

**Office of Enterprise Assessments
Assessment of the Pantex Plant
Emergency Management Program**



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Acronyms

CAP	Corrective Action Plan
CAR	Causal Analysis Report
CNS	Consolidated Nuclear Security, LLC
CRAD	Criteria and Review Approach Document
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
EEG	Exercise Evaluation Guide
EMInS	Emergency Management Information System
EPHA	Emergency Planning Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
ERO	Emergency Response Organization
FY	Fiscal Year
HAZMAT	Hazardous Material
HS	Hazards Survey
IP	DOE Implementation Plan for DNFSB Recommendation 2015-1
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
OE	Operational Emergency
OST	Office of Secure Transportation
PAC	Protective Action Criteria
PER	Problem Event Report
PSS	Plant Shift Superintendent
SME	Subject Matter Expert
TEL	Threshold for Early Lethality
Y-12	Y-12 National Security Complex

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Office of Emergency Management Assessments, within the independent Office of Enterprise Assessments (EA), conducted an emergency management program assessment at the Pantex Plant, addressing three emergency management elements, from November 1, 2016 – January 5, 2017. The three program elements – technical planning basis, plans and procedures, and exercises – are the areas for improvement identified in the DOE implementation plan responding to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2015-1, *Emergency Preparedness and Response at the Pantex Plant*.

EA performed this assessment at the request of the National Nuclear Security Administration Production Office (NPO) to provide an interim independent assessment of progress by the site contractor, Consolidated Nuclear Security, LLC (CNS), in completing the implementation plan actions. CNS plans to finalize the products supporting the implementation plan, including consideration of feedback from this interim EA assessment, before a February 2017 full-participation emergency management exercise intended to validate the new plans, procedures, and processes. Because this was an interim assessment requested by NPO and often-involved review of draft documents and processes or newly approved versions of plans and procedures, EA provided feedback in the form of observations and suggested improvements for management’s consideration while CNS finalizes its program improvements.

EA noted improvement in the areas identified in DNFSB Recommendation 2015-1 and found that CNS and NPO efforts to correct the areas of concern are on schedule with the implementation plan. Areas of identified improvement include:

- Developing a hazards survey and emergency planning hazards assessment that serve as a well-founded technical planning basis for the Pantex Plant emergency management program
- Involving NPO in the recent CNS revisions of the hazards survey and emergency planning hazards assessment to comply with the triennial updates required by DOE Order 151.1C, *Comprehensive Emergency Management System*, resulting in the removal of analyses for hazardous chemicals no longer used at the Pantex Plant and clarifying the emergency planning hazards assessment
- Completing a review of the process for developing emergency action levels to identify needed improvements that facilitate decision-making
- Formalizing the exercise evaluation and critique protocols through procedures and guides and the use of subject matter experts as exercise evaluators
- Improving the exercise issues management and lessons learned programs
- Establishing a site-level drill and exercise committee to improve the exercise program.

EA also noted that CNS is applying several best practices identified in EA's annual emergency management lessons-learned reports from 2014 and 2015 including two identified best practices to improve its exercise program: Exercise Builder software, and a site-level drill and exercise committee. The best practice improvements directly address root causes cited within the IP. Additionally, CNS incorporated the EA 2015 lessons-learned report into its self-assessment process and its implementation of DNFSB Recommendation 2015-1.

Despite evident improvements, EA identified some areas of concern and suggested several improvements for consideration. One area of particular concern is command media, which constitute a hierarchy of documents that provide systematic flowdown of contractual requirements from laws, regulations, rules, DOE directives, and management. Although the *Pantex Plant Comprehensive Emergency Management Plan* contains these requirements for the areas that EA reviewed, CNS command media do not flow down all of these requirements into emergency plan implementation procedures; instead, CNS has created unnecessary layers of command media that may impede the implementation of prescribed processes, rules, or actions to achieve a desired emergency response. Simplification of the command media for the emergency management program would improve its effectiveness by allowing the flowdown of DOE Order 151.1C requirements directly into work practices and defining manuals.

EA also identified some additional items of concern:

- Plans do not include a protective action isolation zone strategy for sheltered personnel within the zone.
- Emergency planning does not describe intended improvements for new concepts of operation or provide additional detail on existing concepts related to event recognition.
- Emergency management command media do not describe concepts and capabilities to ensure a seamless transition from an abnormal event to an emergency event response that requires assistance from outside the facility.
- The drill and exercise programs do not define a schedule for validating response strategies for high-consequence events.

Overall, NPO and CNS have initiated appropriate actions to correct the previously assessed areas of concern in DNFSB Recommendation 2015-1 and are on schedule to meet the implementation plan. EA will complete a full assessment of implementation plan actions at the February 2017 full-participation exercise, where the execution of improved programs, plans, and procedures can be demonstrated.

**Office of Enterprise Assessments
Assessment of the Pantex Plant
Emergency Management Program**

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Office of Emergency Management Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of the emergency management program at the Pantex Plant, focusing on areas identified for improvement in the DOE Implementation Plan (IP) responding to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2015-1, *Emergency Preparedness and Response at the Pantex Plant*. EA performed this assessment at the request of the National Nuclear Security Administration (NNSA) Production Office (NPO) to provide an interim independent assessment of progress by the site contractor, Consolidated Nuclear Security, LLC (CNS), in completing the IP actions.

2.0 SCOPE

The scope of this assessment included three emergency management program elements: technical planning basis, plans and procedures, and exercises. Additionally, the EA team followed up on a sampling of findings from EA's report on the Pantex Plant's full-participation emergency management exercise in 2014.

3.0 BACKGROUND

The Pantex Plant is managed and operated by CNS on behalf of NNSA. Within NNSA, NPO provides Federal line oversight of CNS, in addition to some emergency planning and response activities. DNFSB Recommendation 2015-1 identified three emergency management program elements in need of improvement, namely technical planning basis, plans and procedures, and exercises. DOE submitted the approved IP to the DNFSB on June 16, 2016. CNS and NPO have made significant changes to its program and procedures. CNS plans to finalize the products supporting the IP, including consideration of feedback from this EA assessment, before a February 2017 full-participation emergency management exercise intended to validate the new plans, procedures, and processes. Because this assessment focuses on the Pantex Plant, discussions regarding CNS refer to CNS Pantex. When necessary for differentiation, the report also refers to CNS Enterprise and CNS Y-12 National Security Complex (Y-12). DOE Order, 151.1C, *Comprehensive Emergency Management System*, requires CNS to have a hazardous materials (HAZMAT) program at Pantex because of the radioactive materials, high explosives, and toxic chemicals used and stored on site.

4.0 METHODOLOGY

DOE Order 227.1A, *Independent Oversight Program*, describes and governs the DOE independent oversight program. EA implements this program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. Because this report involves review of draft programs, plans, and procedures, EA uses the terms "observations" and "suggested improvements" to improve the work in progress. Observations describe results of EA's assessment of CNS documentation. Suggested improvements are EA's recommendations for improving the effectiveness of the reviewed

programmatic elements. EA does not intend the suggested improvements to be overly prescriptive or mandatory.

EA identifies the requirements and approach used to assess the technical planning basis, plans and procedures, and exercise emergency management program elements in EA Criteria and Review Approach Document (CRAD) 33-003, Rev. 1, *2016 Emergency Management Program Review Pantex Plant Criteria and Review Approach Document*, and elements of EA CRAD 45-21, Rev. 1, *Feedback and Continuous Improvement Assessment Criteria and Approach-DOE Field Element*.

EA examined key draft and newly approved documents, including plans, procedures, manuals, analyses, and other supporting documents and records, and interviewed key personnel to support the conclusions of this assessment. EA reviewed both current implementing documents and, in some cases, draft documents that CNS plans to finalize prior to the full-scale emergency management exercise scheduled for February 2017. Appendix A lists the members of the EA assessment team, the Quality Review Board, and EA management responsible for this assessment. Appendix B lists the key documents reviewed and personnel interviewed during this assessment, relevant to the observations contained in this report.

5.0 RESULTS

5.1 Technical Planning Basis

Criteria:

The site analyzes plausible scenarios to determine capabilities needed for an effective emergency response and has a means for determining quickly whether an event results in the loss of a significant quantity of hazardous material. (DOE Order 151.1C)

EA analyzed the Pantex Plant emergency management program's technical planning basis to determine its compliance and effectiveness in planning an emergency response required by DOE Order 151.1C, as well as progress in implementing relevant improvements described in the IP. CNS maintains one hazards survey (HS), RPT-MISC-404620, *Pantex Plant Emergency Planning HS*, and one emergency planning hazards assessment (EPHA), MNL-190881 *Pantex Plant EPHA*, which covers all site facilities and serves as the emergency management program's technical planning basis.

The IP addresses technical planning basis weaknesses by improving NPO's oversight of the HS and EPHA maintenance activities and by CNS improving the timeliness for event categorization/classification and protective action decision-making. CNS's planned improvements in using emergency action levels (EALs) and quicker recognition of events are fundamental to timelier decision making. In the past, CNS developed complex EALs with the intention of reducing unwarranted emergency declarations and issuance of protective actions and protective action recommendations from false operational alarms. However, the complexity of the EALs resulted in delays in event categorization, classification, and/or notification as responders perform additional verification steps to distinguish a real event from a false alarm. False fire and radiation alarms frequently occur at the Pantex Plant due to aging systems that are years away from replacement.

CNS recently updated the HS and EPHA to serve as a well-founded technical planning basis for the Pantex Plant emergency management program. During 2016, CNS revised the HS and EPHA to comply with the triennial updates required by DOE Order 151.1C, resulting in the removal of hazardous chemical analysis for chemicals no longer used at the Pantex Plant and improving the EPHA's clarity. Overall, the HS and EPHA comply with DOE Order 151.1C and the HAZMAT screening protocols, and the

quantitative analyses are consistent with the analytical techniques described in DOE Guide 151.1-2, *Technical Planning Basis*. Most importantly, the HS identifies the site-specific generic types of emergency events and conditions that could result in Operational Emergencies (OEs). Furthermore, the EPHA provides appropriate documentation of the quantitative analyses for the potential HAZMAT releases identified in the HS, using acceptable techniques, and provides the results needed to establish the emergency planning zone, develop EALs, and plan appropriate onsite protective actions and offsite protective action recommendations for analyzed scenarios. In doing so, CNS analyzes a set of scenarios reflecting a complete spectrum of events that is consistent with the scenarios and HAZMAT quantities analyzed in the Pantex Plant documented safety analysis (DSA). Except for Office of Secure Transportation (OST) shipments, CNS appropriately maintains the EPHA by monitoring changes in HAZMAT inventories through a chemical requisition group, in which an emergency planner holds a position, and, for radioactive materials, by planning with DSA inventory quantity limits. An appropriately detailed technical planning basis process manual, MNL-EM-352237, *Emergency Management Department Technical Planning Basis Process Program Manual*, which CNS issued as a new manual during 2016, establishes the development and maintenance processes for the HS and EPHA.

Observation 5.1.1. CNS emergency planning as a host site for Office of Secure Transportation (OST) shipments is not based on the most current OST EPHA.

CNS prepares for OST shipments by developing EALs in the OST EAL format, for use by site personnel, based on the OST prepared EPHA. DOE Order 151.1C requires site emergency planners to monitor for significant changes involving HAZMAT on site. Therefore, to ensure that CNS response plans bound an OST shipment's worst-case scenario as required by DOE Order 151.1C, CNS would need to monitor for significant changes in OST analyses in time to make appropriate response plans, if necessary, before a shipment arrives on site.

Suggested Improvement 5.1.1. NPO should establish mechanisms with OST to provide CNS planners a copy of the current OST EPHA in sufficient time to establish emergency planning for potential events from an OST shipment before the shipment arrives at the Pantex Plant site.

NPO and CNS efforts in implementing the IP for the technical planning basis program element are on schedule but remain a work in progress. To date, NPO has completed its review and approval of CNS's HS and EPHA and CNS has completed an EAL evaluation, but CNS EAL updates are ongoing. CNS has moved some of the EAL updates, which were initially a fourth-quarter deliverable within the IP, to an earlier date to use the new EALs, if available, during the February 2017 full-scale exercise. CNS's evaluation of the EALs focused on instrumentation for use in recognizing OEs and defining EAL entry conditions. The results of the EAL evaluation led CNS to consider adding instrumentation to detect flood conditions and to use multiple alarm systems to establish a threshold of alarms that can distinguish OE symptoms from false alarms.

CNS has drafted new EALs specifically for Pantex Plant geographical Zone 4, MNL-190884-Z4, *Zone 4 EALs*, and Pantex Plant Zone 12 South. Significant improvements make the Pantex Plant EALs easier to use and more consistent with CNS Y-12 EALs. For example:

- Changing EALs from a flowchart to a tabular format
- Applying the Y-12 area mapping system program for Pantex Plant safe routing decision making
- Adding isolation zones where personnel protective equipment must be donned for entry.

In addition, EAL changes as part of the IP include:

- Adding EAL entry condition indicators
- Adding quantifiable radiation levels for tritium release indicators
- Adding initial precautionary protective actions
- Removing flowcharts that included confirmatory indicator statements.

Observation 5.1.2. Zone 4 has no instrumentation to detect OEs in the zone, but the Zone 4 EALs unnecessarily include precautionary protective actions in case of false alarms.

Zone 4 EAL entry conditions are entirely based on direct observation eyewitness reports of fires and explosions because there are no instruments in Zone 4 to detect OEs. Therefore, per DOE Order 151.1C, event categorization/classification and initiation of protective actions are required to be completed as soon as possible, and no longer than 15 minutes after event recognition rather than implement precautionary protective actions.

Suggested Improvement 5.1.2. Remove the precautionary protective actions from the Zone 4 EAL set and proceed directly to event classification and initiation of protective actions upon event recognition.

Observation 5.1.3. Zone 12 South EAL entry conditions include multiple alarms, without indicating whether all or some of the conditions are needed for EAL implementation.

Zone 12 South facilities are equipped with fire, security, and/or radiation alarms, which CNS cites as symptoms of OEs for EAL entry conditions in addition to eyewitness reports and security cameras. However, the EAL entry conditions do not clarify whether one or all conditions are necessary to initiate precautionary protective actions or to declare an OE, so using the cited entry conditions could result in frequent sheltering of site personnel for abnormal events or false alarms because of the precautionary protective action statements included in all Zone 12 South EALs. See Observation 5.2.3 for further discussion of transitioning between abnormal events and OEs.

Suggested Improvement 5.1.3. Add conjunctions (“and/or” statements) to EAL entry conditions to identify the indicators requiring EAL implementation.

Observation 5.1.4. Some EAL isolation zone distances do not reflect the calculations of distance to threshold for early lethality (TEL) in the EPHA, and some results of calculations for distance to protective action criteria (PAC) and distance to TEL have been transposed in the EPHA.

As examples, Zone 12 South protective actions do not reflect the distance to TEL values calculated in the EPHA for fire scenarios involving tritium and canned subassemblies and for uranium releases associated with toxicological consequence calculations. In some tritium fire calculations, distance to TEL exceeds distance to PAC in the EPHA tables, and no explanation is provided for this unusual occurrence.

Suggested Improvement 5.1.4. Review all EPHA consequence assessment data tables to verify that the correct distance to PAC and distance to TEL are properly tabulated, and revise the transposed numbers as necessary. Add a quality review of the EALs under development to verify that the distance to TEL numbers used in for EAL isolation zones are the same as the EPHA results.

Observation 5.1.5. The IP does not fully address the underlying cause of untimely event recognition for initiating an effective emergency response.

CNS's EAL evaluation identified the need for administrative requirements to improve communications between the event facility and the Plant Shift Superintendent (PSS). The evaluation suggested that uniformed response personnel, such as the fire department, arriving at the scene should provide the PSS event information, which is the current practice and contributes to untimely categorization/classification decision-making.

Emergency planning does not describe intended improvements for new concepts of operation or provide additional detail on existing concepts related to event recognition. Specifically:

- At Pantex HAZMAT locations, CNS does not adequately document the use of certified operators at the facility (production technicians or other fissile material handlers) and supervisors to implement the event recognition process but instead relies on confirmatory steps by the PSS before event categorization/classification and the initiation of protective actions outside the facility.
- CNS plans to revise some EALs to direct the initiation of precautionary protective actions immediately upon observing an event indicator, without declaring an OE, while gathering confirmatory indicators. Such precautionary protective actions are inconsistent with DOE Order 151-1C, which requires event categorization/classification as soon as possible and no more than 15 minutes from event recognition. Not immediately responding to indicators symptomatic of a HAZMAT release conflicts with DOE Guide 151.1-4, *Response Elements*.

Suggested Improvement 5.1.5. Increase the effectiveness of event recognition by:

- Adding performance criteria to command media for CNS Pantex facility personnel to enable timely categorization of events and provide a seamless transition from a facility-level response to a site-level response, eliminating the need for time-consuming confirmatory steps by the PSS before making event categorization/classification decisions and initiating protective actions outside the facility
- Describing in the emergency plan and flowdown documents the integration of facility operations personnel, including their roles and responsibilities for event recognition and reporting to the PSS
- Providing initial and annual refresher training to certified operators and supervisors on applicable facility-specific EAL entry indicators and notifications to the PSS
- Adding responsible facility operating organization personnel to the approval/concurrence process for EALs to promote a seamless transition between normal operations and an emergency event and facility ownership of the EALs.

Observation 5.1.6. Instructions for EAL isolation zones direct the use of personal protective equipment for responders entering the zone but do not address the evacuation of workers who could be sheltered in the isolation zone.

The precautionary protective action statements and the protective action statements direct the immediate use of a facility as a shelter. The closest fixed facility to a person may be within an isolation zone that could have airborne contaminants above TEL concentrations, and the instructions for isolation zones do not include the evacuation of workers sheltered therein. DOE Guide 151.1-4 promotes the goal of avoiding fatalities, even at the cost of lower exposures to a larger population. Sheltering unprotected personnel within an isolation zone without a complete understanding of the release duration and shelter infiltration rates is not a technically based means of meeting this goal. Some of the isolation zones are so large that site evacuation may be prudent.

Suggested Improvement 5.1.6. Improve evacuation planning by:

- Distinguishing EALs that are based on puff release scenarios (explosions and quick releases when sheltering can be justified) from those based on prolonged release scenarios (fires and long duration/recurring releases when evacuation is prudent).
- Considering the appropriateness of sheltering based on:
 - Egress pathways and the number of evacuees
 - Personnel exposure times
 - Shelter infiltration rates
 - Habitability monitoring capabilities
 - Actions that can be performed to improve the effectiveness of shelters
- Conducting an exercise that tests a site phased release
- Revising the emergency plan to describe a site phased release.

5.2 Plans and Procedures

Criteria:

The site establishes and maintains the authorities and resources necessary to plan, develop, implement, and maintain a viable, integrated, and coordinated comprehensive emergency management program. The emergency plan documents the emergency management program and describes the provisions for response to an OE. The emergency plan implementing procedures (EIPs) describe how the emergency plan is implemented. (DOE Order 151.1 C)

CNS fully complies with DOE Order 151.1C requirements to document the provisions for responses to OEs in the site's emergency plan and to describe the implementation of the emergency plan through the CNS command media. Command media constitute a hierarchy of documents that provide a systematic flowdown of contractual requirements from laws, regulations, rules, DOE directives, and management. CNS command media include policies, strategy documents (formerly contract documents and program descriptions), CNS Enterprise procedures (affecting the Pantex Plant and Y-12), and site procedures.

CNS adequately describes the site's overall emergency response strategy in EM-PLN-0019, *Pantex Plant Comprehensive Emergency Management Plan*, and numerous subordinate implementing documents, many of which are in draft form while CNS transitions to the planned program improvements. CNS appropriately discusses the overall response strategy, including critical response functions, roles, and responsibilities of emergency response organization (ERO) personnel in the emergency plan. Subordinate implementing documents support critical functions, such as the ERO, offsite response interfaces, categorization and classification, protective actions, notifications and communications, consequence assessment, and emergency public information. CNS implements the emergency plan through a hierarchy of subordinate documents, including manuals, handbooks, work practice documents, and checklists. For CNS, the term "work practice documents" is synonymous with EIPs.

Observation 5.2.1. The CNS command media structure does not allow the contractual requirements found in the emergency plan to flowdown directly into EIPs but requires unnecessary layers of command media that may impede the implementation of prescribed processes, rules, or actions to achieve a desired emergency response.

The current CNS command media structure reflects a flowdown from the emergency plan (program description) to manuals (which define roles and responsibilities for the 15 emergency management program elements), and then to work practice documents (EIPs) that provide the “how-to” instructions for the 15 program elements. A longstanding CNS decision to flowdown DOE Order 151.1C requirements only to manuals now requires the development of new work practice documents to prescribe processes, rules, and actions to achieve desired outcomes, and to provide directions and communicate contractual requirements for the performance of emergency management. Many of these work practices were in draft form during this EA assessment. This approach differs significantly from E-PROC-0001, *CNS Enterprise Administrative Command Media Process*, which permits the flowdown of contractual requirements in the emergency plan directly into EIPs. Likewise, this approach differs significantly from the CNS Enterprise process, which defines a manual as a procedure that is composed of chapters, and each chapter can be an individual procedure. These two differences have resulted in a considerably more complex and layered command media process for the Pantex emergency management program. Lastly, procedures (work practice documents and manuals) should form the basis of the baseline exercise evaluation criteria needed in the Exercise Builder software program.

In addition to the emergency plan, CNS has two complementing emergency management program descriptions consisting of EM-PLN-0034, *Continuity of Operations Plan*, and the recently added EM-PLN-0088, *Pantex Incident Management Plan*. The latter plan includes operational concepts, responsibilities, and procedures applicable to the Pantex emergency management organization, fire department, protective force, radiation safety, and NPO. EM-PLN-0034 appropriately describes CNS actions to sustain capabilities for performing essential functions during a continuity event.

On the other hand, EM-PLN-0088 inappropriately breaks from the command media process by including CNS strategies for implementing the National Incident Management System while also providing detailed procedural steps for accomplishing the tasks. In addition, the fire department and radiation safety organization have departmental incident command procedures, neither of which flowdown from the incident management plan nor the emergency plan. The protective force does not have a departmental-level incident command procedure. Overall, while EM-PLN-0088 contains information that is appropriate for inclusion in the emergency plan, it does not adequately integrate the implementation of the incident command system so as to eliminate the need for additional departmental procedures.

CNS command media structure does not intend to use manuals as implementing procedures. Nevertheless, CNS has developed a set of manuals for the emergency management program that are not consistent in their function. CNS has 19 emergency management manuals, including manuals for each of the 15 individual program elements. Ten of the program element manuals are for response elements. The other five are for programmatic elements (technical planning basis, program administration, training and drills, exercises, and readiness assurance) and primarily provide process information and guidance. Other manuals include MNL-352189, *The General Employee Response Manual*, which provides information and procedural instructions on the various types of protective actions that onsite personnel should take in the event of an OE; MNL-352190, *Operations Center Manual*, which describes the roles and responsibilities of the Operations Center and provides “how-to” procedures for the PSS; and MNL-190884, *Emergency Action Levels*, which defines the procedure and criteria for quickly determining whether an event meets the criteria for an OE declaration, as well as providing pre-determined, conservative onsite protective actions and offsite protective action recommendations. Although CNS does not intend for the manuals to be used as EIPs, MNL-352189, MNL-352190, and MNL-190884 primarily function as procedures. The remaining manual, MNL-190881 (the EPHA), serves as the technical planning basis for determining the necessary plans/procedures, personnel, resources, equipment, and analyses that comprise the Pantex OE HAZMAT program.

CNS further complicates its command media with a variety of other guidance documents, including handbooks, checklists, local Pantex forms (called PX-forms), desk aids, and illustrations that support implementation of the emergency management program's procedures and processes. For example, HNDBK 0065, *The Building Warden Handbook*, is a reference for building wardens and building warden assistants in performing their building/facility duties during an emergency.

Overall, CNS could simplify the command media for the emergency management program and improve its effectiveness by allowing the flowdown of DOE Order 151.1C requirements directly into work practices and defining a manual as a procedure consisting of chapters, with each chapter capable of being an individual procedure, consistent with the CNS Enterprise administrative command media process model. This change would promote consolidation of the ten response element manuals and their associated work practices into combined documents that focus on the actions needed to achieve the desired emergency response outcomes. In addition, the resultant documents would form the basis of the baseline exercise evaluation criteria needed in the Exercise Builder software. Similarly, CNS could consolidate the incident management plan and site- and department-level incident command system procedures into a single document, thereby improving the emergency plan by integrating appropriate incident command system information into the program description and establishing proper flowdown of requirements for the incident command system.

The CNS command media appropriately describe the processes for event recognition, event categorization/classification, and issuance of protective actions for affected onsite and offsite populations. DNFSB Recommendation 2015-1 raises a concern about the effectiveness of the command media system. While on site, EA provided initial observations on CNS's response to this concern and suggested improvements for increasing effectiveness in this area.

Suggested Improvement 5.2.1. Simplify and improve the effectiveness of the CNS command media for the emergency management program by:

- Adopting the CNS Enterprise administrative command media process model that allows the flowdown of DOE Order 151.1C requirements directly into procedures
- Defining manuals as procedures consisting of chapters, with each chapter capable of being an individual procedure
- Consolidating each of the ten response element manuals and their associated work practices into single documents that focus on the implementation of emergency response
- Converting manuals MNL-352189, MNL-352190, and MNL-190884 into procedure consisting of chapters, with each chapter capable of being an individual procedure
- Converting the five programmatic element manuals (technical planning basis, program administration, training and drills, exercises, and readiness assurance) into process documents that provide only information and guidance
- Designating MNL-190881 as a standalone report for the technical planning basis, similar to RPT-MISC-404620
- Integrating appropriate information from the incident management plan into the emergency plan and establishing proper flowdown of requirements for the incident command system EPIP
- Consolidating the incident management plan and site- and department-level incident command system procedures into a single document
- Adding an "effective date" on all command media documents showing the calendar date on which the document or change is required for use and compliance becomes mandatory
- Using EIPs (combination of manuals and work practice documents) as the basis of the baseline exercise evaluation criteria needed in the Exercise Builder software.

Notably, CNS has implemented the three best practices that EA identified in *Office of Enterprise Assessments Lessons Learned from the 2014 Emergency Management Reviews* and *Office of Enterprise Assessments Lessons Learned from the 2015 Emergency Management Assessments*, one in 2014 and two in 2015. In addition, CNS has incorporated the EA 2015 lessons-learned report into its self-assessment process and its implementation approach in response to DNFSB Recommendation 2015-1. CNS also considered the applicability of each of the nine lessons learned in the EA report and provided a response to address each of the recommendations.

EA's 2014 lessons-learned report identified CNS's use of Emergency Management Information System (EMInS), a computer-based incident management tool, as a best practice. EMInS links the site's response facilities and has fostered interoperability with the offsite emergency operations centers (local, state, and DOE Headquarters) to capture, distribute, and assess emergency information and expedite rapid and accurate decision-making. CNS has integrated EMInS with its web-based geographical information system to provide the ERO with maps, data, and analysis tools for the site, the surrounding area, and onsite facilities. CNS has planned numerous other enhancements for EMInS in an ongoing phased-implementation approach.

Observation 5.2.2. CNS has not incorporated an initial isolation zone concept into the emergency plan and linked command media.

As discussed in Section 5.1, the initial isolation zone is intended to inform first responders about the area surrounding a HAZMAT incident for which there is potential exposure to dangerous (upwind) and life-threatening (downwind) concentrations of material.

Suggested Improvement 5.2.2. Improve the effectiveness of protective action decision-making by incorporating the initial isolation zone concept into CNS command media and activating the initial isolation zone determination features in EMInS that support protective action decision making.

Observation 5.2.3. CNS has not fully incorporated the facility operating organizations into the emergency plan and associated command media to show the transition from an abnormal event to an emergency response.

Although the framework for emergency response is established and implemented in the emergency management command media, CNS provides little information on the expected response actions from facility operating organizations. For example, the incident management plan includes operational concepts, responsibilities, and procedures applicable to Pantex emergency management, fire department, protective force, radiation safety, and NPO. However, the plan makes no mention of the roles and responsibilities of other site organizations. The plan and procedures acknowledge that there are circumstances under which the radiation safety department would be the incident commander, but the command media do not define those circumstances. During interviews, radiation safety personnel noted that all of those circumstances would require significant support from the production section manager, weapons engineer, and nuclear explosive safety manager. Likewise, security and non-security-related events under the command of the protective force or fire department would require the support of the facility operating organization.

Most Pantex facilities that operate hazardous processes and are nuclear facilities (or operate under nuclear facility rules) must be able to execute a limited response to an emergency in the facility. As the first on scene, personnel in the affected facility assume initial responsibility for managing the incident scene until the appropriate incident commander arrives. Within a Pantex facility, the organization responsible for implementing emergency response at the facility level varies considerably and is hazard-specific in

nature. The organization for a typical facility usually consists of a small number of trained personnel who implement safe shutdown procedures and may already be wearing personal protective equipment that affords protection for limited exposure. Further, the facility can make process subject matter experts (SMEs) available to work with the incident command team and site-level response elements to provide information and assistance toward mitigation of the situation. Nonetheless, the emergency management command media do not describe these concepts and capabilities for ensuring a seamless transition from an abnormal event to an emergency event response that requires assistance from outside the facility.

Suggested Improvement 5.2.3. Improve the effectiveness of transitioning from an abnormal event to an emergency response by:

- Including information on the expected response actions from facility operating organizations in the emergency management command media
- Adding a position on the incident command team for facility operating organizations, where appropriate, to ensure a seamless transition from an abnormal event to an emergency event response.

5.3 Exercises

Criteria:

The formal exercise program validates all elements of an emergency management program using an effective, structured approach and realistic scenarios. The site validates all elements of the emergency management program over a five-year period and invites offsite response organizations to participate in sitewide exercises at least once every three years. The site fully documents each exercise and includes specific objectives, scenario, scope, list of participants, timelines, injects, controller instructions, and evaluation criteria. The site exercises its emergency response capability annually and rotates the basis for the exercise among its facilities with EPHAs. Site-level emergency response organization elements and resources participate in a minimum of one exercise annually. The site evaluates its exercises and uses a critique process that gathers and documents observations of the participants. The site completes exercise after-action reports within 30 working days. (DOE Order 151.1C)

This section discusses EA's assessment of the CNS emergency management program's exercise program for its compliance and effectiveness in validating all elements of an emergency management program required by DOE 151.1C. A full determination of exercise program effectiveness will depend on future exercises after CNS completes command media updates in accordance with the IP.

CNS has a compliant exercise program that is adequately implemented through MNL-EM-352240, *Emergency Management Department Exercise Program Manual*, and WP-EM-0363, *Emergency Management Exercises*. CNS is adhering to the IP schedule for exercise program improvements.

CNS has programmatically improved the exercise evaluation process by formalizing the exercise evaluation and critique protocols through procedures and guides and the use of SMEs as exercise evaluators. The exercise critique "Hot Wash" guide, evaluation meeting guide, and participant questionnaire support critical drill and exercise reviews. CNS recruits SMEs from onsite organizations and from other DOE sites to form an experienced evaluation team. CNS also encourages evaluator/controller SMEs to mentor site personnel to develop additional evaluator/controller SMEs. Additionally, CNS now minimizes the use of evaluators to perform controller tasks. Finally, CNS improved the annual evacuation and accountability drill documentation from 2015 to 2016 by developing a formal drill plan and a summary analysis in after-action reports. Fully implementing exercise processes and the use of SMEs directly addresses the root causes CNS cited in the IP.

Additionally, CNS recently improved its exercise issues management and lessons-learned programs by adding an exercise validation step in corrective action plans (CAPs) to test the effectiveness of corrective actions before closing a finding. Further, CNS has increased the frequency of hands-on training and lessons-learned training by providing quarterly drill opportunities and semi-annual lessons-learned training for ERO members, supplemented by the required reading program. Full implementation of these actions adequately addresses the issues management and lessons-learned program weaknesses identified in the EA report *Office of Enterprise Assessments Review of the Pantex Plant Emergency Management Exercise Program*, November 2015.

Finally, CNS has implemented significant changes over the past year in its efforts to attain a robust exercise program. CNS recently implemented two best practices to improve its exercise program: Exercise Builder software, and a site-level drill and exercise committee. Exercise Builder provides the foundation for consistent exercise planning and evaluation documentation based on EIPs. The CNS drill and exercise committee provides a site-level team with representatives from most Pantex Plant organizations to assist with exercise planning, conduct, and evaluation. These two improvements directly address the root causes CNS cited in the IP.

Overall, the corrective actions executed through IP implementation adequately address several exercise program weaknesses by strengthening key exercise program attributes, such as controller/evaluator SME assignments, exercise planning, and critical evaluations. CNS is also improving the exercise issues management process by adding effectiveness reviews when closing CAPs for exercise findings. Additionally, CNS has instituted two DOE complex-wide exercise program best practices by instituting Exercise Builder software and a site-level drill and exercise committee. Finally, CNS has established exercise evaluation and critique process expectations through procedures and guides.

Observation 5.3.1. CNS has not documented some practices to ensure sustainability of the exercise program.

Although CNS has implemented significant changes in the exercise program, current exercise program documents and records do not reflect some of the practices used to ensure sustainability of the program. For example:

- The five-year exercise plan list three exercises per year and two drills per quarter, conforming to goals stated by CNS personnel. However, MNL-EM-352240 and MNL-EM-352239, *Emergency Management Department Training and Drills Program Manual*, identify only one exercise per year and one drill per quarter.
- CNS has started minimizing the use of dual role controller/evaluators, but current program documents do not define this policy.
- According to Emergency Management staff, CNS plans to mentor onsite SMEs to increase the number of exercise controller and evaluators, but current program documents do not include the controller and evaluator SME mentoring and qualification process.
- CNS updated past exercise finding CAPs to include an action step to validate effectiveness in a graded response, but current program documents do not require this practice.
- CNS improved its annual evacuation and accountability drill documentation from 2015 to 2016 by developing a formal drill plan and summary analysis in the after-action reports, but current program documents do not reflect these improvements.
- The evacuation and accountability drill plan, evaluation criteria, and summary reports do not list the expected or actual completion times suggested in DOE Guide 151.1-4 as criteria for effectiveness.

Suggested Improvement 5.3.1. Implement a robust drill and exercise program by:

- Documenting the following items in MNL-EM-352240 and MNL-EM-352239:
 - Conducting at least one exercise (with a goal of three) per year
 - Establishing a goal of two drills per quarter
 - Maintaining separate controller and evaluator roles in exercises
 - Defining the evaluator/controller mentoring process
 - Requiring CAPs for exercise findings to include a step to validate effectiveness in a future exercise
 - Defining the annual evacuation and accountability drill plan and after-action report for consistency
- Enhancing the documentation for the fiscal year 2017 evacuation and accountability drills by including expected completion time and recording times in the exercise evaluation guide (EEG).

Observation 5.3.2. CNS has not addressed DNFSB Recommendation 2015-1 IP commitment to define a schedule for validating response strategies for high-consequence events with the drill and exercise programs.

The CNS five-year drill and exercise plan does not discuss responses to high-consequence scenarios analyzed in the EPHA. Instead, CNS developed a process for risk ranking hazards identified as event initiators by DOE Order 151.1C and the DSA. CNS uses the event initiator rankings primarily to establish the frequency of scenarios in the five-year drill and exercise schedule. This process shifts focus away from EPHA hazards to event initiators and base program requirements, contrary to the DNFSB recommendation to review plant hazards identified in the EPHA. Consequently, the current five-year drill and exercise plan involves EPHA-analyzed hazards in only 60% of the exercises.

Additionally, the five-year drill and exercise plan does not provide an exercise schedule that defines opportunities for all ERO response elements to develop and demonstrate proficiency with specific EPHA hazards. The EPHA lists 11 hazardous chemicals and 3 radionuclides and the CNS Emergency Readiness Assurance Plan lists 122 facilities with General Emergency potential. Furthermore, some HAZMAT, such as tritium, has multiple chemical forms that require different response actions. However, the five-year drill and exercise plan only identifies EPHA hazards as either chemical or radiological and does not consider the differences in a response based on forms, event type, technical properties, amounts, and locations. With the wide variety of HAZMAT and facilities, CNS could improve exercise program effectiveness by defining a schedule for periodically validating responses to bounding scenarios (having high consequences that test more response capabilities) and varying scenarios to address the different release mechanisms (spills, fires, and explosions) and different technical properties (alpha and beta emitters, heavy and buoyant gases) and different locations (where field responders and employees respond differently because of differences in facilities, geography, and populations).

Suggested Improvement 5.3.2. Develop a five-year drill and exercise plan emphasizing EPHA HAZMAT release scenarios by:

- Identifying scenarios that require a unique response
- Establishing a five-year drill and exercise plan that defines a schedule for periodically validating responses to DSA bounding scenarios
- Incorporating the base program and HAZMAT program requirements into the schedule
- Ensuring that all CNS response elements are scheduled to participate in exercises within a five-year period

- Using CNS’s hazards risk-ranking program to vary exercise scenario initiators
- Tracking the past five years of response capability validation as a basis for future exercise planning.

Observation 5.3.3. CNS’s use of risk-significant exercise objectives limits its effectiveness in critiquing site performance in drills and exercises, contrary to DNFSB Recommendation 2015-1.

CNS has established a practice of identifying some exercise objectives as “risk-significant” in order to focus management attention when all exercise objectives are important. The goal of any response is to protect life, health, safety, and security. Because response element objectives are intertwined and reliant on each other, the response goal may not be achieved due to one or many failed objectives, or even a combination of partially met objectives. CNS’s efforts to identify risk-significant objectives based on an internal rationale prematurely narrows focus. In contrast, CNS’s documented practice of polling controllers and evaluators within 24 hours to identify at least one critical issue for improvement, with a completion date, is effective in promoting implementation of necessary compensatory measures, pending further review and analysis.

Suggested Improvement 5.3.3. Improve the effectiveness of the drill and exercise evaluation process by removing risk-significant rankings for objectives from the EEGs.

Observation 5.3.4. CNS’s use of non-mandatory command media as emergency exercise evaluation criteria adversely affects its ability to critique performance in drills and exercises, contrary to DNFSB Recommendation 2015-1.

CNS bases most exercise evaluation criteria on response tasks described in non-mandatory command media, such as, manuals, handbooks, and checklists. CNS identified the lack of critical exercise evaluation criteria as a weakness in its exercise critique process and has improved its evaluation criteria by using Exercise Builder EEGs, which contain objectives for emergency response elements supported by criteria from specific response actions detailed in command media. However, CNS has not specified the use of only mandatory EIPs in the EEGs, which adversely affects CNS’s effectiveness in analyzing performance because evaluators use non-mandatory criteria to critique ERO performance.

Suggested Improvement 5.3.4. Implement an effective drill and exercise evaluation process by updating the EEGs to only include specific response actions contained in EIPs.

5.4 Previous Findings Follow-up

Criteria:

Assess a sampling of the contractor responses, corrective actions, and recurrence controls for issues identified in the April 2015 EA report. (Paraphrased from the Plan for the Office of Enterprise Assessments Assessment of the Emergency Management Program at the Pantex Plant)

Observation 5.4.1. On October 27, 2016, CNS self-identified in correspondence to NPO that they had not effectively corrected the two findings EA selected for sampling from the April 2015 EA report (2014 Finding F-CNS-1 and 2014 Finding F-CNS-4) and had reopened the findings.

CNS is currently reviewing all external emergency management findings dating back to 2013 to determine the effectiveness of corrective actions and appropriate closure status. As a result, CNS plans to review all CAPs and revise and resubmit them to NPO for approval, if needed. As the effectiveness of

actions is determined and all corrective actions are completed, CNS has committed to submit closure packages for all external findings to NPO for approval of closure.

Additionally, CNS revised the causal analysis report (CAR)/CAPs for Findings F-CNS-1 and F-CNS-4. CNS will formally track the CAR/CAPs and associated corrective actions in the Pantex Problem Event Report (PER) system as:

- PER-2015-0216 (2014 Finding F-CNS-1)
- PER-2015-0219 (2014 Finding F-CNS-4).

Suggested Improvement 5.4.1. Increase the effectiveness of corrective actions by:

- Reviewing the process for ranking issues to ensure that they are properly ranked as deficiencies, weaknesses, or improvement items for appropriate processing in the issues management program
- Reviewing the process that establishes CAPs to ensure that all barriers to successful performance are identified and addressed
- Reviewing the independent verification process and practices to determine how to prevent incomplete emergency management corrective actions from passing an effectiveness review
- Fully implementing the *CNS Enterprise Approach to Readiness Assurance*, designed to improve the process for self-assessments, issues management, performance indicators, lessons learned, and an emergency readiness assurance program.

6.0 ITEMS FOR FOLLOW-UP

EA will complete the assessment of implementation plan actions at the Pantex Plant during the February 2017 full-scale emergency management exercise, where CNS and NPO execution of revised programs, plans, and procedures can be demonstrated.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: November 1, 2016 – January 5, 2017

Office of Enterprise Assessments (EA) Management

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, Deputy Director, Office of Environment, Safety and Health Assessments
C.E. (Gene) Carpenter, Jr., Director, Office of Nuclear Safety and Environmental Assessments
Kevin G. Kilp, Acting Director, Office of Worker Safety and Health Assessments
Gerald M. McAteer, Director, Office of Emergency Management Assessments

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Patricia Williams
Gerald M. McAteer
Michael A. Kilpatrick

EA Site Lead for Pantex Plant

Jim Dykes

EA Assessors

Kurt Runge – Lead
John Bolling
Thomas (Tom) Rogers
William (Bill) Scheib

Appendix B

Key Documents Reviewed, Interviews, and Observations

Documents Reviewed

- E-PROC-0001, *CNS Enterprise Administrative Command Media Process*, Rev. 1, 5/12/16
- EM-PLN-0019, *Pantex Plant Comprehensive Emergency Management Plan*, Issue No. 8.10/31/16
- EM-PLN-0034, *Continuity of Operations Plan*, Issue No. 1, 6/29/15
- EM-PLN-0088, *Pantex Incident Management Plan*, Issue No. 1, 8/24/16
- *Enterprise Approach to Readiness Assurance*, Rev. 0, 11/17/16
- ERO checklists
- MNL-EM-352237, *Emergency Management Department Technical Planning Basis Process Program Manual*, Issue No. 1, 11/14/16
- MNL-EM-352240, *Emergency Management Exercises Manual*, Issue No. 2, 11/1/16
- MNL-190881 *Pantex Plant EPHA*, Issue No. 10, 8/12/16
- MNL-190884, *Emergency Action Levels*, Issue No. 7, 11/2/16
- MNL-190884-ZA, *Zone 4 EALs*, Issue No. 1, draft
- MNL-352189, *General Employee Response Manual*, Issue No. 6, 10/5/16
- MNL-352190, *Operations Center Manual*, Issue No. 5, 11/3/16
- *Pantex Plant Zone 12 South Emergency Action Levels* (draft)
- PX-OG-006, *Incident Management System*, Issue No. 6, 10/28/15
- ISC-404620, *Pantex Plant Emergency Planning HS*, Issue No. 5, 7/8/13
- SSES-FY16-1620651-4989-SSES, *Pantex Plant Five Year Drill and Exercise Plan*, Rev. No. 1, 11/10/16
- WP-EM-0363, *Emergency Management Exercises*, Issue No. 2, 9/23/16
- WP-0119, *Radiological Contingency*, Issue No. 2, 7/22/15

Interviews

- CNS Emergency Services, Senior Manager
- CNS Emergency Management, Manager
- CNS Emergency Management Operations, Section Manager
- CNS Emergency Management Program, Section Manager
- CNS Exercises Program Manager
- CNS Emergency Management Issues Management Lead
- CNS Emergency Management Readiness Assurance Lead
- CNS Hazards Analyst
- CNS Procedures Management, Manager
- CNS Procedures Management, Lead
- CNS Enterprise Command Media staff
- CNS Radiation Safety Department staff
- CNS Senior Hazards Analyst