

**Office of Enterprise Assessments Review of the
Y-12 National Security Complex
Emergency Management Exercise Program**



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Acronyms

CAP	Corrective Action Plan
CDNS	Chief of Defense Nuclear Safety
CNS	Consolidated Nuclear Security, LLC
COGCON	Continuity of Government Condition
CRAD	Criteria, Review, and Approach Document
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EEG	Exercise Evaluation Guide
EMPO	Emergency Management Program Organization
EPHA	Emergency Planning Hazards Assessment
ERAP	Emergency Readiness Assurance Plan
ERO	Emergency Response Organization
FPO	Fire Protection Organization
FY	Fiscal Year
HAZMAT	Hazardous Material
IMS	Issues Management System
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
NSC	National Security Complex
OE-1	Operating Experience Level 1
OFI	Opportunity for Improvement
PSS	Plant Shift Superintendent
TSC	Technical Support Center
Y-12	Y-12 National Security Complex

**Office of Enterprise Assessments Review of the Y-12 National Security Complex
Emergency Management Exercise Program**

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a review of National Nuclear Security Administration's (NNSA) Y-12 National Security Complex (Y-12) exercise program. This review complements EA's severe event response review performed at Y-12 in 2014 to allow conclusions based on a more complete evaluation of the exercise program. The purpose of this EA assessment was to evaluate the exercise program's effectiveness in validating, through tests and demonstrations, all elements of the Y-12 emergency management program and fostering continuous program improvements. EA performed this review from March 24 to April 9, 2015. EA also drew on its observations of Y-12 exercise planning and execution activities from the 2014 site-level exercise to reach conclusions for this review.

Operating contractor Consolidated Nuclear Security, LLC (CNS) manages the site-level emergency management program, and the NNSA Production Office (NPO) provides Federal oversight.

CNS appropriately uses exercise plans and evaluation results to document the site's readiness to respond to Operational Emergencies. EA found that CNS has a comprehensive process for evaluating exercises that ensures an effective and reliable evaluation of emergency responder performance. Exercise packages contain appropriate exercise objectives and evaluation criteria, and CNS uses experienced and well-trained evaluators. CNS also prepares in-depth after-action reports that list issues noted during the exercise, along with recommended actions to correct those issues, and exercise evaluators provide critical assessments of emergency response performance. In addition, CNS has a detailed process for resolving issues that includes appropriate instructions for developing corrective actions to prevent recurrence and for tracking the closure of corrective actions using the contractor issues management system. CNS develops timely corrective actions with reasonable due dates and provides adequate closure evidence for issues in the issues management system. NPO conducts numerous performance-based assessments of the CNS emergency management program and has a comprehensive issues management process.

Notably, the CNS implementation of Exercise Builder, a DOE-produced, computer-based tool for developing emergency exercises, is a best practice, resulting in the exceptional development of a comprehensive baseline of ERO and response organizations' objectives, response steps, and evaluation checklists and criteria. The CNS implementation of a site-level drill and exercise committee is also a best practice, supporting the CNS exercise coordinator, with key responsibilities for coordinating the Y-12 exercise schedule with their organizations, providing input to scenario development, serving as controllers or evaluators during drills and exercises, and reviewing drill and exercise after-action reports for technical and factual accuracy.

However, EA identified some weaknesses in CNS's and NPO's implementation of the emergency exercise program:

- During the past five years, CNS has not validated its planning for some important aspects of the Y-12 emergency management program, such as responding to an onsite Office of Secure Transportation event, utilizing alternate command centers, or implementing the response plan for a City of Oak Ridge Water Treatment Plant event.
- CNS has not defined which exercise improvement items require tracking in the issues management system and has not used this system for many improvement items (from exercises)

and observations (from self-assessments). Until this EA review, contractor assurance personnel had discouraged emergency management personnel from using the system for improvement items and observations. CNS also did not take timely corrective actions to resolve some indicators of emergency response organization performance issues. In addition, CNS documented the status of some improvement items and findings as closed before correcting them, and several corrective actions were not structured to prevent recurrence of the issue. Finally, the only means CNS uses to track the status of improvement items and observations not tracked in the Issues Management System is its annual summaries for exercises and self-assessments.

- NPO does not consistently perform comprehensive evaluations of the contractor program and does not document its evaluation criteria in contractor assessment reports, and those reports are not completed in a timely manner. NPO also does not use its issues management process to track most of the emergency management issues that require NPO action.

Overall, CNS and NPO have a well-established exercise program. For the most part, the exercise program complies with DOE order requirements and has been mostly effective in validating all program elements, identifying findings, and fostering program improvements.

Office of Enterprise Assessments Review of the Y-12 National Security Complex Emergency Management Exercise Program

1.0 PURPOSE

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a review of the emergency management exercise program at National Nuclear Security Administration's (NNSA) Y-12 National Security Complex (Y-12). This review complements EA's severe event response review performed at Y-12 in 2014 to allow conclusions based on a more complete evaluation of the Consolidated Nuclear Security, LLC (CNS) exercise program. The purpose of this EA assessment was to evaluate the exercise program's effectiveness in validating, through tests and demonstrations, all elements of the Y-12 emergency management program and fostering continuous program improvements.

EA performed this review from March 24 to April 9, 2015. This report discusses the scope, background, methodology, results, and conclusions of the review. The review team's findings and opportunities for improvement (OFIs) are also included.

2.0 SCOPE

This EA review assessed the effectiveness and implementation of the emergency management exercise program established by CNS, as well as the line oversight of the exercise program provided by the NNSA Production Office (NPO). The *Plan for the Office of Enterprise Assessments Review of Emergency Management at the Y-12 National Security Complex*, dated February 20, 2015, describes the specific focus of this review. This review evaluated the site's exercise program to determine whether it uses plausible and realistic Operational Emergency event scenarios, validates all elements of the emergency management program, effectively evaluates emergency response, properly conducts exercises, and provides a means to improve the site's preparedness to respond to Operational Emergencies. The review evaluated key exercise program documents; exercise planning and implementation activities for the 2014 site annual exercise; exercise after-action reports for the past five years; corrective action processes for deficiencies, weaknesses, and improvement items identified during exercises; and use of lessons-learned programs.

3.0 BACKGROUND

Y-12 provides critical elements of the NNSA's missions that ensure the safety, reliability, and performance of the U.S. nuclear weapons deterrent. Y-12 also uses its unique capabilities to support research reactor programs for the United States and international customers; other Federal agencies (the Department of Defense and Department of Homeland Security); state and local governments; and private-sector companies. Y-12 has significant quantities of radioactive material and hazardous chemicals, requiring Y-12 to have an Operational Emergency hazardous material (HAZMAT) program in accordance with DOE Order 151.1C, *Comprehensive Emergency Management System*.

Y-12 has a site-level emergency response organization (ERO), which responds to all emergency events within the Y-12 boundaries. As the 24-hour point of contact for Y-12, the plant shift superintendent (PSS) initially directs site-level responses. When an Operational Emergency occurs at Y-12, personnel notify the PSS, who then implements the emergency plan and procedures. The PSS initially categorizes the incident and determines the proper emergency class in accordance with established emergency action

levels, and may activate the ERO. The PSS transitions site-level response to the Technical Support Center (TSC) when it becomes operational. The TSC provides site-level support to the incident commander, including activating and deploying site response assets to the scene, activating mutual aid requests, providing technical support such as site field monitoring, and conducting initial coordination with state and local governments until the Emergency Operations Center is operational. The Emergency Control Center supports the TSC by performing notification and communications functions.

Although each ERO member is required to participate in one exercise annually, CNS has recognized the importance of providing additional drill and exercise opportunities to sustain and improve the proficiency of the ERO, exercise controllers and evaluators, and the emergency management program organization (EMPO) staff responsible for implementing the drill and exercise programs.

The EA assessment program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management's performance in safety and security and other critical functions as directed by the Secretary of Energy. The EA program is described in and governed by DOE Order 227.1, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspector guides, and process guides.

This EA review evaluated the Y-12 exercise program to assess how thoroughly the site-level exercises tested the Y-12 emergency management program over the past five years and how effective the exercise program has been in fostering continuous improvements and lessons learned. As part of the five-year program review, EA also examined the use of severe event exercise scenarios described in the 2013 DOE's Operating Experience Level 1 (OE-1), *Improving Department of Energy Capabilities for Mitigating Beyond Design Basis Events*. EA also examined how the corrective action process was applied to address the internal findings from the CNS after-action report from the 2014 site-level exercise.

EA's exercise review in 2014 identified several strengths. Personnel generally demonstrated strong situational awareness throughout the exercise and effectively performed most of their assigned duties. Y-12's computerized information management system effectively linked Y-12 response facilities, field response elements, and offsite command centers. However, EA observed some performance issues. Significantly, the PSS did not issue instructions on the protective actions that plant personnel should take, and the ERO did not verify whether protective actions had been implemented. During the post-exercise critique, site evaluators discussed the omission of protective actions and included it in the CNS after-action report. EA also identified some additional weaknesses in information management and coordination between Y-12 and the State of Tennessee ERO. This 2015 review evaluated the effectiveness of corrective actions associated with these issues by looking at corrective action plans (CAPs); the processes used to rank findings and to track and close out corrective actions; and the records and documents that serve as objective evidence of completed actions.

4.0 METHODOLOGY

As identified in the EA review plan, this review considered the requirements related to the emergency management exercise program issued through DOE Order 151.1C for an Operational Emergency HAZMAT program. The EA review team used key aspects of these requirements as set out in the inspection criteria and lines of inquiry of Criteria, Review, and Approach Document (CRAD) 45-61, *Exercise Program Review and Severe Event Response Evaluation*. EA completed the Y-12 review under CRAD 45-61 through two inspections and separate reports. In 2014, EA evaluated the site's response to a postulated severe event, as planned and conducted by CNS for the Y-12 annual site-level exercise, and

issued a report on the site's response. This 2015 report discusses both EA's exercise program review and the site's actions addressing findings from the CNS 2014 after-action report.

To gather data for this 2015 review, the EA team examined key documents, such as the Y-12 emergency plan, exercise program implementing procedures, exercise plans, exercise schedules, the set of exercise objectives and criteria, after-action reports, CAPs, the corrective action tracking system, records associated with corrective action closure, and CNS's use of the Y-12 and DOE corporate lessons-learned programs. The EA team also interviewed key personnel responsible for developing and executing the exercise program and used the observations from the 2014 exercise in arriving at conclusions. The members of the EA team, the Quality Review Board, and EA management responsible for this review are listed in Appendix A. Appendix B provides a detailed list of the documents reviewed and personnel interviewed.

5.0 RESULTS

The results of this review are organized around six principal components of an exercise program: exercise plans and procedures, exercise evaluations, after-action reports, exercise conduct, program improvements, and lessons learned. In addition, Section 5.4 addresses the severe event exercise evaluation component described in OE-1.

5.1 Exercise Plans and Procedures

Review Criteria:

A formal exercise program must validate all elements of an emergency management program over a 5-year period. The exercise program must validate facility and site-level emergency management program elements by initiating response to simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicates an integrated emergency response to an actual event. Planning and preparation must use an effective, structured approach that includes documentation of specific objectives, scope, time lines, injects, controller instructions, and evaluation criteria for realistic scenarios. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA reviewed the CNS emergency plan, exercise and drill standards, the baseline ERO and response organizations' objectives, response steps, evaluation checklists and criteria, the 2014 exercise after-action report, the five-year exercise schedule, exercise plans from the most recent five-year period, and records of exercise plan approval.

CNS implements a comprehensive exercise program to validate the site emergency management program. CNS has thoroughly documented the exercise program description and implementing processes in EMPO-500, *Y-12 NSC [National Security Complex] Emergency Plan*; EMPO-517, *Y-12 National Security Complex Drill and Exercise Process*; and Y40-148, *Emergency Management Exercises*. EMPO adequately documents the schedule for executing an ongoing five-year exercise program in EMPO-537, *Y-12 Five Year Exercise Plan*. In addition, CNS adequately describes implementation of evaluated drills in procedure Y40-136, *Emergency Management Drills*. Collectively, these exercise program documents incorporate the applicable DOE Order 151.1C requirements.

CNS delineates the processes that Y-12 uses to design, develop, conduct, evaluate, and document sitewide emergency management drills and exercises in EMPO-517, the *Y-12 National Security Complex Drill and Exercise Process*. Importantly, EMPO has fully implemented Exercise Builder, Version 8, a DOE-produced, computer-based tool for developing emergency exercises. This tool has allowed CNS to generate consistent and detailed drill and exercise plans and after-action reports. EMPO uses Exercise

Builder for both exercises and emergency management drills; the Y-12 Drill and Exercise Process delineates the individual component requirements for development of a drill or exercise plan. Notably, the CNS implementation of Exercise Builder is a best practice, resulting in the exceptional development of a comprehensive baseline of ERO and response organizations' objectives, response steps, and evaluation checklists and criteria.

Y-12 has a single ERO that responds to all emergency events within the Y-12 boundary. CNS conducts multiple exercises and evaluated drills to allow all primary and alternate ERO cadre members to participate in at least one exercise each year. For example, CNS conducted three exercises in 2014, four in 2013, six in 2012, and five in 2011. Although each ERO member is required to participate in one exercise annually, CNS has recognized the importance of providing additional drill and exercise opportunities to improve the proficiency of the ERO, exercise controllers and evaluators, and the EMPO staff responsible for implementing the drill and exercise programs.

CNS defines an emergency management drill or exercise as any drill or exercise that, when conducted, implements a Y-12 emergency management procedure or the Y-12 emergency plan. Operations drills that address facility- or process-specific emergency or abnormal events are conducted in accordance with Y90-027, *Conduct of Training Manual*, Chapter 8, Drills. EMPO uses a response element matrix and a Y-12 hazards matrix to ensure that exercises address all program elements and all documented specific hazards over a five-year period. Additionally, Y-12 participates in the NNSA Office of Emergency Operations no-notice exercise program; the last such exercise was successfully conducted on November 20, 2013. When appropriate, CNS has applied exercise evaluation criteria, documented in after-action reports, to actual responses to evaluate emergency management program elements. These include responses to:

- Changes in the continuity of government condition (COGCON) on January 18 and February 11, 2013, that resulted in an increase of continuity-of-operations readiness posture from COGCON 4 (normal operations) to COGCON 3 (elevated condition) and implementation of Y40-006, *Initial Response to Heightened Continuity of Government Condition*
- Severe weather conditions on February 12, 2014, that resulted in a sitewide phased release of non-essential personnel and validation of Y40-166, *Release of Personnel Due to Abnormal Conditions*
- Purification facility conditions on December 16, 2014, that resulted in an Alert declaration.

CNS appropriately maintains an annual exercise and drill schedule, and EMPO posts the schedule on the Y-12 intranet. CNS also uses an *ERO Response Element Matrix* to schedule and track individual response elements' participation. CNS has conducted at least one exercise each year that involves all contractors located at the site and designates one exercise each year as the annual exercise, which includes the recommended content of the 90-, 60- and 30-Day Exercise Plan (annual exercise) submissions to NPO and DOE Headquarters.

Although the CNS exercise program is comprehensive, EA identified some weaknesses. For example, in the past five years, CNS has not validated the planning for some important aspects of the Y-12 emergency management program, such as responding to an onsite Office of Secure Transportation event, utilizing alternate command centers, or implementing the response plan for a City of Oak Ridge Water Treatment Plant event. (See Section 8.0, **OFI-CNS-1**.) Additionally, CNS requires all Y-12 ERO elements to participate in a drill or exercise annually and specifies that if an ERO element does not participate in any of the site wide exercises, the responsible organization must conduct and document a drill or exercise to fulfill this requirement. During 2014, EA identified that the radiation dosimetry team and east and west personnel survey teams did not meet this requirement for annual exercise participation. (See Section 8.0, **OFI-CNS-2**.)

In conclusion, CNS has established a comprehensive exercise program to validate emergency management program elements at the site. The Y-12 emergency plan, implementing procedures, and exercise and drill process documents effectively incorporate the DOE requirements for the contents of an exercise plan. CNS has effectively implemented Exercise Builder, which has resulted in the development of a comprehensive baseline of ERO and response organizations' objectives, response steps, and evaluation checklists and criteria. Exercise plans for the past five years were adequately prepared in accordance with the implementing standards. However, CNS has not validated planning for some important elements of the Y-12 emergency management program during the past five years. Finally, a few CNS ERO elements did not adhere to established Y-12 requirements for ensuring that all ERO elements participated in an evaluated drill or exercise during 2014.

5.2 Exercise Evaluations

Review Criteria:

Exercises are evaluated and critiqued effectively and reliably and result in corrective actions and program improvements for identified program weaknesses. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA observed the 2014 exercise, some associated critiques at exercise venues, and the controller and evaluator debrief held after the 2014 exercise. EA also reviewed the site emergency plan, site emergency readiness assurance plans (ERAPs), EMPO exercise procedures, EMPO exercise and drill plans, and EMPO exercise after-action reports.

EMPO uses a comprehensive process for evaluating exercises and fully describes the exercise evaluation process in the Y-12 Drill and Exercise Process document, which includes all steps necessary for a critical evaluation of ERO performance. EMPO uses an experienced group of evaluators who are familiar with the areas assigned for evaluation. In addition, EMPO conducts a critique at each venue immediately after the exercise, using the protocol outlined in the Y-12 Drill and Exercise Process to foster critical assessments and to gather and document the observations of the participants. EMPO also conducts a formal evaluator and controller debrief after the exercise to determine whether the responders accomplished the individual exercise objectives, based on a synthesis of all the observations and information gathered during the conduct of the exercise. EMPO categorizes issues identified during exercises as either findings (further categorized as deficiencies or weaknesses) or improvement items as recommended by DOE Guide 151.1-3, *Programmatic Elements Emergency Management Guide*. EMPO enters findings and a few improvement items into the site Issues Management System (IMS); however, because EMPO has not defined what types of observations and improvement items must be entered into IMS, tracking of observations and improvement items in IMS has been inconsistent. (See Section 8.0, **OFI-CNS-3**.)

EMPO's exercise packages promote a thorough evaluation of their exercises. They contain appropriate and detailed exercise objectives, with observable, measurable evaluation criteria, evaluations checklists, and controller and evaluator instructions. The scenario material in the exercise packages is consistent with the exercise objectives and supports a demonstration of each objective. EMPO also evaluates whether emergency response facilities and equipment are readily available, operational, and habitable and whether emergency response procedures contain adequate content. Additionally, EMPO provides controllers and evaluators with exercise-specific training, rules of conduct, and appropriate guidelines on interactions with players before each exercise. EMPO ensures that sufficient staff from CNS and NPO are on hand to evaluate the performance and key decision-making of the responders during the exercise.

In conclusion, EMPO uses a detailed process for evaluating exercises that ensures an effective and reliable evaluation of emergency responder performance. The EMPO exercise packages contain

appropriate exercise objectives and evaluation criteria, and EMPO uses experienced evaluators and reinforces appropriate rules of conduct and interactions with players during training before each exercise. EMPO requires tracking of findings in IMS, but because they do not define what issues must be tracked in IMS, not all improvement items and observations are tracked.

5.3 After-Action Reports

Review criteria:

Evaluation reports for facility and site exercises must be completed within 30 working days and submitted to the Cognizant Field Element, the Program Secretarial Officer(s), and the Director, Office of Emergency Operations. (DOE Order 151.1C)

For this portion of the review, EA reviewed the site emergency plan, EMPO exercise procedures, and EMPO exercise after-action reports.

EMPO prepares detailed, timely exercise after-action reports that identify many issues requiring resolution and demonstrate that the exercises were effectively and reliably conducted, controlled, and critiqued. EMPO conducts critical assessments of the input received from evaluators, and the after-action reports identify findings and numerous improvement items, correlated with the applicable exercise objectives. EMPO also includes recommended corrective actions for the findings and improvement items and identifies the organization responsible for resolution. In addition to documenting whether objectives were met, EMPO typically includes evaluators' comments on the responders' proficiency, communications, coordination, and familiarity with procedures and equipment.

The evaluators' comments also note instances where the evaluator either did not observe ERO performance or felt the performance did not meet the evaluation criteria or procedure requirements; EMPO did not categorize some of these issues as findings or improvement items warranting corrective action, leading to continued inadequate performance and to findings in subsequent exercises. For example, after a fiscal year (FY) 2013 exercise, an evaluator commented that the PSS waited 25 minutes before making onsite protective action announcements and made no follow-on announcements, but EMPO did not categorize this issue as a finding or improvement item and did not implement any corrective actions. In an FY 2014 exercise, the PSS again made no onsite protective action announcements, and EMPO categorized the issue as a finding. In another case, when an evaluator commented after an FY 2010 exercise that fire protection organization (FPO) personnel did not follow their decontamination procedure, EMPO did not categorize the issue as a finding or improvement item and FPO did not implement any corrective actions. Evaluators noted the same issue in two subsequent exercises (FY 2011 and FY 2013). EMPO categorized it as an improvement item in FY 2011 and as a finding in FY 2013. (See Section 8.0, **OFI-CNS-3**.)

In conclusion, EMPO prepares in-depth after-action reports that list issues noted during the exercise, along with recommended actions to correct most issues. The exercise evaluators provide critical assessments of emergency response performance and provide comments on the adequacy of responder actions. However, EMPO does not always take corrective actions to resolve ERO performance issues until the inadequate performance has been repeated.

5.4 Severe Event Exercises

Review criteria:

Severe event exercises include events that impact multiple facilities that cause the loss of infrastructure and primary capabilities and introduce secondary or compounding severe events that occur during critical stages of the initial response or during later remediation efforts. (OE-1 and CRAD 45-61)

When CNS was planning its 2014 annual exercise, EA asked CNS to include severe event components from a list of EA focus areas that were consistent with the OE-1 scenarios. CNS added most of the requested focus areas, so EA was able to validate CNS's capabilities for responding to the types of severe events described in OE-1.

Importantly, CNS appropriately responded to OE-1 and completed severe event planning as documented in EMPO-900, *Y-12 Severe Event Emergency Response Plan*. CNS also produced two additional severe event technical basis documents: EMPO-514/TBC-036, *Technical Basis for Severe Events at the Y-12 National Security Complex*, and EMPO-560/EAL-087, *Emergency Action Levels for Events Involving Multiple Buildings and Severe Events at Y-12 National Security Complex*. Collectively, these documents enable the Y-12 ERO to evaluate severe events involving multiple facilities and make appropriate categorization/classification and protective action decisions. Additionally, CNS trained PSS personnel during a series of multi-facility categorization/classification and protective action drills that were designed to improve their proficiency in using the multi-building emergency action levels. CNS also created a damage assessment tool, based on a geographical information system, to support severe event damage assessment and to help maintain situational awareness and prioritize response actions during a severe event. Furthermore, CNS established an engineering damage assessment team, composed of Y-12 structural engineers, as part of the Y-12 ERO to determine whether Y-12 facilities are safe for occupancy after a seismic or high wind event. CNS effectively validated the aforementioned planning for OE-1 severe event response during the 2014 annual exercise and has also conducted exercises that involve the upper spectrum of consequences, such as the Emergency Preparedness Integrated Capability Exercise 2013.

In conclusion, CNS has effectively validated its planning for responding to the types of severe events described in OE-1. EMPO has developed a severe event response plan with appropriate technical basis documents that enable the Y-12 ERO to evaluate severe events involving multiple facilities and make appropriate categorization/classification and protective action decisions. The Y-12 exercise program includes response to severe events and exercises that involve the upper spectrum of consequences.

5.5 Exercise Conduct

Review Criteria:

Each exercise must be conducted and controlled effectively and reliably. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA observed the conduct of the 2014 site-level exercise and reviewed the CNS after-action report.

CNS effectively conducted and controlled the 2014 annual exercise within the framework of the DOE order and guides; EA did not identify any important issues in exercise conduct. Notably, CNS maintains a site-level drill and exercise committee, supporting the EMPO exercise coordinator, with key responsibilities for coordinating the Y-12 exercise schedule with their organizations, providing input to scenario development, serving as controllers or evaluators during drills and exercises, and reviewing drill and exercise after-action reports for technical and factual accuracy. EMPO demonstrated this practice effectively during the 2014 annual exercise.

EMPO effectively used Exercise Builder to produce the entire exercise package, from the start of the initial planning to the completion of the after-action report. Importantly, the pre-loaded Exercise Builder baseline generated the exercise objectives and the exercise evaluation guides (EEG). This approach ensured that each exercise objective had associated evaluation information, such as the stated objective, the applicable evaluation criteria from the DOE Emergency Management Guide, and an evaluator

checklist. EMPO also tied the evaluation criteria to the evaluator's checklist, which cites the applicable reference from the CNS plan or procedure in the EEG. CNS updates the EEGs after each change to an emergency management plan or procedure, and the organizations responsible for completing the objective's action statement concur in the EEGs. EMPO verified that all Y-12 exercise controllers and evaluators had completed CNS training module number 50227925, *Control and Evaluation of Emergency Drills and Exercises at Y-12*. Additionally, just before conducting the exercise, controllers and evaluators received a briefing on the scenario package and the specific duties assigned to each position. CNS also provided evaluator packages that included information on the stated objectives, the applicable evaluation criteria, and the evaluator checklist. EMPO requires controllers and evaluators to collect and compile all exercise-generated documentation, ensuring auditable records for each exercise.

In conclusion, CNS effectively conducted and controlled the 2014 annual exercise within the framework of DOE requirements. The practice of using a site-level drill and exercise committee to support the EMPO exercise coordinator and to serve as controllers or evaluators during the exercise is a best practice. Additionally, the use of Exercise Builder has enabled CNS to generate consistent, detailed exercise plans that support effective exercise conduct.

5.6 Corrective Actions and Improvements

Review Criteria:

Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, paraphrased from CRAD 45-61)

5.6.1 Contractor Issues Management Process

For this portion of the review, EA reviewed the site emergency plan, the site contractor assurance system description, the CNS issues management procedure, EMPO exercise after-action reports, EMPO self-assessments, and EMPO exercise and self-assessment annual summaries.

EMPO follows CNS procedure Y15-312, *Issues Management Process*, which provides a detailed description of the process for formally resolving issues. CNS prioritizes issues using specific criteria for the four significance levels, A through D, with A having the highest significance. CNS provides appropriate guidance on developing corrective actions and stresses preventing recurrence and implementing timely corrective actions. CNS also formally tracks issues and corrective actions using IMS and requires objective evidence before closing corrective actions.

However, EMPO does not use the CNS issues management process for most of its improvement items and observations. EMPO has entered findings into IMS but has entered only a few exercise improvement items and no self-assessment observations into IMS, because CNS contractor assurance personnel discouraged use of the system for issues that were not findings. In addition, not all weaknesses identified by evaluators in after-action reports are captured as findings or improvement items, and consequently are not subject to the issues management process (see Section 5.3).

When EA discussed this situation with EMPO and the contractor assurance personnel, the contractor assurance personnel revised their position to allow EMPO the option of using IMS for a broader range of issues, including improvement items and observations. To supplement the limited use of IMS, EMPO prepares annual summaries of the status of issues identified in exercises and self-assessments throughout the year and notes the issues that are still open at the end of the year. For the open issues identified in self-assessments, EMPO specifically reviews their status during the next annual self-assessment. However, for open issues identified during exercises, EMPO does not track them to resolution. EMPO also does not track whether exercise issues assigned to external organizations are resolved in a timely

fashion. (See Section 8.0, **OFI-CNS-3**.)

EMPO does not ensure the effective closure of findings. CNS requires identification of root causes, extent-of-condition reviews, independent verification of completion of corrective actions, and effectiveness reviews, but only for level A and B issues. EMPO typically prioritizes its findings from exercise after-action reports as level C or D issues, using the significance determination criteria in the Issues Management Process procedure. Although DOE Order 151.1C requires contractors to independently verify that corrective actions were completed and to validate their effectiveness, EMPO does not complete these actions for the findings identified during exercises. Consequently (as discussed further in Section 5.6.2), EMPO closed some findings before the underlying issues were adequately resolved. (See Section 8.0, **OFI-CNS-3**.)

Finding F-CNS-1: Contrary to DOE Order 151.1C, the Y-12 EMPO does not independently verify the completion of corrective actions or validate that the corrective actions were effective in resolving the findings identified in exercise after-action reports.

In conclusion, CNS's detailed process for resolving issues includes appropriate instructions for developing corrective actions to prevent recurrence and tracking the closure of corrective actions using IMS. Further, EMPO had been discouraged from using IMS to track improvement items and observations; this prohibition was rescinded during the EA review. EMPO's only method for tracking the status of observations and improvement items identified in exercises and self-assessments is an annual summary. Because EMPO typically prioritizes its findings as level C or D, for which the CNS procedure does not require independent verification of corrective action completeness and effectiveness, this process is contrary to DOE Order 151.1C requirements for emergency management-related corrective actions.

5.6.2 Contractor Corrective Actions

For this portion of the review, EA reviewed the CNS issues management procedure, EMPO exercise after-action reports, EMPO self-assessments, EMPO exercise and self-assessment annual summaries, CNS exercise corrective actions, and CNS closure evidence.

For issues entered in IMS, CNS has developed timely corrective actions for findings and improvement items with reasonable due dates, and has provided adequate closure evidence. However, EA noted several weaknesses in closing some improvement items and findings. The EMPO exercise after-action reports identified some improvement items as closed, but the associated rationale indicated that CNS had not yet completed the corrective actions. For example, EMPO closed an improvement item (regarding malfunctioning heating, ventilation, and air conditioning units in an ERO response facility) after CNS asked the building manager to submit a maintenance request, but before CNS fixed the units. In another case, EMPO closed an improvement item (about inconsistent and incomplete information provided to the media) after spokesperson training was scheduled for inclusion in a future drill, but before the training was conducted. In addition, EMPO closed a finding (regarding the failure to provide timely information to the media and the public) after an outside consultant provided recommendations, but before any of those recommendations were implemented; CNS later completed actions to correct this finding and included objectives and evaluation criteria in several later exercises to verify that those actions were effective. As a final example, for a finding involving failure to notify the next of kin for a deceased employee, FPO closed the finding with a statement that FPO did not own this finding so no further action was required on FPO's part. Subsequently, other organizations within CNS completed actions to correct this finding, and EMPO included next-of-kin notification in an FY 2015 exercise; however, that exercise had no specific objective or evaluation criteria to determine whether the completed actions were effective. (See **Finding F-CNS-1** and Section 8.0, **OFI-CNS-3**.)

CNS does not always develop corrective actions that help prevent recurrence of an issue. For example, CNS frequently provides briefings to current ERO personnel to address performance issues noted during exercises but does not ensure that new personnel in these positions receive the same information. EA also noted that some of these briefings were ineffective, because EMPO noted the same performance issues in a subsequent exercise (as in the recurring weaknesses in FPO's decontamination operations). In another case, EMPO repaired malfunctioning equipment in an emergency response facility without examining the facility's periodic testing program to determine why it failed to identify the malfunction. (See Section 8.0, **OFI-CNS-3**.)

In conclusion, CNS develops timely corrective actions with reasonable due dates and provides adequate closure evidence when issues are entered into IMS. However, EMPO after-action reports identified some improvement items and findings as closed before CNS actually fixed the issues. EA also noted several examples of corrective actions that were not structured to prevent recurrence of an issue.

5.6.3 DOE Oversight and Issues Management

For this portion of the review, EA reviewed the site ERAPs, the NPO oversight process procedure, EMPO exercise after-action reports, NPO self-assessments, NPO assessments of the contractor exercise program, NPO exercise and self-assessment corrective actions, and NPO closure evidence.

NPO conducts numerous performance-based assessments of the CNS emergency management program and has a comprehensive issues management process. However, in some cases, NPO does not adequately assess the overall adequacy of the site exercise program. NPO last performed a comprehensive self-assessment of its exercise program responsibilities in FY 2011 and noted one observation, which was subsequently resolved. Since then, NPO has relied on external assessments to identify issues in the EMPO exercise program and has not performed any compliance-based assessments of the EMPO program over the last several years. Although NPO has performed numerous performance-based assessments of EMPO's planning, conduct, and evaluation of individual exercises over the last several years, NPO reports did not document its evaluation criteria, and NPO issued its reports as much as 11 months after the exercise. The 2014 Chief of Defense Nuclear Safety (CDNS) review report also noted that NPO had not performed a comprehensive review of the EMPO exercise program. Further, NPO has not forwarded an EA review report (issued in January 2015) regarding an FY 2014 exercise for EMPO's review and action. (See Section 8.0, **OFI-NPO-1**.)

NPO procedure NPO-3.4.1.1, *NPO Oversight Process*, describes the process that all NPO organizations are to use to formally resolve issues. NPO prioritizes issues into four categories based on significance, and the procedure provides appropriate guidance on developing corrective actions and preventing recurrence. In addition, NPO requires formal tracking of corrective actions (using ePegasus – a computerized issues management tracking system) and the use of objective evidence to close corrective actions. NPO also requires identification of root causes, extent-of-condition reviews, and effectiveness reviews for the two most significant levels of issues. However, although NPO took informal actions to resolve several issues identified in exercise after-action reports, NPO did not enter the issues into ePegasus. EA also noted that contrary to DOE Order 151.1C, NPO did not develop corrective actions within 30 working days for two findings from an FY 2014 CDNS review. One of these findings was that NPO did not complete the required reviews of the contractor emergency management program every three years, and the other was that NPO's poor tracking of required submissions for hazard surveys and emergency planning hazards assessments (EPHAs) had resulted in late contractor submissions and delayed approvals. At the time of this EA review, these findings remained unresolved, and no corrective actions had been identified. (See Section 8.0, **OFI-NPO-2**.)

Finding F-NPO-1: Contrary to DOE Order 151.1C, NPO did not develop corrective actions within

30 working days of receipt of a final evaluation report.

In conclusion, NPO conducts numerous performance-based assessments of the CNS emergency management program and has a comprehensive issues management process. However, NPO does not consistently perform comprehensive self-assessments of their program or compliance-based assessments of the contractor program. NPO also does not document its evaluation criteria in its contractor assessment reports, does not prepare timely contractor assessment reports, and does not promptly forward external assessment reports for action. Further, NPO does not use its issues management process to resolve most of the emergency management issues that require NPO action. Finally, contrary to DOE Order 151.1C, NPO has not yet developed corrective actions for two findings from an FY 2014 CDNS review, and these findings remain unresolved.

5.7 Lessons Learned

Review Criteria:

Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA reviewed the CNS lessons-learned program documents and after-action reports from exercises and drills for the past year.

CNS has adequately captured lessons learned from onsite and other activities in its lessons-learned database, Performance Track. DOE Order 151.1C requires the readiness assurance program to include a system for incorporating and tracking lessons learned from training, drills and exercises, actual event responses, and a sitewide lessons-learned program. Additionally, the site must participate in the DOE/NNSA corporate lessons-learned program. In addition to identifying lessons learned applicable to emergency management in Performance Track, CNS communicates lessons learned through after-action reports, annual ERO refresher training, and ERO continuing training. In recent years, Y-12 has added three emergency management-related lessons learned to the DOE/NNSA corporate database. Additionally, Performance Track shows 25 emergency management-related lessons learned for 2014, including 14 from EA's 2013 emergency management lessons-learned report. However, most Y-12 ERO members (209 out of 290) do not receive emergency management-related lessons learned through Performance Track, and the current annual ERO refresher training lacks a summary of lessons learned from the previous year. (See Section 8.0, **OFI-CNS-4**.)

6.0 CONCLUSIONS

CNS appropriately uses exercise plans and evaluation results to document the site's readiness to respond to Operational Emergencies. CNS's comprehensive process for evaluating exercises ensures an effective and reliable evaluation of emergency responder performance. Exercise packages contain appropriate exercise objectives and evaluation criteria, and CNS uses experienced and well-trained evaluators. CNS also prepares in-depth after-action reports that list issues noted during the exercise and recommend actions to correct those issues, and exercise evaluators provide critical assessments of emergency response performance. In addition, CNS has a detailed process for resolving issues that includes appropriate instructions for developing corrective actions that prevent recurrence and for tracking the closure of corrective actions using IMS. CNS develops timely corrective actions with reasonable due dates and provides adequate closure evidence for issues in IMS.

However, EA identified some weaknesses in CNS's and NPO's implementation of the emergency exercise program:

- The evaluation element is effective, comprehensive, and rigorous. CNS has developed an extensive and comprehensive baseline of ERO and response organizations' objectives, response steps, and evaluation checklists and criteria. This baseline implements the complete set of objectives and criteria from a DOE emergency management guide and augments the guide's generic criteria to produce measurable standards that are based on Y-12 emergency plans and procedures. However, during the past five years, CNS has not validated its planning for some important aspects of the Y-12 emergency management program, such as responding to an onsite Office of Secure Transportation event, utilizing alternate command centers, or implementing the response plan for a City of Oak Ridge Water Treatment Plant event
- CNS has not defined which exercise improvement items require tracking in IMS and has not used this system for many improvement items (from exercises) and observations (from self-assessments). (Contractor assurance personnel had discouraged them from using the system but altered their position during the EA review.) In addition, CNS did not take corrective actions to resolve some indicators of ERO performance issues, and CNS after-action reports documented some improvement items and findings as closed before CNS actually corrected the issues. EA also noted several examples of corrective actions that were not structured to prevent recurrence of an issue. Finally, CNS prepares annual summaries of the status of issues identified in exercises and self-assessments throughout the year but does not otherwise track the status of open exercise issues
- NPO conducts numerous performance-based assessments of the CNS emergency management program and has a comprehensive issues management process. However, NPO does not perform comprehensive self-assessments of their program or compliance-based assessments of the contractor program. NPO also does not document its evaluation criteria in contractor assessment reports, prepare timely contractor assessment reports, or promptly forward external assessment reports. Finally, NPO does not use its issues management process to resolve most of the emergency management issues that require NPO action.

Overall, CNS and NPO have a well-established exercise program. The exercise program has been compliant with DOE order requirements over the past five years and (with the noted exceptions) has been effective in validating all program elements, identifying findings, and fostering program improvements.

7.0 FINDINGS

As defined in DOE Order 227.1, *Independent Oversight Program*, findings are significant deficiencies or safety issues that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy or Federal regulation. CAPs must be developed and implemented for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1 to manage these CAPs and track them to completion.

NNSA Production Office

Finding F-NPO-1: Contrary to DOE Order 151.1C, NPO did not develop corrective actions within 30 working days of receipt of a final evaluation report.

NPO did not develop corrective actions within 30 working days for two findings from an FY 2014 CDNS review as required. These findings remain unresolved, and no corrective actions have yet been identified.

Consolidated Nuclear Security, LLC

Finding F-CNS-1: Contrary to DOE Order 151.1C, the Y-12 EMPO does not independently verify the completion of corrective actions or validate that the corrective actions were effective in resolving the findings identified in exercise after-action reports.

EMPO does not independently verify that corrective actions were completed or validate that they are effective for findings as required by DOE Order 151.1C. The Issues Management Process procedure does not require these actions for level C and D issues, the significance levels typically assigned to exercise findings per the significance level criteria. Because EMPO did not ensure that these order requirements were otherwise met, EMPO closed some findings before the underlying issues were adequately resolved.

8.0 OPPORTUNITIES FOR IMPROVEMENT

This EA review identified six OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices, or provide potential solutions to minor issues identified during the conduct of the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is expected that the responsible line management organizations will evaluate these OFIs and accept, reject, or modify them as appropriate, in accordance with site-specific program objectives and priorities.

NNSA Production Office

OFI-NPO-1: Consider enhancing NPO's oversight of the EMPO exercise program by:

- Including exercise program responsibilities in NPO's annual self-assessments
- Documenting evaluation criteria used to determine performance in contractor assessment reports
- Completing timely contractor assessment reports
- Periodically conducting comprehensive, compliance-based assessments of the EMPO exercise program
- Ensuring prompt transmittal of external assessments of the EMPO emergency management program to CNS.

OFI-NPO-2: Consider improving the resolution of NPO emergency management issues by:

- Entering existing unresolved emergency management issues into ePegasus
- Developing timely corrective actions for emergency management issues and documenting these actions in ePegasus.

Consolidated Nuclear Security, LLC

OFI-CNS-1: Consider validating, in the exercise program, the planning for responding to an onsite Office of Secure Transportation event, utilizing alternate command centers, and implementing the response plan for a City of Oak Ridge Water Treatment Plant event.

OFI-CNS-2: Consider adding a tracking mechanism to ensure that if an ERO element does not participate in any of the sitewide exercises, the responsible organization conducts and documents a drill or exercise to fulfill the annual exercise requirement.

OFI-CNS-3: Consider enhancing the EMPO issues management process by:

- Increasing the attention given to evaluator comments that indicate ERO performance issues during exercises
- Revising the Y-12 Drill and Exercise Process to include criteria for determining the types of improvement items to be tracked in IMS, such as long-term equipment repairs, new or revised training, and procedure revisions
- Identifying improvement items and findings as closed in exercise after-action reports only if all actions to resolve the issue have been completed
- Ensuring that corrective actions result in an implemented solution for the issue and prevent recurrence of the issue
- Entering existing unresolved improvement items and observations into IMS
- For issues requiring corrective action by organizations external to EMPO, including EMPO in the issues resolution process, instead of allowing the external organization to close the issue without EMPO involvement
- Independently verifying that corrective actions have been completed and validating that corrective actions were effective for all findings.

OFI-CNS-4: Enhance continuous improvement derived from the lessons-learned by:

- Revising Y15-906PD, *Contractor Assurance System*, to require Y-12 ERO members to subscribe to Performance Track to receive emergency management-related lessons-learned
- Sharing emergency management lessons learned between Y-12 facilities and functional groups, including performance weaknesses with cross-cutting or common issues requiring corrective action
- Summarizing emergency management related lessons-learned from the previous year in the annual ERO refresher training.

Appendix A Supplemental Information

Dates of Review

Onsite Review: March 24 – April 9, 2015

Office of Enterprise Assessments

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments

Quality Review Board

William A. Eckroade
Thomas R. Staker
William E. Miller
Karen L. Boardman
Michael A. Kilpatrick

Enterprise Assessments Site Lead

Jimmy S. Dyke

Enterprise Assessments Reviewers

Randy L. Griffin – Lead
John D. Bolling
Teresa A Lachman

Appendix B

Key Documents Reviewed and Interviews

Key Documents Reviewed

- EMPO-500, *Y-12 NSC Emergency Plan*, Rev. 7, 2/8/14
- EMPO-517, *Y-12 National Security Complex Drill and Exercise Process*, Rev. 10, 12/4/14
- EMPO-537, *Y-12 Five Year Exercise Plan*, Rev. 14, 8/14
- EMPO-900, *Y-12 Severe Event Emergency Response Plan*, 8/24/14
- NPO-3.4.1.1, *NPO Oversight Process*, Rev. 1, 10/28/14
- Y15-312, *Issues Management Process*, 3/5/14
- Y15-906PD, *Contractor Assurance System*, 8/21/14
- Y40-148, *Emergency Management Exercises*, 1/11/12

Interviews

- NPO Emergency Management Program Manager
- Y-12 Contractor Assurance Senior Manager
- Y-12 Drill and Exercise Coordinator
- Y-12 EMPO Manager (Acting)
- Y-12 Emergency Services Manager
- Y-12 Lessons Learned Program Manager
- Y-12 Readiness Assurance Coordinator