



Lessons Learned from Assessments of Emergency Management Programs at U.S. Department of Energy Sites During Fiscal Year 2021

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Office of Enterprise Assessments
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Acronyms

CNS	Consolidated Nuclear Security, LLC
COVID-19	Coronavirus Disease 2019
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
EA	DOE Office of Enterprise Assessments
EM	Environmental Management
EOC	Emergency Operations Center
EPHA	Emergency Planning Hazards Assessment
EPI	Emergency Public Information
ERO	Emergency Response Organization
FY	Fiscal Year
JIC	Joint Information Center
NNSA	National Nuclear Security Administration
OE	Operational Emergency
OST	Office of Secure Transportation
Pantex	Pantex Plant
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
Y-12	Y-12 National Security Complex

LESSONS LEARNED FROM ASSESSMENTS OF EMERGENCY MANAGEMENT PROGRAMS AT U.S. DEPARTMENT OF ENERGY SITES DURING FISCAL YEAR 2021

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted multiple independent assessments in fiscal year (FY) 2021 to evaluate the effectiveness of DOE/National Nuclear Security Administration (NNSA) emergency management programs. This report documents lessons learned from these performance-based and programmatic appraisals, with attention to identified trends and significant issues affecting multiple DOE/NNSA sites. Strengths, weaknesses, best practices, and recommendations are identified with the goal of promoting organizational learning and improving performance throughout the DOE complex.

EA conducted 13 independent assessments of emergency management programs at DOE and NNSA sites, as well as a complex-wide study of social media used during emergencies. The 13 assessments measured the ability of site-level emergency response organizations (EROs) to respond to postulated incidents, evaluated processes for identifying and validating emergency response capabilities, and verified that site closure of previous EA-issued findings was performed in a manner designed to prevent recurrence. The study analyzed the integration of social media into emergency public information (EPI) activities.

The assessed sites demonstrated generally well-developed and effectively implemented programs. EA identified a number of strengths and best practices, including:

- Consolidated Nuclear Security, LLC (CNS) at both the Y-12 National Security Complex (Y-12) and the Pantex Plant (Pantex) developed strong Coronavirus Disease 2019 (COVID-19) protocols for site exercises to continue evaluations of emergency response organization (ERO) proficiency and protocols without compromising employee safety.
- Savannah River Nuclear Solutions, LLC (SRNS) at the Savannah River Site (SRS) and Triad National Security, LLC at Los Alamos National Laboratory demonstrated best practices in implementing courtesy notification processes for local and state response agencies. These two sites established criteria for events that are below reportable occurrence requirements but could draw media and public interest.
- Findings follow-up assessments cited CNS at Pantex and SRNS at SRS for best practices in readiness assurance processes. At Pantex, the contractor integrates a robust effectiveness review process within exercise plans. At SRS, the contractor implements a comprehensive, multi-faceted approach that ensures corrective actions are resolved.
- Mission Support Alliance, LLC at the Hanford Site was cited for best practices following the Plutonium-Uranium Extraction (PUREX) Plant tunnel collapse, most notably the public affairs team's use of Facebook Live to broadcast real-time information from the emergency operations center.

EA also identified areas where improvements are needed. Site-specific issues are identified in each of the 13 assessment reports. A summary is provided below:

- Three sites were assessed for the specific purpose of determining if their response capabilities were being tested as required, and EA determined that none of these sites validated all of their capabilities. Capabilities not validated through testing include responses to Office of Secure Transportation incidents on sites, agreements with offsite support entities, interface capabilities with local emergency management agencies, and virtual emergency operation center capabilities.

- Effectiveness reviews of corrective actions for finding closure are weak at several DOE sites. Approximately half of the reviewed findings were closed but not adequately resolved, largely due to the methods used in closure processes.
- At four of the 13 sites assessed, Federal oversight roles were insufficient for resolving findings and for ensuring all required response capabilities are tested within a five-year timeframe.
- Site EPI social media tools and processes are emerging but are not yet effective. Areas of weakness include the planning for coordinated and integrated EPI and social media activities with offsite stakeholders, counterparts, and traditional media. In addition, most social media strategies, policies, and plans are not comprehensive.

This report provides recommendations to the NNSA Office of Emergency Operations and DOE program secretarial offices, field element managers, and site contractors for improving emergency management programs. Selected recommendations are highlighted below; a complete list of recommendations is provided in section 4.0 of the report.

NNSA Office of Emergency Operations and DOE Program Secretarial Offices

- Stress the importance of verifying and testing all ERO response capabilities, including offsite response capabilities identified in memoranda of agreement/understanding.
- Promote the development and use of matrices in five-year exercise plans to ensure that all emergency response capabilities are validated over a five-year period.
- Promote the development of COVID-19 protocols for emergency management programs so that drill and exercise programs can resume, thereby maintaining ERO proficiency without compromising employee safety.

DOE Field Element Managers

- Confirm that five-year exercise plans adequately validate all response elements and capabilities.
- Ensure that exercise scenarios are sufficiently complex to test and verify the ERO's readiness to respond to challenging incidents and to validate corrective actions.
- Formally track the site's progress in implementing its five-year exercise plan to ensure that all response capabilities are validated.

Site Contractors

- Develop five-year exercise plans that validate all response elements and capabilities.
- Include objectives in exercise packages for the purpose of validating corrective actions.
- Develop and implement pandemic protocols so that drill and exercise programs can resume, thereby maintaining ERO proficiency without compromising employee safety.
- Work with local and state response agencies to establish mutually agreed-upon courtesy notification criteria for events that are not reportable but could draw media and public interest.
- Ensure that EPI plans and procedures fully support the use of social media during emergencies.

LESSONS LEARNED FROM ASSESSMENTS OF EMERGENCY MANAGEMENT PROGRAMS AT U.S. DEPARTMENT OF ENERGY SITES DURING FISCAL YEAR 2021

1.0 INTRODUCTION AND SCOPE

During fiscal year (FY) 2021, the U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted 13 independent assessments of emergency management programs within DOE, including National Nuclear Security Administration (NNSA) and Office of Environmental Management (EM) sites, as well as a complex-wide study of social media use during emergencies. The 13 assessments measured the ability of site-level emergency response organizations (EROs) to respond to postulated incidents, evaluated processes for identifying and validating emergency response capabilities, and verified proper site closure of previous EA-issued findings in a manner designed to prevent recurrence. The study analyzed the integration of social media into emergency public information (EPI) activities.

The Department's independent oversight 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. This report documents lessons learned from EA's FY 2021 emergency management oversight activities, with attention to identified trends and significant issues affecting multiple DOE/NNSA sites. Three of the assessment reports were published in FY 2022 but are included in this report because they were based on assessments conducted in FY 2021. Strengths, weaknesses, best practices, and recommendations are identified with the goal of promoting organizational learning and improving performance throughout the DOE complex.

The scope of EA's FY 2021 emergency management oversight activities is summarized below.

Exercise Evaluations

EA evaluated the ERO's response to hazardous material release exercises at two sites. In July 2021, EA observed a full-scale exercise at the Pantex Plant (Pantex) that involved two simulated radiological releases, including one with offsite consequences. A full-scale exercise is a complex test of many aspects of an integrated emergency response. In September 2021, EA observed a full-participation exercise at the Y-12 National Security Complex (Y-12) that involved a simulated Office of Secure Transportation (OST) incident. A full-participation exercise involves multiple levels of DOE organizations, as well as state and local governments. The specific response elements assessed for both exercises included emergency notifications and communications, incident classification, protective actions, consequence assessment, emergency facilities and equipment, offsite response interfaces, and ERO cadre and support team performance.

Emergency Preparedness Capability Assessments

To ensure a state of readiness for analyzed Operational Emergencies (OEs), EA reviewed exercise packages and after-action reports for three high-hazard NNSA sites over a five-year period to determine whether the exercises adequately tested the site-specific emergency response capabilities the sites identified as necessary, including capabilities identified in agreements with offsite agencies.

Finding Follow-up Appraisals

To ensure the effectiveness of contractor implementation and Federal oversight of corrective actions, EA reviewed the closure records for 59 previous findings issued by EA to contractors and their respective Federal field offices between 2012 and 2020 at eight sites.

Emergency Public Information Social Media Study

EA analyzed the integration of social media into EPI activities. The study was based primarily on observations, interviews, and data collected from seven sites and five Headquarters offices between January 2019 and June 2020 culminating in a report published in January 2021.

The members of the EA report preparation team, the Quality Review Board, and EA management responsible for this lessons-learned report are listed in appendix A. Appendix B describes the criteria and review approach documents (CRADs) used in this lessons-learned report; for the sites assessed, Table B-1 shows the key elements reviewed, associated contractors, DOE field elements, and DOE Headquarters program offices. Source documents are listed in appendix C.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. As identified in the site-specific EA assessment plans, selected topics from EA CRADs were used to provide a focused set of objectives, criteria, and approaches for the assessments and study. EA assessment plans also reference requirements for contractor assurance systems found in DOE Order 414.1D, *Quality Assurance*, and DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*.

All EA FY 2021 emergency management assessments included reviews of key documents, such as exercise packages, after-action reports, corrective action plans, causal analyses, emergency plans, emergency planning hazards assessments (EPHAs), implementing procedures, and associated emergency management-related analyses. EA conducted interviews with key personnel responsible for developing and executing each site's emergency management program. EA also observed performance during exercises.

3.0 RESULTS

Assessment results are reported for the major focus areas examined during performance-based and programmatic assessments. The following three subsections describe the observed program strengths and weaknesses.

3.1 Emergency Preparedness Capability Tests and Responder Performance

DOE Order 151.1D, *Comprehensive Emergency Management System*, mandates that DOE sites participate in a formal readiness assurance program that establishes a framework and associated mechanisms for ensuring that emergency plans, procedures, and resources are sufficiently maintained, exercised, and evaluated. In addition, DOE Order 151.1D identifies the functional emergency response requirements for DOE and NNSA sites. These requirements include developing an integrated and comprehensive emergency management system to ensure that sites can respond effectively and efficiently to all OEs so that appropriate response measures are taken to protect workers, responders, and the public.

Management and operating contractors must determine the necessary site emergency response capabilities based on site-specific attributes, including the types and forms of hazardous materials, demographics, and geography. EA assessments conducted in FY 2021 verified emergency response capabilities related to hazards identified in the EPHAs at three high-hazard NNSA sites, as well as the ability of EROs at two NNSA sites to respond to simulated hazardous material incidents.

An analysis of the FY 2021 emergency preparedness capability and emergency response assessments demonstrated that the assessed sites, with minor exceptions, adequately established, maintained, and validated the emergency response capabilities of ERO cadres and teams, as required by DOE Order 151.1D. The assessed sites continue to refine emergency plans and policies, procedures, equipment, and related processes by generally employing effective exercises, drills, workshops, and seminars, as well as issues management and validation processes. Overall, the technical planning basis observed at sites was sound, and numerous proficiencies were recognized across the DOE complex. Significantly, EA observed that exercise scenarios involving severe event initiators and OST incidents at host sites were added as potential OEs. Furthermore, onsite protective actions, coupled with offsite protective action recommendations, are adequate to protect the health and safety of onsite and offsite populations using conservative methodologies. With few exceptions, emergency plan implementing procedures provide sufficient guidance for effectively executing responses to OEs. Site emphasis on maintaining emergency plans, emergency readiness assurance plans, and exercise programs demonstrate continued focus on the technical considerations and methodologies required by DOE Order 151.1D.

EA observed good practices related to emergency response performance and validation of programmatic capabilities. In the performance-based assessments, ERO personnel effectively initiated pre-determined protective action recommendations and offsite notifications, when necessary, within minutes of classification of each incident. Furthermore, EA assessments found that Federal oversight and management and operating contractors used EPHAs to maintain an appropriate ERO composed of the skills and disciplines needed to mitigate emergency incidents effectively. Such actions are indications of mature and effective emergency management programs.

During FY 2021, exercise evaluation opportunities at DOE sites were limited due to Coronavirus Disease 2019 (COVID-19) safety considerations. Several DOE sites have developed and implemented COVID-19 protocols so that full or limited-scope drills and exercises could continue during the pandemic. EA observed emergency response performances involving full-scale and full-participation exercises at Y-12 and Pantex, both of which implemented effective COVID-19 safety plans to ensure participant safety.

Strengths

One strength related to COVID-19 protocols was identified during the emergency response assessments and is summarized below.

COVID-19 Protocols

- Consolidated Nuclear Security, LLC (CNS) at both Y-12 and Pantex developed and implemented COVID-19 protocols for site exercises conducted in FY 2021 to allow for continued evaluation of ERO proficiency and procedures without compromising employee safety. To maintain social distancing during the pandemic, CNS complies with social distancing guidance and does not allow evacuees to assemble during exercise evacuations. In addition, to protect the ERO, exercise safety plans require controllers to ensure that participants adhere to all the site's COVID-19 protocols for worker safety. CNS also expanded the use of its emergency management information system to provide a daily log for pandemic response activities at the site, which can be reviewed by the ERO during drills, exercises, and actual emergencies.

Weaknesses

While performance-based and programmatic assessments generally identified noteworthy attributes, the assessments sometimes revealed weaknesses in emergency preparedness capability tests and responder performance. Weaknesses identified during emergency exercise evaluations are not described in this report because the issues identified are not common to multiple sites. However, one issue identified during capability tests was common to all three sites assessed and is therefore described below.

Capability Testing

- None of the three assessed sites had an adequate site-level exercise program that validated all required response interface capabilities. Specifically, two sites had not tested capabilities required for OST host sites; one site had not tested explosive ordnance disposal support capabilities; one site had not tested interface capabilities with all of its neighboring counties; one site had not validated the capability of its incident commander to respond to radiation incidents and provide initial immediate protective actions for workers; and one site had not validated the capability of its virtual emergency operations center (EOC).

3.2 Findings Follow-up Appraisals

Per DOE Order 151.1D, attachment 3, paragraph 14.b.(1), all DOE sites and facilities must identify and track corrective actions for findings identified during evaluations, assessments, drills, exercises, and actual emergencies. In FY 2021, EA remotely reviewed closure records for 59 previous findings issued by EA to contractors and their respective Federal field offices at 8 sites from 2012 through 2020. The reviewed records consisted of corrective action plans, causal analysis documents, evidence of completed actions, effectiveness reviews using verification and validation processes required by DOE Order 151.1C/D as applicable at the time the findings were made, and the required approval processes used by the responsible contractor(s) and the applicable Federal site office to verify the effectiveness of findings closure.

Several of the assessed sites showed generally well-developed and effectively implemented programs with some strengths and certain areas of weakness. Two sites closed all findings, and one site demonstrated highly effective readiness assurance processes in its closure of 11 of the 13 reviewed findings, providing strong evidence that issues were properly analyzed and addressed and that plans, procedures, processes, and training are adequate to prevent recurrence, including records of performance demonstrations for corrective action validation.¹

Strengths

During the findings follow-up appraisals, EA identified a number of strengths and best practices. Strengths are summarized below. Best practices are identified in section 4.0 of this report.

¹ A comprehensive review of the strengths, weaknesses, and best practices found in the eight findings follow-up field notes produced by EA in FY 2021 is available in *Summary Report: Independent Focused Assessment of Emergency Management Corrective Actions at National Nuclear Security Administration and Office of Environmental Management Sites*, March 2022.

Emergency Communications

- In response to a 2014 EA finding regarding emergency communications, CNS at Pantex implemented effective improvements identified as strengths, including: implementing a geographic information system tool for use in the EOC; adding a mapper position for the incident command team; developing a project plan for implementation of the information management system; and developing and implementing the logistics team's resource request processes.

Weaknesses

The findings follow-up appraisals revealed continuing weaknesses at multiple DOE sites. EA noted numerous readiness assurance issues, including multiple incidents of weak verification and validation processes that resulted in repeated performance issues, as well as multiple instances of exercise programs that did not test a full spectrum of potential incidents and capabilities. Recurring issues related to the notifications and communications program element were also prevalent.

Verification and Validation

- Verification and validation processes are weak at multiple DOE sites. These processes are used to ensure that corrective actions are in place and are tested to measure their effectiveness in preventing recurrence of similar findings. Of the 59 findings reviewed at 8 sites, EA concluded that only 29 were adequately resolved. Six of the eight sites appraised during the finding follow-up assessments had issues related to inadequate effectiveness reviews. Specifically, some sites did not perform effectiveness reviews (required under DOE Order 151.1C), some sites chose to verify and validate corrective actions through procedure reviews instead of using an evaluated drill or exercise, and one site did not implement the requirements for causal analysis.

Federal Oversight

- Federal oversight issues were noted at several sites, including:
 - Lack of procedural requirements pertaining to the review and approval of corrective action plans for external findings identified during evaluations, assessments, drills, exercises, or actual emergencies, as well as for findings at defense nuclear facilities.
 - Inadequate reviews of corrective action programs for internal findings to ensure that corrective actions are tracked, identified, implemented, and closed effectively to prevent issue recurrence.
 - Inadequate observation of performance evolutions (e.g., exercises and drills) for the purpose of validating and verifying corrective actions.

3.3 Emergency Public Information

The results of EA's EPI social media study indicate that the DOE complex is not fully prepared to use social media effectively during an emergency. After publication of the study in January 2021, EA evaluated two exercises, one of which involved EPI and activation of the joint information center (JIC); during the exercise, JIC staff appropriately used social media accounts to control rumors.

Strengths

In the EPI social media study, EA cited nine best practices but no other specific strengths. The best practices are summarized in section 4.0 of this report.

Weaknesses

EA also identified areas where improvements are needed. Specifically, DOE field office and site contractor public affairs organizations have not adequately coordinated and integrated EPI and social media activities with offsite stakeholders, counterparts, and traditional media in preparation for an incident. In addition, social media strategies, policies, and plans throughout the DOE complex are not comprehensive and lack a site-specific social media strategy that outlines collaboration and coordination of public information activities with offsite response agencies and stakeholders.²

4.0 BEST PRACTICES

Best practices are safety-related practices, techniques, processes, or program attributes observed during an assessment that may merit consideration by other DOE/NNSA and contractor organizations for implementation. While additional best practices are identified in the 13 assessments and one complex-wide study published by EA in FY 2021, the following best practices are highlighted in this lessons-learned report for broader application by others.

Readiness Assurance

Savannah River Nuclear Solutions, LLC (SRNS) at the Savannah River Site (SRS) implemented a comprehensive, multi-faceted approach to ensure that corrective actions are adequately resolved. This process is considered a best practice in the DOE complex because it will enhance safety and reduce risk. This approach includes: comprehensive revision of self-assessment and corrective action program procedures; revision of review board charters; creation of a new readiness assurance manager position; increased emergency management staffing to support readiness assurance; increased involvement of its facility review board; development of a CRAD for use in self-assessments; training of emergency management personnel on readiness assurance activities; and implementation of a policy for timely issuance of lessons learned.

Verification and Validation

CNS at Pantex demonstrated a mature and highly effective readiness assurance process, providing strong evidence of effective closure for 11 of the 13 findings chosen by EA for review. Contractor records showed that issues were properly analyzed and addressed and that plans, procedures, processes, and training are adequate to prevent recurrence. Most notably, as a best practice, the contractor's verification and validation processes for effectiveness reviews are robust and key to preventing issue recurrence. Multiple times during the validation process, the contractor identified additional corrective actions needed for effective closure of findings. These additional corrective actions would not have been discovered without robust verification and validation reviews. For evaluated drills and exercises, the contractor includes objectives specifically designed to validate corrective actions. The contractor also sometimes uses a series of evaluated drills to ensure that closure actions are adequate to prevent recurrence.

² Additional information about EPI weaknesses observed in the DOE complex, as well as recommendations on how to address various EPI social media issues, is available in the EA report *Integration of Social Media into Emergency Public Information*, January 2021.

Common Operating Picture

CNS at Pantex implemented several best practices in the process of closing a finding pertaining to emergency communications, including: defining information flow processes within facilities and field response elements for the purpose of enhancing overall communications; developing a project plan for implementation of the information management system; developing ERO checklists and procedures to enhance information sharing; and adding checklist tasks to specifically prompt sharing of critical information with both offsite entities and the onsite ERO.

Courtesy Notifications

Courtesy notification processes at two sites were cited as a best practice. SRNS at SRS and Triad National Security, LLC at Los Alamos National Laboratory established mutually agreed-upon criteria for events that are below reportable occurrence requirements but could draw media and public interest. Both sites developed procedures that outlined criteria for determining whether an event, condition, or concern required such a notification. For situations that do not meet the agreed-upon criteria but for which the emergency duty officer thinks courtesy notifications might still be appropriate, a conference call with pre-determined management officials is convened to make decisions.

Emergency Public Information

In the *Integration of Social Media into Emergency Public Information* report, EA recognized nine best practices, including several practices implemented at the Hanford Site following the Plutonium-Uranium Extraction (PUREX) Plant tunnel collapse. The most notable of Hanford's best practices was Mission Support Alliance, LLC's use of Facebook Live to broadcast real-time information from the EOC. Because of issues with audiovisual equipment, the Hanford public affairs staff could not hold traditional news conferences during the emergency, so the public information director conducted a news conference via Facebook Live instead. EPI staff used the live-streaming application to show the location of the PUREX tunnel on a map, communicate to the public that there was no evidence of contamination or release, and direct the public and media to a website updated with the latest emergency response information. Additionally, EA identified as a best practice the Hanford public affairs team leader's practice of setting his cellphone to alert when receiving specific key words from social media platforms. These alerts helped the Hanford public affairs team facilitate a rapid public information/social media response during the emergency. Finally, Hanford information technology staff were commended for quickly adding web servers in response to increased social media activity. Additional EPI best practices cited in the study, such as use of social media simulators to simulate social media activities, are available in EA's *Integration of Social Media into Emergency Public Information* report.

5.0 RECOMMENDATIONS

The following recommendations are based on the analysis of EA assessments as summarized in the results section of this report. While the weaknesses from individual assessments did not apply to every reviewed site, the intent of the recommendations is to provide insights for potential improvements at all DOE/NNSA sites. Consequently, DOE/NNSA organizations and site contractors should evaluate each of the recommendations and implement those applicable to their respective facilities and/or organizations.

NNSA Office of Emergency Operations and DOE Program Secretarial Offices

- Stress the importance of testing and verifying all ERO response capabilities, including offsite response capabilities identified in memoranda of agreement/understanding, and capabilities that are seldom used.
- Use the sites' emergency readiness assurance plans to track progress in testing and verifying all ERO response capabilities over a five-year period.
- Promote the development and use of matrices in five-year exercise plans to ensure that all emergency response capabilities are validated over a five-year period.
- Promote the development of pandemic protocols for emergency management so that drill and exercise programs can resume, thereby maintaining ERO proficiency without compromising employee safety.

DOE Field Element Managers

While implementing oversight responsibilities, critically evaluate the ability of the exercise program to validate all emergency response capabilities, as well as to validate corrective actions and program improvements. Specifically:

- Ensure that procedures require the review and approval of corrective action plans for external findings identified during evaluations, assessments, drills, exercises, or actual emergencies, as well as for all findings at defense nuclear facilities.
- Ensure that corrective actions are tracked, identified, implemented, and closed effectively to reduce or prevent issue recurrence.
- Promote the development of pandemic protocols for the exercise program so that ERO proficiency can be maintained without compromising employee safety.
- Through review of the site's five-year exercise plan and exercise schedule, confirm that a sufficient number of exercise scenarios is planned to adequately validate all response elements and capabilities at all facilities or groups of facilities.
- During review and approval of the site's exercise plans, ensure that exercise scenarios are sufficiently complex to test and identify appropriate improvements to response capabilities.
- In review and submittal of the emergency readiness assurance plan, formally track the site's progress in implementing its five-year exercise plan to ensure that all response capabilities are tested.

Site Contractors

To improve readiness assurance processes, including verification and validation of corrective actions:

- Review self-assessment and corrective action procedures and processes, including staffing levels, to ensure that the emergency management program can successfully identify issues and causes, recognize trends, and validate the adequacy of corrective actions to prevent recurrence.
- Develop exercise objectives that are specifically designed to validate corrective actions.
- Consider using a series of evaluated drills, rather than a single exercise, to ensure that closure actions are adequate to prevent recurrence.

To improve the ability of exercise programs to ensure ERO proficiency and test all response capabilities:

- Develop pandemic protocols for the exercise program so that ERO proficiency can be maintained without compromising employee safety.
- Schedule and conduct a sufficient number of exercise scenarios to validate all response elements and capabilities at all facilities or groups of facilities.
- Develop and execute exercise scenarios that are sufficiently complex to verify the ERO's readiness to respond to challenging incidents and to test and identify appropriate improvements to response capabilities.

To promote a common operating picture and shared situational awareness during an emergency:

- Analyze the field and ERO information flow dynamics to define the critical paths of key information and to identify expected actions for achieving and maintaining situational awareness among all teams.
- Adapt an information flow structure that assigns specific responsibility for each key information set, including responsibility for verifying and validating essential incident information collected in the automated information management system.
- Incorporate detailed guidance and direction for communications in the emergency plan, implementing procedures, and response checklists to ensure prompt sharing of critical information with both offsite entities and the onsite ERO.
- Expand the use of electronic information systems. If an automated information management system is already in use, review the system to ensure that key incident information is captured and displayed on a real-time basis in a manner that enhances overall communications and promotes a common operating picture. If an adequate system is not available, install a robust information management system in all site response facilities, including the high-hazard facility command centers, 24-hour duty officer location, EOC, consequence assessment team office, JIC, and incident command post to foster interoperability with the field and response centers. If computer security requirements prohibit the use of emergency information management systems in the field, ensure that verbal updates of key information are continually provided to field responders.
- Use an integrated geographic information system and automated information management system for such functions as tracking responder locations, geographically mapping protective action zones, and assessing facility damage.

To improve EPI and relations with offsite emergency management partners:

- Work with local and state response agencies to establish mutually agreed-upon courtesy notification criteria for events that fall below reportable occurrence requirements but could draw media and public interest.
- Ensure that EPI plans and procedures fully support the use of social media during emergencies.
- Consider using streaming applications, such as Facebook Live, to communicate emergency information to the public and media.
- Ensure a rapid public information/social media response during emergencies by encouraging EPI personnel to set their cellphones to alert when receiving specific key words from social media platforms.

Appendix A Supplemental Information

Office of Enterprise Assessments Management

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Appendix B
Criteria and Review Approach Documents and Assessed Sites

To determine whether policies, procedures, capabilities, and operational performance met U.S. Department of Energy (DOE) objectives for effectiveness in the areas examined, assessments included elements from the following Office of Enterprise Assessments (EA) criteria and review approach documents (CRADs):

- EA CRAD 33-05, *Contractor Readiness Assurance and Exercise Program*, Rev. 0, March 2017
- EA CRAD 33-07, *DOE/NNSA Emergency Management Exercise Review*, Rev. 1, October 2017
- EA CRAD 33-09, *DOE O 151.1D Emergency Management Program*, Rev. 0, April 2019
- EA CRAD 33-10, *Federal Line Management Oversight of the Emergency Management Program*, Rev. 0, July 2020.

Numerous objectives, criteria, and programmatic lines of inquiry were reviewed from each of these documents. However, because the assessments were focused, only selected objectives, criteria, and/or programmatic lines of inquiry were used. Scope and objective details were provided to each site prior to the assessments in planning documents developed specifically for each assessment.

In addition to the assessments, the following CRAD was referenced for the emergency public information social media study:

- EA CRAD 33-08, *Emergency Public Information Social Media*, Rev. 0, March 2019.

The table below lists the assessed sites, along with the key elements reviewed, contractors, local DOE offices, and DOE Headquarters program offices, including the National Nuclear Security Administration (NNSA).

Table B-1. Sites, Key Elements Reviewed, Contractors, Local DOE Offices, and DOE Program Offices

Site	Key Elements Reviewed	Contractor	DOE Field Element	Headquarters Program Office
Los Alamos National Laboratory	Emergency Preparedness Capabilities Assessment/ Findings Follow-up Assessment	Triad National Security, LLC	Los Alamos Field Office	NNSA
Pantex Plant	Emergency Preparedness Capabilities Assessment/ Findings Follow-up Assessment/Annual Exercise Evaluation	Consolidated Nuclear Security, LLC	NNSA Production Office	NNSA
Y-12 National Security Complex	Emergency Preparedness Capabilities Assessment/ Annual Exercise Evaluation	Consolidated Nuclear Security, LLC	NNSA Production Office	NNSA

Site	Key Elements Reviewed	Contractor	DOE Field Element	Headquarters Program Office
Idaho Site/Idaho Cleanup Project	Findings Follow-up Assessment	Fluor Idaho, LLC	Idaho Operations Office	EM
Lawrence Livermore National Laboratory	Findings Follow-up Assessment	Lawrence Livermore National Security, LLC	Livermore Field Office	NNSA
Hanford Site	Findings Follow-up Assessment	Mission Support Alliance, LLC CH2M Hill Plateau Remediation Company Washington River Protection Solutions, LLC	Richland Operations Office Office of River Protection	EM
Sandia National Laboratories – New Mexico	Findings Follow-up Assessment	National Technology and Engineering Solutions of Sandia, LLC	Sandia Field Office	NNSA
Savannah River Site	Findings Follow-up Assessment	Savannah River Nuclear Solutions, LLC	Savannah River Operations Office Savannah River Field Office	EM and NNSA
Waste Isolation Pilot Plant	Findings Follow-up Assessment	Nuclear Waste Partnership, LLC	Carlsbad Field Office	EM

Appendix C Source Documents

- FN-EA-33-ICP-10-12-2020, *Follow-up Assessment of Emergency Management Finding Status*, October 12 – November 18, 2020
- FN-EA-33-LLNL-10-12-2020, *Emergency Management Finding Follow-up Assessment*, October 12 – November 20, 2020
- FN-EA-33-SRS-01-25-2021, *Emergency Management Finding Follow-up Assessment*, January 25 – March 12, 2021
- FN-EA-33-Pantex-2021-03-08, *Emergency Management Finding Follow-up Appraisal*, March 8 – April 16, 2021
- FN-EA-33-LANL-03-15-2021, *Emergency Management Finding Follow-up Assessment*, March 15 – May 7, 2021
- FN-EA-33-WIPP-2021-05-28, *Emergency Management Findings Follow-up Assessment*, April 19 – May 28, 2021
- FN-EA-33-SANDIA-04-19-2021, *Emergency Management Finding Follow-up Assessment*, April 19 – June 4, 2021
- FN-EA-33-Pantex-2021-07-22, *Independent Assessment of Emergency Management at the Pantex Plant*, July 22, 2021
- FN-EA-33-HAN-06-01-2021, *Emergency Management Findings Follow-up Assessment*, June 1 – August 3, 2021
- EA Study, *Integration of Social Media into Emergency Public Information*, January 2021.
- EA Report, *Emergency Preparedness Capability Assessment at the Y-12 National Security Complex*, April 2021.
- EA Report, *Emergency Preparedness Capability Assessment at the Pantex Plant*, July 2021.
- EA Report, *Independent Assessment of Emergency Preparedness Capabilities at the Los Alamos National Laboratory*, December 2021.
- EA Report, [*Independent Assessment of Emergency Management at the Y-12 National Security Complex*](#), April 2022.
- EA Report, [*Summary Report: Independent Focused Assessment of Emergency Management Corrective Actions at National Nuclear Security Administration and Office of Environmental Management Sites*](#), March 2022.