Office of Enterprise Assessments Lessons Learned from Assessments of Emergency Management Programs at U.S. Department of Energy Sites

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Office of Emergency Management Assessments
Office of Environment, Safety and Health Assessments
Office of Enterprise Assessments
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Acronyms

CAT	Consequence Assessment Team
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
EA	DOE Office of Enterprise Assessments
EM	DOE Office of Environmental Management
EMG	Emergency Management Guide
ERO	Emergency Response Organization
HAZMAT	Hazardous Material
IC	Incident Commander
ICP	Incident Command Post
NNSA	National Nuclear Security Administration

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Environment, Safety, and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted emergency management program assessments at four DOE sites during calendar year 2017. The sites, selected based on risk, are under the direction of the Office of Nuclear Energy, the Office of Environmental Management, and the National Nuclear Security Administration. The objective of each assessment was to determine the effectiveness of emergency management programs, including Field Element readiness assurance. This lessons learned report focuses on issues that affect multiple sites and identifies strengths and weaknesses, best practices, and recommendations, with the goal of promoting organizational learning and improving performance throughout the DOE complex.

During 2017, EA observed that most sites have developed and effectively implemented many aspects of their emergency management programs, but some specific areas of weaknesses prevent them from being fully effective. Several programs had evident strengths. The Idaho Operations Office developed an assessment tool based on a comprehensive set of evaluation criteria from Emergency Management Guide 151.1-3, *Programmatic Elements*, Appendix D. Also, contractors at the Paducah Site and Pantex Plant implemented effective site-level drill and exercise committees. Further, Idaho Site and Pantex Plant contractors installed technology upgrades to improve communications and assist in maintaining situational awareness and a common operating picture.

Nonetheless, EA identified some common weaknesses, related primarily to the choice of exercise scenarios, exercise evaluation, response performance, and issues management. Contractors did not always choose exercise scenarios that demonstrate their full response capabilities over a five-year period, and emergency response organization performance was not always effectively evaluated during exercises. Additionally, contractors sometimes did not ensure that communications and integration among responders were fully adequate in establishing situational awareness and a common operating picture. Further, in some instances, contractor corrective action plans did not fully address the findings from assessments and exercises, and the corrective actions did not include verification and validation of the effectiveness of corrective actions in resolving the original finding. Finally, DOE Field Elements and contractors did not always ensure that contractor responsibilities for maintaining long-term effectiveness of the emergency management program were addressed during (and after) contractor transitions.

Previous EA lessons learned reports identified several weaknesses that were similar to those identified above. For example, previous lessons learned reports identified gaps in the exercise programs at some sites, where all elements of the emergency management program were not systematically validated over a five-year period. Also, some sites did not implement effective communications and use of information management tools to establish situational awareness and a common operating picture among various response elements and organizations. Finally, some sites' corrective actions did not lead to program improvements that adequately prevented recurrence of some identified issues.

EA recommendations focus on improving exercise evaluations by using the full capabilities of the Exercise Builder program to facilitate evaluation of the exercises and assessment of procedural gaps during the exercise planning and evaluation process. The recommendations also encourage increased emphasis on long-term exercise planning and conduct to ensure the evaluation of the full range of

potential events and response capabilities over time and the continuation of the exercise five-year plan through changes in prime contractors. The recommendations highlight some suggestions to improve the effectiveness of the emergency management corrective action programs across the DOE complex, such as ensuring thorough causal analyses, sufficient corrective actions to address the root causes, and independent verification and validation of the effectiveness of the corrective actions.

Finally, because of the recurring weaknesses identified in EA lessons learned reports, line management review of previous reports and report recommendations could identify additional actions that would facilitate improvement in their emergency management programs.

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1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Environment, Safety, and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted emergency management assessments at four DOE sites during calendar year 2017. The sites, selected based on risk, are under the direction of the Office of Nuclear Energy, the Office of Environmental Management (EM), and the National Nuclear Security Administration (NNSA). The objective of each assessment was to determine the effectiveness of specific elements of the emergency management programs, including Field Element readiness assurance.

This lessons learned report identifies issues that affect multiple sites and/or facilities and identifies strengths and areas of weakness, best practices, and recommendations, with the goal of promoting organizational learning and improving performance throughout the DOE complex.

1.1 Background

EA manages the Department's independent oversight program. This program is designed to enhance DOE safety and security programs by providing the Secretary and Deputy Secretary of Energy, Under Secretaries of Energy, other DOE managers, senior contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements, and the effectiveness of DOE and contractor line management performance and risk management in safety and security and other critical functions as directed by the Secretary. DOE Order 227.1A, *Independent Oversight Program*, describes and governs the DOE independent oversight program. EA implements the program through a comprehensive set of internal protocols and assessment guides.

EA focused its emergency management assessment efforts in 2017 on the Pantex Plant, Paducah Site, Idaho Site, and Waste Isolation Pilot Plant because each site had significant program changes during the past few years. The Pantex Plant initiated emergency management program changes as the result of Defense Nuclear Facilities Safety Board Recommendation 2015-1, *Emergency Preparedness and Response at the Pantex Plant*. The Idaho Site EM project, Idaho Cleanup Project Core, transitioned to a new contractor one year before the EA assessment. At the Paducah Site, one EM project transitioned to a new contractor three years before the EA assessment and then transitioned to another contractor shortly after the EA assessment, while a second EM project transitioned to a new contractor two months before the EA assessment. The Waste Isolation Pilot Plant recently restarted operations after an extended shutdown.

Previous EA emergency management lessons learned reports, such as those for calendar years 2015 and 2016, identified a number of weaknesses that were similar to those identified during the 2017 EA assessments. For example, previous lessons learned identified that exercise programs at some sites did not systematically validate all elements of the emergency management program over a five-year period. Also, some sites did not demonstrate effective, accurate communications and use of information management tools to establish situational awareness and a common operating picture among various response elements and organizations. Finally, some sites' corrective actions did not lead to program improvements that adequately prevented recurrence of an identified issue.

1.2 Scope and Methodology

This report reflects an analysis of collected lessons learned from emergency management assessments completed during 2017 by independent assessment teams examining parts of the emergency management programs. During that timeframe, EA completed four assessments that included an exercise program review, full-scale exercises, contractor readiness assurance, and DOE Field Element readiness assurance (see Appendix B). Table 1 provides the sites assessed, along with the key elements in the assessments, associated contractors, local DOE offices, and DOE Headquarters program offices.

The summary statements in Section 2 below reflect aggregated issues from the four reports published by EA. Those reports remain a snapshot of conditions at the facility at the time of the assessment. The issued reports, provided to the assessed organizations, may have resulted in corrective actions or enhancements not reflected in these discussions.

Table 1.
Sites, Key Elements Assessed, Contractors, DOE Program Offices, and Local DOE Offices in the Assessment

Assessment Site	Key Elements Assessed	Contractor	DOE Field Element	DOE Headquarters Program Office
Pantex Plant	Full-scale Exercise	Consolidated Nuclear Security, LLC	NNSA Production Office	NNSA
Paducah Site	DOE Field Element Readiness Assurance Contractor Readiness Assurance	Fluor Federal Services, Inc. Mid-America Conversion Services, LLC Swift and Staley, Inc.	Portsmouth/ Paducah Project Office	EM
Idaho Site	DOE Field Element Readiness Assurance Contractor Exercise Program Full-scale Exercise	Battelle Energy Alliance, LLC Fluor Idaho, LLC	Idaho Operations Office	Office of Nuclear Energy EM
Waste Isolation Pilot Plant	Contractor Readiness Assurance (Corrective actions)	Nuclear Waste Partnership, LLC	Carlsbad Field Office	EM

The scope of the assessments included elements from five criteria and review approach documents (CRADs):

- CRAD 45-21, *Feedback and Continuous Improvement Assessment Criteria and Approach – DOE Field Element*, Rev. 1, 12/4/12

- CRAD 33-03, *2016 Emergency Management Program Review Pantex Plant,* Rev. 0, 10/18/16

- CRAD 33-05, *Contractor Readiness Assurance and Exercise Program,* Rev. 0, 3/22/17

- CRAD 33-06, *Federal Line Management Oversight of the Field Emergency Management Program,* Rev. 0, 3/22/17

- CRAD 33-07, *DOE/NNSA Emergency Management Exercise Review,* Rev. 1, 10/19/17.

EA used these criteria to determine whether the policies, procedures, and operational performance met DOE objectives for effectiveness in the areas examined.

1.3 Requirements and Guidance

Upper tier requirements for emergency management programs at the assessed sites flow down from DOE Order 151.1C, *Comprehensive Emergency Management System.* Additional requirements for contractor assurance systems are included in DOE Order 414.1D, *Quality Assurance,* and DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*. DOE Emergency Management Guides (EMGs) provide additional guidance: EMG 151.1-1A, *Emergency Management Fundamentals and the Operational Emergency Base Program*; EMG 151.1-2, *Technical Planning Basis*; EMG 151.1-3, *Programmatic Elements*; and EMG 151.1-4, *Response Elements*.

2.0 OVERALL ASSESSMENT

During 2017, EA observed that most sites have generally well-developed and effectively implemented programs with certain areas of weakness. Some strengths include:

- The Idaho Operations Office developed an assessment tool based on a comprehensive set of evaluation criteria from DOE Order 151.1C and EMG 151.1-3, Appendix D.

- Paducah Site and Pantex Plant contractors implemented a site-level drill and exercise committee, a previously identified EA best practice.

- Idaho Site and Pantex Plant contractors implemented technology upgrades to improve communications, aiding in achieving and maintaining situational awareness and a common operating picture.

However, some sites have common weaknesses in the effectiveness of exercise scenario selection and evaluation, response performance and procedures, issues management processes and implementation and long-term effectiveness of the emergency management program after contract transitions. Key weaknesses include:

- Contractors do not always choose exercise scenarios over time to demonstrate that their emergency response organizations (EROs) can effectively respond to the full spectrum of hazardous material (HAZMAT) events or use the full set of ERO capabilities.

- Contractors do not always ensure that communications and integration among responders are fully adequate and that response procedures are sufficiently detailed to prevent weaknesses in establishing situational awareness and a common operating picture.

- Contractors do not always effectively evaluate ERO performance during exercises.

- Contractor corrective actions did not always resolve the original finding; corrective actions did not fully address the findings from assessments and exercises and did not include verification and validation of the effectiveness of those actions.

- DOE Field Elements and contractors do not always ensure that contractor responsibilities for maintaining long-term continuity of the emergency management program are addressed during (and after) contract transitions.

2.1 Exercise Programs

Criterion: A formal exercise program must validate all elements of an emergency management program over a 5-year period. The exercise program must validate facility and site-level emergency management program elements by initiating response to simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicates an integrated emergency response to an actual event. Planning and preparation must use an effective, structured approach that includes documentation of specific objectives, scope, time lines, injects, controller instructions, and evaluation criteria for realistic scenarios. Each exercise must be conducted, controlled, evaluated, and critiqued effectively and reliably. Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, Attachment 2, (Contractor Requirements Document), 6.)

The purpose of a formal exercise program is to establish a framework and associated mechanisms for assuring that emergency plans, response procedures, and resources are effective by ensuring that they are sufficiently exercised and evaluated, and that emergency planning assumptions are validated. In addition, issues management processes should ensure that appropriate and timely improvements are made in response to shortfalls identified through comprehensive exercise evaluations.

EA found that most sites adequately document a formal exercise program in their emergency plan, drill and exercise plan, and implementing procedures. Most sites satisfactorily plan, conduct, and document exercises, but contractors at some sites do not always choose a sufficient number of exercise scenarios to demonstrate over a five-year period that their EROs can successfully respond to the full spectrum of HAZMAT incidents or use the full set of ERO capabilities.

Strengths

Paducah and Pantex contractors have established effective site-level drill and exercise committees. The drill and exercise committees support the exercise coordinator, with key responsibilities for coordinating the site exercise schedule with their organizations, providing input to scenario development, serving as controllers or evaluators during drills and exercises, and reviewing drill and exercise after-action reports for technical and factual accuracy.

Weaknesses

Site contractors have not always chosen exercise scenarios to demonstrate that their EROs can effectively respond to the full spectrum of HAZMAT events or use the full set of ERO capabilities. Some

contractors do not conduct the number of exercises necessary to demonstrate the effectiveness of all aspects of the ERO over a five-year period. As a result, sites did not always demonstrate effective ERO response to the full spectrum of potential events; such as, mass casualty incidents, unplanned nuclear criticality, and hazardous material events that are classified as a general emergency, and a design basis event or a beyond-design-basis event involving multiple facilities. Further, sites did not always demonstrate effective use of all ERO capabilities, such as using alternate command centers, participating with the DOE Headquarters and NNSA radiological assets, testing all planned protective actions, and conducting a joint response with the fire department and protective force to a security concern with a HAZMAT component and a protective force representative serving as the incident commander (IC). Emergency response requires time urgent actions by the ERO. When the full range of response procedures and capabilities are not tested periodically, the ERO may not be prepared to respond promptly and effectively to events with potentially adverse impacts to workers and the public.

2.2 Full-Scale Exercise - Communications

Criteria: The contractor at all DOE/NNSA facilities must provide for continuing effective communication among response organizations throughout an emergency and establish effective communications methods between event scene responders, emergency managers, and response facilities. (DOE Order 151.1C, Attachment 2, 12.f & 12.g)

Site-level emergency response organization elements and resources must participate in a minimum of one exercise annually. This site exercise must be designed to test and demonstrate the site's integrated emergency response capability. (DOE Order 151.1C, Attachment 2, 6.b (2))

Planning and preparation must use an effective, structured approach that includes documentation of specific objectives, scope, time lines, injects, controller instructions, and evaluation criteria for realistic scenarios. Each exercise must be conducted, controlled, evaluated, and critiqued effectively and reliably. Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, Attachment 2, 6.)

Program and exercise evaluations (including appraisals and assessments) must be based on specific standards and criteria, issued by the Director, Office of Emergency Operations. (DOE Order 151.1C, Attachment 2, 7.a (1))

DOE Order 151.1C requires that contractors regularly conduct site exercises to demonstrate the site's integrated emergency response capability. Important response capabilities are effective communications and integration among response organizations and effective methods of communication among event scene responders, emergency managers, and response facilities. Effective communications and integration within and between response teams contribute to a common operating picture of the emergency response and shared situational awareness among all teams, as well as offsite organizations.

EMG 151.1-4 denotes that clear and detailed emergency response procedures and checklists that flow down from the emergency plan and higher order documents are one mechanism for facilitating situational awareness and a common operating picture. It promotes the effective use of communications equipment as another mechanism for obtaining and sharing situational awareness and a common operating picture. Radios and telephone systems, public warning and notification systems, internet systems, incident management information systems, and social media are examples of technology that are used to communicate effectively and share a common understanding of the emergency. In addition, the Office of Emergency Operations published the evaluation performance criteria supporting DOE Order 151.1C in EMG 151.1-3, Appendix D.

Although some emergency management programs used procedures, communications equipment, and integration and coordination effectively to obtain and share situational awareness, some sites and contractor organizations within sites continue to have weaknesses. Effective use of these mechanisms varied widely across the sites assessed.

Strengths

EA observed several improvements in the use of technology in full-scale exercises at sites evaluated in 2017. Specifically, at the Pantex Plant, the use of the Emergency Management Information System during the 2017 full-scale exercise significantly improved the Emergency Operations Center information collection and management processes, as well as the delivery of timely notifications to DOE Headquarters and the offsite authorities. At the Idaho Site, effective use of a telephone bridge line integrated with the public-address system in the Emergency Operations Center significantly enhanced situational awareness. Additionally, notable physical improvements to Fluor Idaho's Emergency Control Center at the Idaho Nuclear Technology and Engineering Center, such as additional wall monitors, whiteboards, and communications equipment, led to improvements in communications and ultimately improved situational awareness within the center.

EA also observed areas of effective integration of team members and between teams in 2017. During the full-scale exercise at the Pantex Plant, the offsite field monitoring team coordinator was co-located with the consequence assessment team (CAT) members, resulting in very close coordination and cooperation. The offsite field monitoring team coordinator immediately provided field monitoring team data to the CAT members, who quickly and accurately updated assessments. During an exercise at the Idaho Site, effective integration within the Emergency Control Center resulted in the team members being well informed and their efforts being well coordinated.

Weaknesses

Nevertheless, insufficiently detailed response procedures sometimes led to weaknesses in establishing situational awareness and a common operating picture, and communications among responders were not always adequate. Further, contractors have not always effectively evaluated ERO performance.

In some cases, response procedures and checklists either contained unclear roles and responsibilities for collecting specific event information or conflicted with one another. During one exercise, the ERO incorrectly tracked the status of injured personnel throughout the exercise because emergency planners did not adequately assign the responsibilities for collecting and distributing validated information in emergency response procedures. Also, the incident command team, composed of protective force, fire department and radiological safety department personnel, focused completely on controlling their respective field teams. Site emergency response procedures did not assign an individual responsible for integration, leading to weaknesses in integration and coordination of the various incident command teams. Furthermore, although most sites have a web-based incident information management system, some ERO members either do not know where or how to post information or where in the system to obtain information because of missing detail in response procedures. Clear, detailed, and thorough emergency response procedures are critical to ERO members performing the many infrequent activities required during an emergency.

Additionally, some ERO teams did not communicate and integrate well either within the team or between the teams. This weakness further degrades the common operating picture and is similar to a previous lessons learned on the lack of integration of CATs into the rest of the ERO. During one exercise, because of the lack of communications from and integration of the incident command team, fire department and radiological safety department personnel entered the simulated bombing scene before the protective force

conducted a sweep for additional explosives. At another exercise, radiological control technicians arrived at the incident command post (ICP) to frisk fire department personnel and release the fire engine and equipment, but the fire department had already departed. During the same exercise, lack of coordination between the command center and the ICP resulted in the ICP being unnecessarily close and downwind from the potential radiological release for longer than necessary.

Specific consequences of weaknesses in establishing situational awareness and a common operating picture included decisions based on incomplete or inaccurate information. In one exercise, the IC was unaware of the potential for radiological doses during the event, so the IC did not establish a safe operating location for the ICP and staging areas. Also, CAT members did not produce accurate follow-on assessments because they were unaware of updated radiological material inventories and field monitoring results.

In addition to the weaknesses noted with situational awareness, the EA assessments also identified instances where contractors were not fully effective in evaluating ERO performance. Most contractors identify weaknesses related to ERO procedure utilization and minor procedural flaws. However, the exercise evaluations have not always identified more significant procedural inadequacies, such as overly complicated command media structure, lack of flowdown from the emergency management plan, and lack of integration within and external to the emergency management organization. Site contractors did not always correlate significant ERO performance weaknesses with inadequate procedures. The weaknesses in exercise evaluation often stem from a lack of structure in the evaluation processes that are incorporated in the exercise design. As a result, opportunities for improving ERO performance due to significant procedural weaknesses are missed because they are not always identified as issues during exercise evaluations.

Although the sites assessed in 2017 have implemented some modules of the Exercise Builder program, no sites assessed in 2017 have fully implemented the evaluation module. Exercise Builder, which is a DOE-produced, computer-based tool for developing and evaluating emergency exercises, uses the criteria in EMG 151.1.1-3, Appendix D, as its standard set of performance-based criteria. During incorporation of site-specific response procedures into the Exercise Builder evaluation module, planners overlay procedures to the performance-based criteria, and procedural gaps or conflicts become clear. Emergency planners are then able to address the procedural issues and effectively evaluate ERO performance during an exercise.

Obtaining situational awareness and sharing a common operating picture among teams is one of the more difficult, but one of the most important, goals for an ERO. Weaknesses in response procedures, lack of communications and integration among and between emergency response teams, and ineffective use of web-based incident information management systems all contribute to this condition. Shortcomings in the evaluation of exercises hinder the ability of sites to identify weaknesses and over time improve their ability to respond to and mitigate the consequences of an event.

2.3 Contractor Readiness Assurance

Criteria: Continuous improvement in the emergency management program results from implementation of corrective actions for findings (e.g., deficiencies, weaknesses) in all types of evaluations, including both internal and external evaluations. (DOE Order 151.1C, Attachment 2, 7.b (1))

Corrective action plans must be developed within 30 working days of receipt of the final evaluation report. Corrective actions must be completed as soon as possible. Corrective actions addressing revision of procedures or training of personnel should be completed before the next annual self-assessment of the program. (DOE Order 151.1C, Attachment 2, 7.b (1) (a))

Completion of corrective actions must include a verification and validation process, independent of those who performed the corrective action, that verifies that the corrective action has been put in place and validates that the corrective action has been effective in resolving the original finding. (DOE Order 151.1C, Attachment 2, 7.b (1) (b))

The purpose of the emergency management corrective action program is to continually improve the program through reliable implementation of corrective actions for findings from evaluations, including exercises, as well as both internal self-assessments and external assessments. Requirements in this area derive from DOE Order 151.1C, which states that corrective actions are to be implemented and that corrective action plans must include an independent verification and validation process. The verification and validation process must verify that the corrective action has been put in place and validate that the corrective action has been effective in resolving the original finding. These requirements are above and beyond the requirements for corrective actions specified in DOE Orders 414.1D and 226.1B. EMG 151.1-3 provides an acceptable methodology for a corrective action program and guidance on the development of corrective actions, including the need to analyze causal factors.

All contractors implement a corrective action program based on DOE Orders 414.1D and 226.1B; however, DOE Order 151.1C has supplemental requirements for corrective action programs that contractors do not consistently incorporate into the contractor assurance system, such as DOE 151.1C issues management requirements for independent verification and validation of the effectiveness of corrective actions. Some contractors did not develop adequate causal analyses, resulting in ineffective corrective actions, and some contractors did not perform adequate verification and validation of the corrective actions.

Strengths

Consolidated Nuclear Security, LLC has added an exercise validation step in corrective action plans to test the effectiveness of corrective actions before closing a finding. This step can provide additional assurance that the corrective action was effective in resolving the original issue, thus preventing recurrence.

Weaknesses

Although all contractors implement a corrective action program, some weaknesses exist in identifying and implementing appropriate corrective actions that are effective in preventing recurrence of issues.

To ensure that corrective actions are adequate, the root causes of the finding must be identified and addressed. At some sites, the level of rigor of causal analysis was inadequate, resulting in ineffective corrective action plans. One site self-identified that causal analyses for some findings were less-than-adequate, and subsequently revised those causal analyses and corrective actions to more closely address the causes of the findings. At another site the corrective action plans for the 2016 EA assessment findings and deficiency omitted several important actions as the result of inadequate causal analyses.

Additionally, some contractors do not adequately perform verification and validation of emergency management corrective actions as required, contributing to the recurrence of performance problems. Sites either did not categorize the issues at an action level high enough to invoke a verification and validation step or did not specifically require verification and validation for all emergency management findings without regard to action level. At one site, the Emergency Management issues management process appropriately included the preparation, implementation, verification, and validation of corrective actions; however, the site issues management process, which was used to manage the issues and implement the corrective actions, did not address the need for verification and validation of emergency management

findings. Another site assigned an action level to the corrective actions that did not require verification and validation of effectiveness and did not include the emergency management requirements for verification and validation in the corrective action plans. Consequently, the corrective action process did not verify or validate the effectiveness of corrective actions in resolving the original findings and, as a result, some ERO performance issues remained uncorrected.

A rigorous causal analysis process is necessary to identify all of the root causes that contributed to the finding and enable the development of correct and sufficient corrective actions. An independent verification and validation process can help ensure that the corrective actions are completed and effectively resolve the original findings. Strengthening these two areas will help prevent the recurrence of issues and improve the emergency management program.

2.4 DOE Field Element Readiness Assurance

Criterion: (Field Element Managers) conduct assessments of facility emergency management programs at least once every three years, review contractor self-assessment programs annually to ensure compliance with DOE directives and policy, and provide the results/conclusions to the Program Office and the Director, Office of Emergency Operations. (DOE Order 151.1C, I.9.m.)

DOE Order 151.1C states that the DOE Field Element provides the first (lowest) level of line management oversight of DOE and NNSA facilities, sites, and activities. Field Element managers are responsible for reviewing and approving site, facility, and activity corrective action plans for external findings identified during evaluations, assessments, drills, exercises, and actual emergencies and, based on site, facility, and activity performance, periodically reviewing corrective action programs for internal findings to ensure programmatic effectiveness.

EMG 151.1-3 provides acceptable methods for meeting the programmatic elements of emergency management and includes a standard set of generic, performance-based criteria to be used for the evaluation of the emergency management programs.

The assessments revealed that the level of DOE Field Element oversight of the emergency management program varied widely. DOE Field Elements provided some oversight, including the review and approval of the Emergency Readiness Assurance Plan and conduct of some program assessments, but at one site, the Field Element did not complete the necessary assessments. It is notable that some DOE Field Elements were overseeing contract transitions during the time periods surrounding the assessments.

Strengths

The Idaho Operations Office has a noted strength of conducting self-assessments that are appropriately scoped, thorough, effective, and comprehensive. The Idaho Operations Office has developed a self-assessment guide that is based on DOE Order 151.1C and EMG 151.1-3 criteria and provides instructions for the self-assessment team, resulting in a clear and complete record of the assessment activities and results.

Weaknesses

The DOE Field Element for one site did not perform complete evaluations of contractor emergency management programs over a three-year period, review contractor self-assessments annually, or conduct self-assessments of the emergency management program annually. At this site, the DOE Field Element's corrective action program procedure did not identify the different types of causal analysis for different significance levels of issues and did not require independent verification and validation prior to closing

findings. The missing requirements for causal analysis and verification and validation are similar to the contractor's weaknesses in these areas.

DOE Field Element oversight is especially important during contract transition, when recent and pending contract changes can result in readiness assurance and exercise program schedules being inconsistent with DOE Order 151.1C review periods. Although there was evidence of some oversight requiring due diligence reviews, DOE Field Element oversight has not always been effective in ensuring the continuity of the emergency management program requirements after contract transition. DOE Order 151.1C has several performance requirements to validate all program elements over a five-year period. DOE did not assure that one new contractor established a plan to continue validating program elements and complete all of the performance requirements. Consequently, completed exercises for this site did not include the full spectrum of events or full set of ERO capabilities, and programmatic assessments had not been conducted for all 15 program elements. As a result, weaknesses in the emergency management program (including ERO response, program assessments, and emergency preparedness hazards assessments updates) could go unidentified and uncorrected.

Effective Field Element oversight can identify weaknesses in the site contractor's emergency management program, providing opportunities for program improvement. Contract transitions will continue as DOE seeks new approaches to managing its facilities, plants, and laboratories. Because the Field Element staff manages the contracts and is a continuous presence at the site, the Field Element staff must ensure that continuity within the emergency management program is maintained throughout contract transitions and over the five-year period, and that corrective action processes are managed seamlessly.

3.0 SUMMARY OF RESULTS

3.1 Best Practices

During 2017, EA did not identify any new best practices among the DOE sites.

3.2 Recommendations

These recommendations are based on lessons learned that were identified during EA assessments in 2017. While the underlying deficiencies and weaknesses from individual reviews did not apply to every site reviewed, the recommended actions are intended to provide insights for potential improvements at all DOE sites. Consequently, DOE organizations and site contractors should evaluate the applicability of the following recommended actions to their respective facilities and/or organizations and consider their use as appropriate in accordance with Headquarters and/or site-specific program objectives.

DOE Field Element Managers

- Improve the completion of the DOE Order 151.1C requirements for five-year periodicity reviews of all topic areas through contract transition by considering the following suggested actions:

    - For competitive contracts, the DOE contracting team (head of contracting authority, contract specialists, and Source Evaluation Board) should ensure that appropriate emphasis is placed on continuity of the emergency management program during contract development and consider including continuity of the emergency management program in the statement of work, in a special H-clause on continuity during transition, and in the transition plan deliverables (similar to continuity of operations and security).

- The DOE Field Element subject matter expert for emergency management should review contract transition deliverables for the emergency management program. The DOE subject matter expert should also ensure that the incoming contractor documents the status of the emergency management program and assumes responsibility for any existing corrective actions. Additionally, the DOE Field Element should consider developing performance metrics and performance incentives tied to achieving a fully effective program and maintaining the five-year program deliverables.

- Improve the effectiveness of DOE Field Element oversight by ensuring that complete evaluations of contractor emergency management programs are performed over a three-year period, contractor self-assessments are reviewed annually, and a self-assessment of the DOE Field Element emergency management program is conducted annually.

- Review the contractor's corrective action program to ensure that the rigor of causal analysis is appropriate for the significance of the finding, and that independent verification and validation is performed. Additionally, ensure that the EMG 151.1-3, Appendix D, evaluation criteria are used by both DOE and the contractor to evaluate performance during assessments.

Site Contractors

- To demonstrate that the ERO can effectively respond to plausible incidents, develop lists of the full spectrum of HAZMAT release scenarios and the full set of ERO capabilities. Use these lists in preparing a five-year exercise plan and choosing scenarios to demonstrate the effectiveness of the planned responses.

- Improve the effectiveness of ERO response procedures and performance evaluations during an exercise through full implementation of the Exercise Builder evaluation module by:

  - Conducting the emergency response procedure assessment and establishing site-specific performance-based evaluation criteria using the response procedures actions in the Exercise Builder evaluation module.

  - Improving response procedures by reviewing and updating procedures to address any multi-procedural gaps or conflicts.

  - Updating the Exercise Builder evaluation module, as necessary, by incorporating any procedural changes.

  - Evaluating ERO performance during exercises by using the site-specific performance-based evaluation criteria within Exercise Builder.

- During training and drills, emergency management managers should emphasize achieving situational awareness and a common operating picture through effective communications, integration of teams, and response procedures as a priority for their Emergency Directors and the ERO. When situational awareness and a common operating picture are not achieved, emergency managers should clearly identify the issues in the after-action reports and develop specific corrective actions to resolve the specific issues.

- Increase the effectiveness of the corrective action program by:

- Reviewing the issues ranking process and ensuring that the process leads to an appropriate causal analysis.

- Reviewing the procedures, guidance, and training for root cause analysis to ensure that the corrective action plan appropriately addresses the root causes for an issue.

- Ensuring that the appropriate integration between the emergency management and the site issues management processes so that the independent verification and validation of the effectiveness of the corrective actions for emergency management findings is adequately addressed and the original issue is corrected.

- Including the validation of the effectiveness of corrective actions for significant issues in exercise objectives.

Appendix A
Supplemental Information

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Appendix B
Source Documents

- EA Report, *Office of Enterprise Assessments Assessment of the Pantex Plant 2017 Full-Scale Exercise – June 2017*

- EA Report, *Office of Enterprise Assessments Assessment of Emergency Management at the Paducah Site – November 2017*

- EA Report, *Office of Enterprise Assessments Assessment of the Emergency Management Exercise Program at the Idaho Site – January 2018*

- EA Report, *Office of Enterprise Assessments Assessment of Emergency Management at the Waste Isolation Pilot Plant – February 2018*