Office of Enterprise Assessments Review of the Y-12 National Security Complex 2014 Site-Level Exercise

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Office of Emergency Management Assessments
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Acronyms

CA	Consequence Assessment
CAM	Consequence Assessment Manager
CNS	Consolidated Nuclear Security, LLC
DOE	U. S. Department of Energy
EA-33	Office of Emergency Management Assessments
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
ECC	Emergency Control Center
ED	Emergency Director
EMInS	Emergency Management Information System
EOC	Emergency Operations Center
EPI	Emergency Public Information
ERO	Emergency Response Organization
FMT	Field Monitoring Team
HAZMAT	Hazardous Material
HQ	Headquarters
IC	Incident Commander
ICP	Incident Command Post
IH	Industrial Hygiene
NARAC	National Atmospheric Release Advisory Center
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
OFI	Opportunity for Improvement
PF	Protective Force
PSS	Plant Shift Superintendent
RAP	Radiological Assistance Program
SAE	Site Area Emergency
SEOC	State Emergency Operations Center (State of Tennessee)
TEMA	Tennessee Emergency Management Agency
TSC	Technical Support Center
Y-12	Y-12 National Security Complex
YAMS	Y-12 Area Mapping System

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) reviewed a Y-12 National Security Complex (Y-12) emergency management exercise during the June 17 – July 10, 2014 timeframe. Y-12 is operated by Consolidated Nuclear Security, LLC (CNS) with oversight by the National Nuclear Security Administration (NNSA) Production Office. CNS conducted the exercise to test Y-12's preparedness for responding to a complex hazardous material event scenario involving widespread damage across the Y-12 site, mass casualties, and radiological and chemical releases.

During the exercise, EA determined that the Y-12 emergency response organization exhibited several strengths. Personnel generally demonstrated strong situational awareness, which is largely attributed to the Y-12 computerized information management system that linked Y-12's response facilities, field response elements, and offsite command centers. Further, CNS had integrated the computerized information management system with a web-based geographical information system to provide maps, data, and analysis tools for the Y-12 site, the surrounding area, and many onsite buildings. For example, the newly developed automated damage assessment process assisted the emergency response organization in matching the response resources to the appropriate need and provided prioritized damage assessment analyses and maps. In addition, emergency response organization personnel effectively performed most of their assigned duties during this exercise.

Despite these strengths, the Office of Emergency Management Assessments (EA-33) identified some performance issues. Most significantly, the plant shift superintendent did not issue instructions about protective actions that should be taken by plant personnel and the emergency response organization did not verify whether protective actions had been implemented on site for the hazardous material releases. CNS evaluators identified some of these concerns for corrective action but did not identify the failure of the emergency response organization to verify protective actions as an area that needs to be improved to fully address the observed shortcomings. EA also identified a few weaknesses in information management and coordination between Y-12 and the State of Tennessee emergency response organization.

Overall, the Y-12 emergency response organization responded effectively to this challenging exercise scenario. The various command centers maintained a common operating picture and effectively deployed resources to treat injured personnel, and minimize property damage. Y-12 plans to take corrective actions for the performance issues identified by EA and those identified in the Y-12 after-action report; EA will review the effectiveness of the corrective actions in a follow-up review of the Y-12 emergency management program.

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Y-12 National Security Complex 2014 Site-Level Exercise

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) reviewed a Y-12 National Security Complex (Y-12) emergency management exercise that was conducted on June 18, 2014. The review was conducted by EA's Office of Emergency Management Assessments (EA-33) during the June 17 – July 10, 2014 timeframe.

EA-33 performed the review to evaluate Y-12's preparedness for responding to a HAZMAT event and to assess Y-12's compliance with DOE Order 151.1C, *Comprehensive Emergency Management System*. During this review, EA reviewed the ability of various site response organizations to recognize specific hazardous situations, notify appropriate onsite and offsite organizations and agencies, implement appropriate protective actions, establish command and control of the simulated emergency event, and mitigate the event in compliance with DOE requirements. In a related effort, EA is preparing an independent review report of the Y-12 emergency management exercise program that will cover the planning and execution of the exercise and the corrective actions taken to address issues identified during the exercise.

EA's review of the Y-12 annual exercise is the second of four reviews of site exercises that EA plans to perform in 2014. EA will publish an annual emergency management lessons learned report reflecting analysis of results from all of the 2014 assessments.

2.0 Background

Y-12 is operated by Consolidated Nuclear Security, LLC (CNS). The National Nuclear Security Administration (NNSA) Production Office (NPO) provide direction to and oversight of CNS. The Eastern Region of the Tennessee Emergency Management Agency (TEMA) is responsible for state-level responses to emergencies. TEMA participated in the exercise and served as the State Emergency Operations Center (SEOC) for the postulated Y-12 emergency.

Y-12 performed its annual exercise to test and demonstrate the proficiency of the integrated emergency response capability of the Y-12 emergency response organization (ERO) in accordance with DOE Order 151.1C; its associated DOE Guide 151.1-3, *Program Elements, Emergency Management Guide*; and Y-12 emergency plans and procedures. Y-12 also used the exercise as an opportunity to demonstrate progress in planning and preparedness activities identified by Health, Safety and Security Operating Experience Level 1 (OE-1: 2013-01), *Improving Department of Energy Capabilities for Mitigating Beyond Design Basis Events*. The following paragraphs provide a brief overview of the exercise scenario and major events.

The initiating event for this site-level exercise was a postulated earthquake in east Tennessee that caused moderate to heavy damage to multiple Y-12 buildings and isolated power losses. The Fire Department Alarm Room, central alarm station, and Plant Shift Superintendent (PSS) received numerous alarms and calls reporting the simulated damage and injuries. The Uranium Chip Oxide Facility sustained major damage (i.e., collapsed roof and walls) and was on fire. Falling storage containers severely damaged the hazardous material (HAZMAT) storage area at another facility, and it appeared hazardous material was spilling out of the storage area. In response, the PSS selected the emergency action levels (EALs)

corresponding to these events and declared site area emergencies (SAEs) at the two locations, initiated offsite notifications, and activated the Y-12 ERO.

The PSS received additional calls reporting damage and injuries. The PSS passed this information on to the Incident Commander (IC) and together they established the response priorities. The IC developed and implemented an incident action plan and requested mutual aid assets, which were unavailable during the duration of the exercise. The Y-12 Technical Support Center (TSC) was declared operational and an initial press release was developed and distributed. The TSC manager requested a turnover briefing from the PSS, and upon completion, the emergency director (ED) duties were transferred from the PSS to the TSC manager. TSC personnel identified the (HAZMATs) at risk, developed an onsite monitoring plan, and worked with the IC to refine response priorities.

The Emergency Operations Center (EOC) was declared operational and established communications with TEMA and DOE Headquarters (HQ). The EOC crisis manager assumed ED duties from the TSC manager. Additional information was developed for release to the media and the public, and the EOCs for the surrounding counties and city of Oak Ridge were declared operational. The consequence assessment (CA) team developed and posted an accurate event-based plume model, and the TEMA requested support from the DOE Radiological Assistance Program (RAP). TEMA personnel received and concurred with the Y-12 offsite field monitoring plan, and operational control of RAP was coordinated with the RAP team liaison at TEMA. Y-12 field monitoring teams (FMT) monitored the boundaries of the plume and confirmed that contamination did not travel offsite. The exercise was terminated when key exercise objectives were demonstrated.

3.0 Assessment of Site Performance

This section provides the EA assessment, based on this exercise, of the ability of the Y-12 site to respond to severe events impacting multiple facilities, included positive aspects and areas of weakness. Appendix B details the reviews of the individual ERO exercise objectives that were evaluated by EA, including the Incident Command Post (ICP), Emergency Control Center (ECC), TSC, and EOC.

Immediately after the exercise began (at the time of a postulated earthquake), the IC appropriately and safely deployed all Fire Protection Organization resources to the two HAZMAT emergency scenes and established a safe location for the ICP. The IC quickly established effective command and control at the emergency scenes, briefed the IC technical support team, and clearly stated that the response priorities were life safety and incident stabilization. During the emergency, the IC continuously ensured the safety of field emergency responders, and the triage officer at the ICP ensured that injured personnel received appropriate medical treatment. The IC also maintained a clear understanding of field response activities and provided frequent updates to the PSS and TSC.

The IC appropriately requested mutual aid assets to perform search and rescue activities and effectively used onsite resources to accomplish the search and rescue activities, when external organizations indicated that they could not provide timely support. The IC developed and implemented an incident action plan that appropriately documented most functions required by Y-12 procedures, except incident objectives and communication protocols. Further, the IC received appropriate assistance from the IC technical support team; however, the TSC did not document or track the IC's request for industrial hygiene monitoring resources, which were not available to respond. (See **OFI-CNS-4**.)

CNS personnel in the ECC performed adequately in most cases. They appropriately used available tools and equipment to gather and disseminate event information, perform event classifications, provide notifications to offsite authorities and site workers, dispatch first responders, and activate the ERO.

However, they did not issue protective actions for site workers. CNS successfully transferred the ECC from normal electrical power to standby generator power, and then returned to normal power during the exercise. Four qualified PSSs, with the assistance of control center specialists, performed emergency functions in the ECC. After considering a General Emergency classification, the lead PSS declared two SAEs; the PSS classification decision was timely and consistent with EALs. The lead PSS performed offsite notifications in a timely manner.

The lead PSS served as the ED until the TSC was staffed, a turnover briefing was completed, and the TSC manager accepted the ED role in accordance with the Y-12 emergency plan and implementing procedures. The PSS did not issue the planned protective actions linked to the EALs that were used to classify the emergencies. CNS evaluators also observed and documented, in the CNS after-action report for resolution, that planned protective actions were not implemented.

CNS personnel in the TSC also demonstrated adequate performance. They appropriately staffed the TSC and turned over ED duties to the EOC crisis manager, and used available tools and equipment to disseminate event information, perform response support functions, accept and perform ED duties, and keep the IC and EOC informed of event conditions. However, the ED did not verify the status of protective actions, and the TSC staff did not use the Y-12 Area Mapping System (YAMS) to develop protective action zones and automated public address announcements to inform plant personnel of protective actions. CNS evaluators also observed, and documented in the CNS after-action report for resolution, that protective actions were not implemented and YAMS was not used.

The Y-12 EOC effectively performed its primary functions, including coordinating and providing National Nuclear Security Administration (NNSA) and DOE-HQ elements and state and local governments with required notifications and updates. The EOC maintained adequate information flow between the site, NNSA and DOE-HQ elements, and TEMA, including the generation and dissemination of various technical products. The Consequence Assessment Manager (CAM) provided numerous briefings to the CA room staff and ensured that the staff clearly understood which affected facility was the highest priority and clearly articulated that the top priority was life safety. CA room staff appropriately validated the classification of the event, determined affected facility source terms, developed timely dispersion model projections, and maintained position-specific logs. Additionally, the CAM and FMT captain developed a field monitoring strategy/plan based on the worst-case radiological plume plot projection.

Y-12 personnel effectively maintained situational awareness, which was largely attributed to the use of the Y-12 emergency management information system (EMInS). EMInS, a computerized information management system, linked the entire Y-12 ERO via information flow processes within Y-12's response facilities and field response elements. Additionally, EMInS achieved interoperability among specialized onsite response facilities (ECC, TSC, EOC, Media Center) and fostered interoperability with offsite facilities (TEMA Field Coordination Center, TEMA Environmental Monitoring Coordination Center, SEOC, and DOE-HQ EOC) to capture, distribute, and assess emergency information that expedited rapid and accurate decision-making. CNS has effectively integrated EMInS with YAMS. While not utilized by the TSC in this exercise YAMS is a web-based geographical information system that provides the ERO with views, data, and analysis tools for the Y-12 site, the surrounding area, and interiors of many onsite buildings. CNS recently developed some new response tools, including an automated damage assessment process to assist the ERO in matching the response resources to the appropriate need, incorporating prioritized damage assessment analyses and mapping. The new damage assessment tool also provides summaries of building and infrastructure damage, using pull-down boxes.

Nevertheless, EA-33 identified a few minor performance issues associated with information management and coordination. Information posted on the personnel status board was not always timely and did not

have the level of detail needed by ERO decision-makers to keep managers aware of the status of injured personnel during the event. (See **OFI-CNS-2.)** In addition, Y-12 and TEMA did not effectively communicate information and coordinate actions about potential hazards to the public; as a result, TEMA activated the regional emergency alert system, directing nearby residents to stay indoors, although Y-12's consequence assessment models and field monitoring data indicated no offsite impacts were expected. (See **OFI-CNS-1.)**

CNS and NPO representatives effectively validated new emergency public information (EPI) communication capabilities tied to EMInS. Using its automated EPI approval process, Y-12 effectively coordinated a quick, consistent, factual message among public information officers in five different locations. In addition, EMInS was used to facilitate the integration with social media so that Y-12's public information officers could collect all the response information posted in EMInS and prepare bullet-point facts that were electronically reviewed and approved for outside release, and then used Twitter to disseminate the information.

4.0 Findings

As defined in DOE Order 227.1, *Independent Oversight Program*, findings indicate significant deficiencies or safety issues that warrant a high level of management attention and that, if left uncorrected, could adversely affect the DOE mission, the environment, worker safety and health, the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy or Federal regulation. Corrective action plans 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 corrective action plans and track them to completion.

This review identified a condition that was important, but did not issue a finding. EA observed that the PSS did not review and implement protective actions linked to the EALs, as required in Y40-158, *Protective Action Decision Making*. Furthermore, TSC and EOC personnel did not verify whether protective actions had been implemented for the HAZMAT releases or use YAMS for protective action decision-making.

CNS evaluators also observed that the PSS did not issue initial protective actions, discussed the omission during the exercise critique meeting, and included it as a finding requiring corrective actions in the CNS exercise after action report (Y-12 corrective action ISM#: 31274418). The lack of EAL protective actions verification by TSC and EOC personnel was not discussed in their after-action report; however, the CNS after action report includes a discussion that YAMS was not used for subsequent protective action decision-making as part of the protective action finding.

5.0 Opportunities for Improvement

This EA review identified five opportunities for improvement (OFIs). These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by the EA-33 review team 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 anticipated that these OFIs will be evaluated by the responsible line management organizations and either accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

NNSA Production Office

OFI-NPO-1: Consider expediting approval of the draft *Oak Ridge Reservation Multi-site Response Plan*, which includes provisions for a Federal Leadership Team that could be activated for specific multi-site events or regional events.

Consolidated Nuclear Security, LLC

OFI-CNS-1: Consider providing TEMA with information on EMPO-514/TBC-036, *Technical Basis for Severe Events at the Y-12 National Security Complex* (DRAFT), and Y-12 EAL: EMPO-560/EAL-087R1, *Emergency Action Levels for Events Involving Multiple Buildings and Severe Events at Y-12 NSC* (DRAFT) so that TEMA can better communicate information and coordinate actions about potential hazards to the public.

OFI-CNS-2: Consider improving the process for tracking EMInS information flow to ensure that the information in the environment safety and health status board and personnel status board is complete.

OFI-CNS-3: Consider modifying the *Incident Command Checklist/Initial Assessment Report* to include all items required by Y-12 procedure Y40-154 for an incident action plan.

OFI-CNS-4: Consider improving the tracking of IC action requests to the TSC by documenting these requests in EMInS.

Appendix A
Supplemental Information

Dates of Review

June 17 – July 10, 2014
Exercise: June 18, 2014

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APPENDIX B
Independent Assessment of Exercise Objectives

The exercise was designed, coordinated, conducted, and documented in accordance with EMPO-517, *Y-12 National Security Complex Drill and Exercise Process*. Y-12 National Security Complex (Y-12) personnel had recently developed some draft severe event response related plans and procedures and were using the exercise to validate their effectiveness before finalizing them. Consolidated Nuclear Security, LLC (CNS) developed the exercise using 72 exercise objectives.

The Office of Enterprise Assessments (EA) and its Office of Emergency Management Assessments (EA-33) selected 32 of these objectives for independent review in the following four areas:

- Emergency Operations Center
- Emergency Control Center
- Incident Command Post
- Technical Support Center.

This appendix identifies the selected objectives and provides EA's independent assessment for each. This approach enables Y-12 Federal and contractor managers to consider EA perspectives in their evaluation of the exercise and in the development of corrective actions and additional improvements.

Emergency Operations Center

Y12-EOC.1 – Given an emergency response, Y-12 Emergency Operations Center equipment, communications, and/or materials are operational and readily available for use in accordance with Y40-162, Emergency Operations Center Operations (7/18/2013).

CNS successfully demonstrated the operability and availability of the Emergency Operations Center (EOC) equipment, communications, and materials. During the exercise, the EOC was adequately equipped to safely perform emergency response functions in accordance with Y40-162. The EOC facility included emergency management information system (EMInS) work stations, facsimile machines, telephones, radios, job aids, emergency action levels (EALs), emergency planning hazards assessments, site emergency response maps, and smart boards for recording significant events.

Y12-EOC.2 – Given an Operational Emergency, staff the EOC or alternate EOC in accordance Y40-139, Y-12 National Security Complex Emergency Response Organization (03/29/2010) and Y40-162, Emergency Operations Center Operations (7/18/2013).

The exercise was designed to begin with the emergency response organization (ERO) staff already in place, and appropriate protocols were followed to declare the EOC operational.

Y12-EOC.3 – Given event information, validate the categorization and classification of the event or update the classification in accordance with Y40-156, Event Categorization and Classification (12/12/2012); Y40-162, Emergency Operations Center Operations (7/18/2013); and EMPO-560, Y-12 National Security Complex Emergency Action Levels.

CNS appropriately validated the categorization and classification of the hazardous material (HAZMAT) spill and uranium oxide fire events. Initially, consequence assessment (CA) room staff members were incorrectly informed that there was a fire and HAZMAT spill at the affected facility. The dispersion modelers appropriately questioned the event categorization, which should have been a General Emergency based on a fire involving HAZMAT. Subsequently, the Consequence Assessment Manager (CAM) received confirmation that there was no fire at the facility. The dispersion modelers confirmed

that the event was appropriately classified as a site area emergency (SAE). Additionally, the dispersion modelers confirmed that the Uranium Chip Oxide Facility fire was appropriately classified as an SAE.

Y12-EOC.5 – Given event information, determine or validate then provide protective action recommendations to the state in accordance with the State of Tennessee Multi-jurisdictional Emergency Response Plan for the U.S. Department of Energy Oak Ridge Reservation (2011); Y40-155, Offsite Notifications (12/12/2012); and Y40-158, Protective Action Decision Making (12/14/2011).

CNS and the National Nuclear Security Administration Production Office (NPO) established effective interfaces to ensure an integrated and coordinated emergency response with the Federal, state, and local agencies and organizations that are responsible for emergency response and protection of the workers, the public, and the environment. However, the Tennessee Emergency Management Agency (TEMA) and CNS self-identified some issues for corrective action.

- TEMA was advised that the memorandum from the Deputy Secretary of Energy that had previously designated a Lead Federal Manager for the Oak Ridge Reservation was rescinded, potentially changing the Y-12 National Security Complex (Y-12) response to a regional catastrophic event. TEMA was unfamiliar with the details of a replacement protocol, still in draft form during the exercise, and questioned the effectiveness of the protocol for a multi-site event impacting both Y-12 and the Oak Ridge National Laboratory. (See Section 5.0, **OFI-NPO-1**.)

- TEMA also questioned whether concurrent multi-facility SAEs could result in a higher emergency declaration. The concern ultimately caused TEMA to activate the regional emergency alert system, directing nearby residents to stay indoors. However, no CA or projection concluded that the public was at risk. (See Section 5.0, **OFI-CNS-1**.)

- CNS informed TEMA of the need for an evacuation route protocol for various earthquake magnitudes, based on the calculated survivability of major bridges and highway overpasses, which would guide Y-12's planning for site evacuations.

Y12-EOC.7 – Given an operational EOC, establish and maintain communications with DOE-HQ and the State EOC (SEOC) in accordance with the State of Tennessee Multi-jurisdictional Emergency Response Plan for the U.S. Department of Energy Oak Ridge Reservation (2011) and Y40-162, Emergency Operations Center Operations (7/18/2013).

CNS successfully demonstrated a very comprehensive and effective computerized information management system for emergency management. During the exercise, the Y-12 EMInS enabled effective communications that provided enhanced situational awareness between the site, DOE Headquarters (DOE-HQ), and the State of Tennessee. EMInS linked the entire Y-12 ERO via information flow processes within Y-12's response facilities and field response elements. EMInS also achieved interoperability among specialized onsite response facilities to capture, distribute, and assess emergency information to expedite rapid and accurate decision-making; such facilities included: Emergency Control Center (ECC), Technical Support Center (TSC), EOC, Media Center. Additionally, EMInS provided an ability to foster interoperability with offsite facilities, such as the TEMA Field Coordination Center, TEMA Environmental Monitoring Coordination Center, Tennessee's State Emergency Operations Center (SEOC), and DOE-HQ EOC. Throughout the exercise, EMInS effectively communicated a common operating picture and shared situational awareness by providing current information on the incident status and ERO actions in relation to the incident. Effective communication enabled the ERO to predict changes to the incident and forecast future actions. Notably, TEMA and DOE-HQ were provided with broad access to the Y-12 EMInS, enabling them to stay apprised of current event information. Electronic

situation reports were provided to DOE-HQ using EMInS. In addition, Y-12 had dedicated Federal staff in the Y-12 EOC to maintain connectivity and communications with the DOE-HQ EOC.

Y12-EOC.8 – Given an operational EOC, determine source term and develop dispersion model projections on hazardous material releases in accordance with Y40-162, Emergency Operations Center Operations (7/18/2013).

CNS adequately determined the source term for the postulated HAZMAT releases and developed plume projections for the initial and ongoing CAs. The dispersion modelers determined the highest priority facility of concern and the facility source terms. The modelers also developed timely dispersion model projections, using available job aids and modeling software. The modelers used a job aid that contains a CA modeling priority table to determine which facility had the highest priority. Initially, the modelers used the National Atmospheric Release Advisory Center (NARAC) software to run pre-loaded emergency planning hazards assessment default worst-case release scenarios with real-time weather and provided accurate, timely initial worst-case plume projections. The CAM and Dispersion Modeling System Coordinator initiated the identification of a more refined source term with the Y-12 TSC for use in the ongoing CA. As event source terms became available, the CA team developed event-based plume projections using NARAC software. The CAM and Dispersion Modeling System Coordinator checked each plume model for accuracy. Furthermore, CAs were updated when actual and projected changes in facility status and release conditions were identified. Each plume plot projection was uploaded into EMInS for the Crisis Manager and EOC staff, SEOC, DOE-HQ, Y-12 TSC, and emergency public information (EPI) personnel to view. Further, CNS had recently implemented a process to place multiple plume model plots on a single Y-12 map, but this process did not work during the exercise. CNS self-identified this issue during the exercise and appropriately resolved the problem. Lastly, EOC CA staff continually monitored the weather and provided projected weather information to EOC staff.

Y12-EOC.9 – Given an operational EOC, develop and/or provide event information to support emergency public information operations in accordance with Y40-135, Public Information (02/26/2013) and Y40-162, Emergency Operations Center Operations (7/18/2013).

The Y-12 EOC effectively supported EPI operations, using EMInS to acquire event information and distribute timely EPI. Several new EPI processes were validated during the exercise. For example, an automated EPI approval process was effectively used to coordinate a quick, consistent, and factual message among public information officers at five different locations, optimizing the process to ensure the news release was still relevant. Additionally, CNS and NPO effectively used EMInS to facilitate timely integration with social media so that Y-12's public information officers could collect all the response information posted in EMInS and provide bullet-point facts that were electronically reviewed and approved for external release through Twitter. The CAM also informed EPI personnel each time plume plot projections were uploaded into EMInS.

Y12-EOC.10 – Given an Operational Emergency, process event information to reflect site conditions including personnel safety, hazard conditions, mitigation, significant events, action items, and other event information in accordance with Y40-162, Emergency Operations Center Operations (7/18/2013).

CNS significantly enhanced the EMInS by integrating the YAMS, a web-based geographical information system that provides the Y-12 ERO with views, data, and analysis tools for the Y-12 site, the surrounding area, and interiors of many onsite buildings. Specific emergency response applications included: live video, meteorological monitoring data, atmospheric dispersion modeling, damage assessment, field monitoring data, Y-12 site master planning data, personnel data obtained from the Corporate Information Center, facilities information data, and engineering drawings including site drawings, utility drawings, and facility floor plans. CNS also validated the use of an automated damage assessment process to assist

the ERO in matching the response resources to the appropriate need, which included prioritized damage assessment analyses and mapping.

The CAM provided a comprehensive initial briefing and direction to the CA room staff. The CAM ensured that the CA room staff clearly understood which affected facility was of highest priority and clearly articulated that the top priority was life safety. Additionally, the CAM and CA room staff continually reviewed EMInS when significant events affecting the staff occurred, ensuring there were no questions or concerns. Further, CA room staff appropriately maintained logs for post-event analysis, report production, and a legally defensible chronology of notification and communications activities.

Y12-EOC.11 – Given an operational EOC, coordinate and review the TSC onsite tactical decisions and develop/implement strategic decisions in accordance with Y40-162, Emergency Operations Center Operations (7/18/2013).

Although CNS successfully used EMInS to enable situational awareness between the TSC and EOC, some performance issues associated with EMInS were noted. For example, personnel status board information was posted too slowly and lacked the level of detail needed by EOC and TSC decision-makers. Consequently, CNS did not maintain adequate situational awareness of injured personnel status during the event. Additionally, the environment, safety and health status board was not used to capture the relevant HAZMAT data, as required. (See Section 5.0, **OFI-CNS-2**.)

Y12-EOC.13 – Given an Operational Emergency, coordinate and manage the Y-12 offsite field monitoring operations accordance with the State of Tennessee Multi-jurisdictional Emergency Response Plan for the U.S. Department of Energy Oak Ridge Reservation (2011), Y40-162, Emergency Operations Center Operations (7/18/2013), and Y40-164, Field Monitoring (02/17/2011).

CNS appropriately developed an initial field monitoring strategy/plan that was based on plume plot projections. The CAM briefed the field monitoring team (FMT) captain on the emergency event and informed the FMT captain when offsite field monitoring operations were approved. The CAM also notified the FMT coordinator that the *Y-12 FMT Authorization to Perform Off-Site Monitoring* form had been signed. The CAM and the FMT captain developed an initial field monitoring strategy/plan based on the worst-case plume plot projection for the radiological release.

Y12-EOC.16 – Given an Operational Emergency that threatens site Continuity of Operations Mission Essential Functions and/or Essential Supporting Activities, the Emergency Director (ED) analyzes and determines activation of the Continuity of Operations Plan in accordance with the EMPO-800 Y-12 National Security Complex Continuity of Operations Plan (June 2011) and Y40-006, Initial Response to Heightened Continuity of Government Condition (COGCON) (10/09/2012).

The exercise duration minimally affected continuity of operations and did not require complete implementation of EMPO-800. Consequently, little discussion occurred among the management team regarding mission essential functions and essential supporting activities.

Emergency Control Center

Y12-PSS.1 – Given an emergency response, Emergency Control Center response equipment, communications, and/or materials are operational and readily available for use in accordance with Y40-165, Emergency Control Center Operations (07/25/2013).

CNS successfully used properly working pagers, radios, telephones, and weather monitoring display equipment to gather event information, activate command centers, and determine and provide safe route

instructions to responders. Additionally, the ECC was successfully transferred from normal power to standby power and then back to normal power during the exercise.

Y12-PSS.2 – Given an event, collect event information in accordance with Y40-165, Emergency Control Center Operations (07/25/2013).

CNS successfully collected event information using two way communication systems and weather monitoring display equipment. Four qualified plant shift superintendent (PSS) personnel were in the ECC and performed data collection tasks efficiently through distribution of assignments and collaborative efforts.

Y12-PSS.3 – Given an emergency response, provide event and meteorological information to responders in accordance with Y40-165, Emergency Control Center Operations (07/25/2013).

CNS personnel used two-way communication systems to gather and disseminate event information among responders and used computer displays to determine meteorological conditions from onsite weather towers instrumentation.

Y12-PSS.4 – Given an event, categorize and classify the event or recommend event categorization and classification to the ED in accordance with Standing Orders, Y40-156, Event Categorization and Classification (12/12/2012), and EMPO-560, Y-12 National Security Complex Emergency Action Levels.

CNS promptly and appropriately classified two operational emergencies as SAEs. Four qualified PSSs were in the ECC at the time of the event to support event classification. The PSSs selected the two EALS applicable to the damaged facilities where HAZMAT releases were occurring and concluded that two SAE events were in progress—one for a facility HAZMAT release and one for a Uranium Chip Oxide Facility fire. The PSSs then considered an EAL for events involving multiple buildings, as well as a severe event that would allow for a General Emergency classification at the discretion of the PSS. The PSS decided to declare a General Emergency, but an exercise controller used an exercise contingency inject message to keep the classification at an SAE, as designed by exercise planners. The lead PSS made the event classification within 15 minutes from the time of event discovery, as required by DOE Order 151.1C.

Y12-PSS.5 – Given event categorization and classification, make regulatory notifications at the direction of the Emergency Director in accordance with Y40-155, Offsite Notifications (12/12/2012).

A qualified PSS completed the required oral notifications to offsite authorities in a timely manner. The PSS recorded known event information on the initial notification form and used this form to relay information over a ringdown phone. The ringdown phone provides direct communications with the DOE-HQ Watch Office, TEMA, the Oak Ridge National Laboratory, the East Tennessee Technology Park, and the City of Oak Ridge. The oral notifications were completed within 15 minutes from the time of event classification, as required by DOE Order 151.1C.

Y12-PSS.6 – Given an Operational Emergency, activate the Emergency Response Organization to the primary or alternate location in accordance with Standing Orders, Y40-165, Emergency Control Center Operations (07/25/2013) and EMPO-560, Y-12 National Security Complex Emergency Action Levels.

Although much of the ERO was already in place as an exercise timesaving measure, CNS successfully activated the ERO by dispatching first responders (simulated at a terrain board) and staffing of the TSC and the EOC. PSS office personnel used pagers and radios to activate the ERO.

Y12-PSS.10 – Given initial event information, determine and implement protective actions in accordance with Y40-158, Protective Action Decision Making (12/14/2011) and/or SO-Y-12-12-11-022 (6/22/2011).

The PSS did not review and implement protective actions linked to the EALs that were used during the exercise. CNS evaluators also observed this omission, discussed it in the exercise critique meeting, and included it as a finding requiring corrective actions in the CNS exercise after action report.

Incident Command Post

Y12-EMS.4 – Given mass casualties (3 or more injured), conduct triage operations in accordance with Y40-139, Y-12 National Security Complex Emergency Response Organization (03/29/2010) and Y79-54-FDO-033, Fire Protection Operations Emergency Response Manual (05/01/2012).

CNS provided appropriate medical treatment and planning for the mass casualties associated with the exercise. The Incident Commander (IC) suitably divided the Fire Protection Organization medical resources between the various event scenes to ensure that each scene had sufficient emergency medical personnel. The triage officer at the Incident Command Post (ICP) effectively oversaw triage operations, kept an accurate tally of injured personnel treated by fire fighters, and followed up when conflicting information was received about injured personnel. In addition, the IC demonstrated a proactive stance by ensuring that injured personnel were treated promptly and that uninjured personnel located outside were monitored for signs of heat stress.

Y12-IC.2 – Given an emergency, respond to the event scene or designated location in accordance with Y40-154, Incident Command and Control (12/12/2012).

The IC safely deployed all resources of the Fire Protection Organization to the two primary emergency scenes and established an ICP. Immediately after the earthquake, the IC proactively ordered that all fire apparatus be moved outside the fire stations to ensure the availability of the equipment and minimize the potential damage to the equipment from aftershocks. The IC also effectively used current meteorological data (wind direction and speed) to travel safely to the event scene and determine a safe location for the ICP.

Y12-IC.3 – Upon arrival, assess the event situation in accordance with Y40-154, Incident Command and Control (12/12/2012).

Throughout the exercise, the IC maintained a clear understanding of the facilities impacted, the status of hazard mitigation, and the location of injured personnel. The IC command staff referenced the pre-fire plans for the two affected HAZMAT facilities to determine the appropriate response to the situations. The IC command staff appropriately used the *Incident Command Checklist/Initial Assessment Report* to document an initial assessment of the incident, and the IC promptly provided this information to the PSS. The IC maintained frequent contact throughout the exercise with the PSS and TSC, providing crucial updates on the field emergency response.

Throughout the emergency, the IC effectively ensured the safety of field emergency responders. The IC implemented appropriate contamination control measures for fire fighters and for potentially contaminated personnel who were evacuated from building 9401-5. Upon viewing the plume plot for the HAZMAT spill on EMInS and noting that the wind had changed direction, the IC immediately warned the protective force (PF) to move their personnel out of the plume path. The IC also asked the PF to keep personnel away from all collapsed and damaged buildings that might have released HAZMAT.

Y12-IC.4 – Upon arrival, establish Incident Command in accordance with Y40-154, Incident Command and Control (12/12/2012).

The IC established effective command and control at the event scenes. The IC maintained reliable, continuous, effective, and accurate communication among the field emergency responders, PSS, and TSC throughout the exercise. Additionally, the IC appropriately assigned responsibilities among the IC command staff and technical support team to ensure all necessary functions were covered and clearly articulated that the response priorities were life safety and incident stabilization.

Y12-IC.6 – Upon implementation of the Incident Command System, develop and implement an Incident Action Plan in accordance with Y40-154, Incident Command and Control (12/12/2012) and/or the Building/Facility Pre-Fire/Tactical Plan.

The IC developed and implemented a mostly comprehensive incident action plan. The IC appropriately kept the treatment of injured personnel as a high priority throughout the emergency response. The IC also appropriately requested numerous mutual aid assets (including fire assets, ambulances, and a structural collapse rescue team) during the initial assessment report provided to the PSS; however, reports provided to the IC throughout the exercise indicated that mutual aid assets would not be able to immediately respond to the site. Consequently, the IC effectively planned, coordinated, and accomplished reentry activities using resources available on site. To assist with managing the emergency, the IC used the *Incident Command Checklist/Initial Assessment Report* in lieu of developing a written incident action plan. The checklist's usefulness as a substitute for a written incident action plan is somewhat limited because the checklist does not document the incident objectives and communication protocols as required by Y-12 procedure Y40-154, *Incident Command and Control*, for an incident action plan. (See Section 5.0, **OFI-CNS-3**.)

Y12-TechTm.2 – Given an emergency response, IC Technical Support Team responds to the event scene in accordance with Y40-139, Y-12 National Security Complex Emergency Response Organization (03/29/2010) and Y40-154, Incident Command and Control (12/12/2012).

The IC technical support team quickly responded to the ICP and received a briefing from the IC on the incident action plan.

Y12-TechTm.3 – Given arrival at the ICP, the Radiological Control IC Liaison provides contamination control operations in accordance with Y40-139, Y-12 National Security Complex Emergency Response Organization (03/29/2010).

The Radiological Control IC Liaison appropriately confirmed the habitability of the ICP and performed other contamination control duties requested by the IC, such as monitoring personnel at assembly stations and fire fighters as they exited the emergency scene.

Y12-TechTm.4 – Given arrival at the ICP, the Industrial Hygiene (IH) IC Liaison provides IH support in accordance with Y40-139, Y-12 National Security Complex Emergency Response Organization (03/29/2010).

The IC appropriately requested monitoring support from the IH IC liaison; however, IH monitoring resources were not available and the request was not documented. The IC asked the IH IC liaison to monitor for mercury at building Alpha-4 and for asbestos at the old biology building. The IH IC liaison forwarded the request to the TSC and was told that monitoring resources were not currently available and that the request would be added to the TSC list of actions, although the TSC did not document this action in EMInS. (See Section 5.0, **OFI-CNS-4**.)

Technical Support Center

Y12-TSC.1 - Given an emergency response, Y-12 Technical Support Center response equipment, communications, and/or materials are operational and readily available for use in accordance with Y40-153, Technical Support Center (TSC) Operations (10/05/2011).

CNS successfully collected and disseminated event information using two-way communication and computer-based systems. The TSC effectively used telephones, radios, and video conferencing equipment for two-way communications. The TSC staff also appropriately used checklists that directed operational checks be performed for other equipment and supplies, such as a fax machine, the public address system, EMInS, YAMS, TSC information display screens, and general supplies.

However, the TSC did not make use of YAMS during the exercise to identify areas where protective actions should be implemented. CNS evaluators also observed this omission, discussed it in the exercise critique meeting, and included it as a finding requiring corrective actions in the CNS exercise after-action report.

Y12-TSC.2 - Given an Operational Emergency, staff and activate the Y-12 TSC in accordance with Y40-153, Technical Support Center (TSC) Operations (10/05/2011).

CNS successfully demonstrated the capability to activate and staff the TSC in a timely manner. The TSC reached minimum staffing requirements and became operational 24 minutes after the SAE declaration. The TSC coordinator successfully used a checklist to verify and record that minimum staffing requirements were met. The PSS briefed the TSC manager on the emergency, and then the emergency director (ED) duties were formally transferred from the PSS to the TSC manager. The TSC manager announced to the TSC staff that the TSC was operational and that he was the ED. The TSC staff also informed the IC of the TSC's operational status.

Y12-TSC.7 - Given an Operational Emergency, assess and modify if necessary onsite protective actions based on changing event conditions in accordance with Y40-153, TSC Operations (10/05/2011) and Y40-158, Protective Action Decision Making (12/14/2011).

The TSC manager did not verify protective actions that should have been established by the PSS, but modified the protective actions based on changing event conditions. TSC personnel did not determine whether protective actions were implemented because the releases had been mitigated when the TSC manager became the ED. Later in the exercise, the TSC manager demonstrated appropriate protective action considerations for the changing conditions by considering the need to have an engineering evaluation performed for the Jack Case building (for use in housing evacuees) because of possible building damage from the postulated earthquake. The TSC manager also demonstrated the process for planning a site evacuation, using early release protocols to coordinate an evacuation by site zones. The TSC manager also considered the possibility of monitoring of Bear Creek road for radioactive material because plume plots showed the potential for contaminated areas on the road.

Y12-TSC.8 - Given an operational emergency, manage the onsite response in support of the Incident Commander in accordance with Y40-153, Technical Support Center (TSC) Operations (10/05/2011); Y40-005, Y-12 National Security Complex Reentry Planning (11/28/2011); and Y40-158, Protective Action Decision Making (12/14/2011).

The TSC response coordinator used a checklist to ensure communications were coordinated with the IC. The TSC communicator continually monitored communications and provided communications, as necessary.

Y12-TSC.10 - Given an Operational Emergency, provide the Y-12 EOC with information and data the event dictates in accordance with Y40-153, TSC Operations (10/05/2011).

CNS demonstrated effective methods to provide information from the TSC to the EOC. The TSC manager provided an initial briefing to the EOC crisis manager and periodic reports on event conditions. Continuous discussions occurred during the exercise to provide updated information regarding postulated injuries and fatalities. The TSC manager used telephones and video conferencing equipment to provide information to the EOC, and additional information was provided via EMInS.

Y12-TSC.15 - Given an Operational Y-12 EOC, formally turn over ED duties to the Y-12 EOC in accordance with Y40-153, TSC Operations (10/05/2011).

CNS demonstrated a formal and comprehensive turnover of the ED duties from TSC manager to the EOC crisis manager. The EOC crisis manager informed the TSC manager when he was ready to receive a turnover and accept the ED duties. After the TSC team leaders updated the TSC manager with current information, the TSC manager provided a briefing to the EOC crisis manager via a video link. The EOC crisis manager formally accepted the duties of the ED. The TSC staff and the IC were informed of the operational status of the EOC and the transfer of the ED duties.