organizations are included in the technical appendices of this report.

ISM Core Function Implementation

For the most part, Y-12 has effective processes, and most hazards were appropriately analyzed and controlled. However, implementation of the Y-12 processes was not always sufficiently rigorous, resulting in some hazards that were not effectively analyzed and controlled.

Programmatic Work at an Enriched Uranium facility. Existing procedures or other technical work documents adequately define the scope of work for most current manufacturing operations, and project and work schedules adequately define production needs. BWXT has adequately documented the AJHA process and the Manufacturing Division is using the AJHA process for new activities. In most cases, controls are established and implemented for recognized hazards. Most program work observed by OA was performed within established controls, and workers indicated that they felt empowered to stop work if safety concerns arose. However, some deficiencies exist. The Manufacturing Division has not implemented the new AJHA process sufficiently to ensure adequate activity/task-level hazards analyses in all cases, and minimal effort has been expended by the Manufacturing Division to migrate older job hazards analyses to the new system. Some of the resulting hazard controls are not specific enough to adequately address the actual hazards of the job, and administrative requirements do not provide a process to ensure that all AJHA controls are implemented. Additionally, although the facility radiological hazards are generally well characterized, the radiological hazards analysis process used to develop radiological work permits is not implemented with sufficient rigor. Radiological work permit work descriptions are too

generic, controls are not effectively tailored to the specific work being performed, and workers have not received required briefings.

Maintenance. ISM implementation in maintenance work at Y-12 is not yet effective and mature. BWXT has an *Integrated Work Control Manual* that is the primary means of implementing ISM for maintenance work. The manual includes requirements for planning, scheduling, performing, and reviewing work, but this manual has only been in place for a few months. The AJHA system and the Maintenance Planning Guide are well defined and are generally adequate to accomplish work safely, but are not being effectively implemented for many work activities, including complex work and minor work. In some cases, these processes are cumbersome, and planners and supervisors are not effectively using them. This situation is particularly evident in the extensive use of minor work classifications for complex jobs. Subsequent hazards analyses and identification of controls are inadequate to ensure that all necessary controls are effectively integrated into work.

Glovebox Relocation Project. The glovebox relocation project is a project involving the reduction of the Y-12 security area through the relocation of two positive pressure gloveboxes to another site facility. Significant resources have been expended in defining and managing work scope and resources; analyzing hazards at the facility, project, and work activity level; ensuring that the appropriate hazard controls are identified and implemented; and performing work safely. However, there are also opportunities for improvement in several areas. The operation of a positive pressure glovebox requires a level of contaminant control for equipment dismantlement that has not been ensured through routine surveys. Informal assumptions about glovebox leakage have not been adequately proven and documented. AJHAs for some of the initial work activities for this project did not have job-specific hazards and controls, although improvements are evident since the work control processes were revised in April 2005. The two radiological work permits for this project do not bound all of the potential radiological

hazards as defined in project work documents, and in some cases the work packages do not reflect new or clarified hazards and controls. In one case, resident facility waste may not have been appropriately characterized, and was stored in a construction area without the potential consequences being appropriately analyzed. Although improvements are needed in the aforementioned areas, the overall work activities meet most ISM objectives.



Y-12 Decontamination and Decommissioning Project

Construction. Processes have been established and implemented to define the scope of work and the job steps or tasks necessary for performing this work. The AJHA and activity hazards analysis processes are being used effectively to identify many physical and environmental hazards associated with construction work. BWXT has established an adequate set of ES&H requirements and appropriate mechanisms for conveying these requirements to the construction workforce through contracts, activity hazards analyses, daily briefings, weekly safety meetings, and training. The level of compliance with established requirements is generally good. While established processes are generally appropriate, there are weaknesses in implementation of the established processes for analyzing hazards and establishing and implementing controls. Some tasks for work performed by NNSA construction contractors are not defined in sufficient detail in activity hazards analyses to support identification of appropriate hazards and controls. In addition, hazardous material exposure health hazards are not consistently addressed in AJHAs or activity hazards analyses, and expectations for identifying and analyzing health hazards have not been made clear through contract requirements or procedures. Noise levels are not routinely monitored at some construction sites. Expectations for identification and analysis of pre-existing site-related hazards are not clear, and some

hazards have not been identified or adequately analyzed by BWXT. Some controls are not adequately tailored to address planned tasks and anticipated hazards and some requirements are not well understood or effectively implemented and enforced. In particular, contract requirements that are more restrictive than corresponding OSHA requirements are not always met. Inattention to detail with regard to some hazard controls represented a potential safety risk to workers, particularly for BWXT-subcontracted and NNSA-contracted construction projects.

Environmental Management System

YSO provides effective direction to and oversight of BWXT for the development and implementation of an environmental management system, and has provided appropriate incentives to achieve environmental management system and pollution prevention expectations. The environmental management system is fully integrated within ISM, and the required elements from ISO 14001 have been achieved. The site has a proactive pollution prevention program that has received a number of awards. However, Y-12 does not have a centralized program for funding pollution prevention projects to ensure that cost-effective projects are implemented.

Chronic Beryllium Disease Prevention Program

The Y-12 chronic beryllium disease prevention program is comprehensive and effective. YSO and BWXT management communicate and coordinate effectively to monitor and continually improve the program. The program manual effectively delineates the 10 CFR 850 requirements and best practices developed by BWXT. YSO and BWXT are actively involved in the Headquarters Beryllium Working Group and have contributed to the DOE-wide lessons-learned program. Although analysis and feedback are an integral part of the process, a recent event raised concerns about the sampling protocols in beryllium buffer areas and the critique process used to identify and correct events below the regulatory reporting requirements.

Hoisting and Rigging

NNSA and BWXT have applied OSHA hoisting and rigging requirements to all construction work at

the Y-12 site. Most activities were well planned, and all equipment met established requirements. Two instances were observed where inattention to detail resulted in hazards and/or controls being missed. Additionally, the more conservative NNSA hoisting and rigging standards are not included in the BWXT prime contract and have not been imposed on subcontractors.

Essential System Functionality

BWXT has appropriate programs in place to ensure the functionality of the safety systems that OA evaluated at an Enriched Uranium facility (i.e., fire protection sprinkler systems, dry vacuum, and accountable steam condensate). The engineering and configuration management programs have significantly improved since OA's evaluation in 2003 and are now generally well defined and appropriate. BWXT has established the appropriate types and levels of procedures for effective control of the conduct of engineering and configuration management. The safety systems reviewed are generally well designed and adequately surveillance tested. Furthermore, operator and fire department procedures and training are appropriate, and operations personnel demonstrate good knowledge of the systems and an ability to properly implement their procedures. Many aspects of maintenance are adequate; however, the technical bases for the preventive maintenance of the dry vacuum and accountable steam condensate systems was not well defined and did not adequately address component reliability.

Although the current engineering design and configuration management programs are appropriate, the implementation of design and configuration management requirements has some weaknesses, including inadequate maintenance of the technical basis index summary for the accountable steam condensate system, inappropriate treatment of a temporary modification as a repair, and incomplete and inadequate technical justification of a modification to the dry vacuum system hopper tank access door. Further, some weaknesses were identified in the USQ procedure and its implementation, resulting in deficiencies in USQ screening worksheets and determinations. Weaknesses were also identified in the rigor of ensuring design inputs and inputs for operational safety requirement controls that, although developed prior to the configuration management program improvements, degrade the current level of assurance of system functionality. BWXT has taken some action to address this problem

for future design work but has not adequately addressed potential existing design input flaws.

BWXT has made noteworthy improvements in its engineering programs, and most engineering work evaluated during this review was well done. Some weaknesses, both from work performed prior to the program improvements and during implementation of current requirements, indicate that further improvement is needed to provide greater assurance of safety system functionality.

Documented Safety Analysis Transition

BWXT has developed generally appropriate procedures for preparing new 10 CFR 830-compliant safety basis documents for an Enriched Uranium facility and submitted an initial revision of the safety basis to YSO in September 2004. YSO has provided an adequate review of the September 2004 safety basis and YSO and BWXT are working well to resolve comments and complete the safety basis. The implementation plan for the new safety basis does not include adequate requirements for reconciling it with all the changes generated against previous versions and for flowing down all requirements, assumptions, and controls into facility procedures and training. There are also a few technical deficiencies in BWXT's safety basis development procedures and the resulting safety basis document at an Enriched Uranium facility, including guidance for categorizing the frequency of fires is incomplete and the technical bases for the technical safety requirements' limits on fire sprinkler water supply pressure are not well documented.

Safety System Oversight

YSO has a generally robust safety system oversight program and is providing effective oversight of the vital safety systems that OA evaluated during this evaluation. BWXT has a generally effective system engineer program that is well implemented in most aspects. Furthermore, BWXT has an effective program for performing assessments of vital safety systems. OA identified some weaknesses in system engineer performance of specialized tasks (e.g., design modification development and USQ process) that indicate that either the training and qualification program is not ensuring that engineers are well prepared to perform these duties or that the process for performing these tasks may not ensure that persons with appropriate expertise are supporting these efforts. In

addition, system engineers were not formally trending safety system performance. Notwithstanding these weaknesses, overall YSO and BWXT safety system oversight programs are adequately defined and implemented.

BWXT Feedback and Improvement

BWXT has established and implemented many effective feedback and improvement processes, and the metrics for such areas as injuries and illnesses and the occurrence reporting and processing system indicate gradually improving performance. BWXT has made improvements to some feedback and improvement processes and conducts many assessment and inspection activities that result in safer work environments, improved safety processes, and better performance. Most contractor assurance system elements have been adequately detailed in program descriptions and institutional procedures, and some program elements, such as independent assessments, are comprehensive and rigorously implemented. Progress has been made in the quality of management self-assessments. Many safety issues identified in independent or external assessments are effectively addressed using the issues management system and review boards to manage evaluations and dispositions. Many lessons learned are identified and applied to work planning and performance. Several recently implemented programs have focused on improving operational and general safety performance through surveillance and coaching by coworkers, supervision, and management. However, process and performance weaknesses in some feedback and improvement programs are hindering the achievement of performance excellence and continuous safety improvement. Weaknesses persist in the consistent and rigorous documentation and management of all safety issues regardless of their source; these weaknesses could mask performance issues and impede continuous safety improvement. Many lower level deficiencies are not being accurately classified, properly evaluated, or formally managed to effective resolution. The description, investigation, and analysis

of some injury and exposure events are not performed with sufficient rigor to accurately identify root causes and implement recurrence controls. Weaknesses also continue in the identification, communication, and application of lessons learned from other DOE facilities and in sharing of locally generated lessons with the DOE complex.

NNSA/YSO Oversight

NNSA Headquarters and YSO are actively engaged at Y-12 and are providing effective direction and oversight in most aspects of ES&H programs. YSO has well-defined programs and generally good procedures, and has used the Pegasus system effectively to manage information, improve efficiency, and enhance accountability of YSO staff. YSO has achieved ISO 9001 registration, which is an internationally recognized quality management standard. The YSO Facility Representative Program and Technical Qualification Program are mature and effective programs. YSO continues to have an effective program for evaluating contractor performance using the performance analysis matrix and performance evaluation plan. Assessments are performed as required, although assessment rigor and documentation varies from assessor to assessor within YSO. Corrective action tracking for YSO assessments of contractors and YSO self-assessments are generally effective. Additional management attention is needed to enhance oversight of construction safety and ensure that sufficient resources are devoted to accomplish scheduled assessments in a few areas. In addition, YSO is not fully utilizing available information to refine its oversight priorities, and its lessons-learned program is not mature. The ECP for YSO currently has a number of weaknesses following a transition of responsibilities from the Oak Ridge Operations Office to the NNSA Service Center; however, the YSO manager has directed YSO to establish a fully compliant, stand-alone ECP at Y-12, which will be maintained until the Service Center capability is online and demonstrates the ability to assume the ECP responsibilities.

YSO and BWXT have established ISM systems that are conceptually sound. BWXT also has appropriate programs in place to ensure the functionality of the evaluated safety systems at an Enriched Uranium facility, and engineering and configuration management programs have significantly improved since 2003. YSO and BWXT have addressed the complex issues associated with implementing an environmental management system, a chronic beryllium disease prevention program, and safety system oversight and have implemented appropriate actions to meet applicable requirements. Many aspects of YSO and BWXT feedback and improvement programs are functioning effectively.

However, there are weaknesses in implementation of BWXT site processes in a number of areas, including work control processes, radiological work permits, construction safety requirements, design change control, and the USQ process. There are also weaknesses in BWXT issues management processes that hinder

effective resolution of deficiencies. Improvements in issues management processes are key to achieving the needed improvements in safety management across Y-12 activities and essential systems. Continued attention is also needed to ensure that the documented safety analysis transition is effective.

YSO and BWXT have recognized some of the implementation weaknesses and have taken or initiated some appropriate actions. For example, the new *Integrated Work Control Manual* was developed to improve the implementation of hazards analysis and control processes at the task level for maintenance activities; the manual defines an effective and systematic process for performing work safely. In addition, BWXT is in the process of reorganizing its ES&H support to provide more focus on activity-level hazards and work controls. While much work remains, some of the recent initiatives are appropriate steps toward addressing observed deficiencies.

6.0 Ratings

The ratings reflect the current status of the reviewed elements of the Y-12 ISM program.

Implementation of Core Functions #1-4 for Selected Work Activities

Y-12 ACTIVITY	CORE FUNCTION RATINGS			
	Core Function #1 – Define the Scope of Work	Core Function #2 – Analyze the Hazards	Core Function #3 – Identify and Implement Controls	Core Function #4 – Perform Work Within Controls
Programmatic Work at an Enriched Uranium facility	Effective Performance	Needs Improvement	Needs Improvement	Effective Performance
Maintenance	Needs Improvement	Needs Improvement	Needs Improvement	Effective Performance
Glovebox Relocation Project	Effective Performance	Needs Improvement	Effective Performance	Effective Performance
Construction	Effective Performance	Needs Improvement	Needs Improvement	Effective Performance

Essential System Functionality

Engineering Design NEEDS IMPROVEMENT
 Configuration Management EFFECTIVE PERFORMANCE
 Surveillance and Testing EFFECTIVE PERFORMANCE
 Maintenance NEEDS IMPROVEMENT
 Operations EFFECTIVE PERFORMANCE

Feedback and Improvement - Core Function #5

YSO and BWXT Feedback and Continuous Improvement Processes NEEDS IMPROVEMENT

APPENDIX A

SUPPLEMENTAL INFORMATION

A.1 Dates of Review

Planning Visit	August 8 – 12, 2005
Onsite Inspection	August 22 – September 2, 2005
Report Validation and Closeout	September 13 – 15, 2005

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Director, Office of Security and Safety Performance Assurance
Michael A. Kilpatrick, Director, Office of Independent Oversight and Performance Assurance
Patricia Worthington, Director, Office of Environment, Safety and Health Evaluations
Thomas Staker, Deputy Director, Office of Environment, Safety and Health Evaluations

A.2.2 Quality Review Board

Michael Kilpatrick	Patricia Worthington
Dean Hickman	Robert Nelson

A.2.3 Review Team

Thomas Staker, Team Leader			
Phil Aiken	Vic Crawford	Brad Davy	Ivon Fergus
Marvin Mielke	Jim O'Brien	Shivaji Seth	Robert Compton
Al Gibson	Joe Lischinsky	Jim Lockridge	Joe Panchison
Don Prevatte	Michael Shlyamberg	Ed Stafford	Mario Vigliani

A.2.4 Administrative Support

Lee Roginski	Tom Davis
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A.3 Ratings

The Office of Independent Oversight and Performance Assurance uses a three-level rating system to provide line management with a tool for determining where resources might be applied toward improving environment, safety, and health. It is not intended to provide a relative rating between specific facilities or programs at different sites because of the many differences in missions, hazards, and facility life cycles, and the fact that these reviews use a sampling technique to evaluate management systems and programs. The three ratings and the associated management responses are:

- Effective performance, which indicates that management should address any identified weakness
- Needs improvement, which indicates a need for significantly increased management attention
- Significant weakness, which indicates a need for immediate management attention, focus, and action.

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APPENDIX B

SITE-SPECIFIC FINDINGS

Table B-1. Site-Specific Findings Requiring Corrective Action

FINDING STATEMENTS
1. BWXT line organizations and subcontractors have not implemented the AJHA and AHA processes with sufficient rigor to ensure effective identification, analysis, and tailoring of activity/task-specific hazards and associated controls, and effective communication of the controls to workers.
2. BWXT line management and Radiological Control personnel have not implemented the RWP request form and associated hazards analysis process with sufficient rigor to ensure effective radiological hazards analysis.
3. The BWXT RWP process does not ensure that RWPs have adequate work scope descriptions, have appropriate controls that are tailored to specific activities, or that workers receive required RWP pre-job briefings.
4. BWXT maintenance work is not always clearly defined with sufficient detail to support hazards analysis, resulting in some work being incorrectly identified and planned as minor work rather than complex work.
5. Most BWXT maintenance work orders are not subject to any systematic hazards analysis, resulting in some hazards not being adequately identified and analyzed prior to work authorization.
6. Controls are not always clearly identified, appropriately tailored to the work being performed, and integrated into the work documents, resulting in controls not being implemented during the course of BWXT maintenance work.
7. Some glovebox disassembly and relocation activity-level hazards have not been adequately identified, analyzed, documented, or sufficiently linked to the work activity by BWXT.
8. NNSA has not ensured that tasks identified in AHAs for NNSA construction projects are defined in sufficient detail to support effective identification of hazards and controls, and AHAs do not address all hazards or controls.
9. BWXT work control processes have not been effective in ensuring compliance with NNSA safety requirements that are more restrictive than corresponding OSHA requirements for construction activities.
10. The employee concerns program for YSO does not meet some requirements of DOE Order 442.1A, <i>Employee Concerns Program</i> .
11. BWXT has not established and implemented a fully effective corrective action program that ensures that all safety deficiencies, especially those identified during less formal assessments and reviews, are appropriately documented, properly categorized for significance, and evaluated in a timely manner, with accurate causal analysis and extent of condition evaluations, and identification of appropriate recurrence controls.

Table B-1. Site-Specific Findings Requiring Corrective Action (continued)

FINDING STATEMENTS
12. BWXT is not sufficiently documenting and investigating occupational injuries and illnesses that involve work control deficiencies to consistently identify root causes and implement effective corrective and preventive actions.
13. BWXT has not established and implemented a lessons-learned program that ensures that applicable externally generated lessons learned are identified and actions are taken to apply the lessons learned to improve safety performance and prevent adverse events or non-compliances.
14. BWXT has not applied the appropriate rigor, formality, and attention to detail in establishing and documenting the technical bases for some important safety system parameters, such as certain OSR limits.
15. BWXT did not effectively implement its design change process to ensure that the ASC TBIS remained current and that the DV system remained functional during a recent design change.
16. BWXT did not adequately implement its USQ procedure for performing USQ screenings and determinations for several proposed facility changes at an Enriched Uranium facility and did not adequately implement its work planning, control, and execution process to ensure that a USQD is valid at the time the associated facility change is implemented.
17. BWXT has not adequately established the technical basis for and implemented preventive maintenance on some safety-grade components in the dry vacuum and accountable steam condensate systems to ensure their reliability, as required by DOE Order 420.1A.