Office of Enterprise Assessments Review of the Sandia National Laboratories/New Mexico 2014 Site-Level Emergency Management Exercise

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

AHCF	Auxiliary Hot Cell Facility
CAD	Computer Aided Dispatch
CAS	Central Alarm Station
CAT	Consequence Assessment Team
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
ED	Emergency Director
EMT	Emergency Management Team
EOC	Emergency Operations Center
EPHA	Emergency Planning Hazards Assessment
EPI	Emergency Public Information
EPIP	Emergency Plan Implementing Procedure
ERG	Emergency Response Guidebook
ERO	Emergency Response Organization
ERT	Emergency Response Team
FMOC	Facilities Management and Operations Center
ft	Feet
GE	General Emergency
HAZMAT	Hazardous Material
IC	Incident Commander
ICP	Incident Command Post
KAFB-FD	Kirtland Air Force Base Fire Department
NARAC	National Atmospheric Release Advisory Center
OE	Operational Emergency
OFI	Opportunity for Improvement
PA	Protective Action
SAE	Site Area Emergency
SFO	Sandia Field Office
SITREP	Situation Report
SNL/NM	Sandia National Laboratories/New Mexico
SOP	Standard Operating Procedure
TAR	Tone Alert Radio
TIA	Timely Initial Assessment

Executive Summary

The U.S. Department of Energy Office of Enterprise Assessments (EA) evaluated the Sandia National Laboratories/New Mexico (SNL/NM) emergency management exercise conducted on September 10, 2014. The Sandia Corporation, which operates SNL/NM (with oversight by the National Nuclear Security Administration Sandia Field Office), conducted the exercise to test SNL/NM's preparedness for responding to a severe event scenario involving a postulated tornado, widespread damage across SNL/NM, mass casualties, a missing container of radioactive material, and an unknown chemical spill.

During this exercise, the SNL/NM emergency response organization readily performed their duties in the face of a challenging exercise scenario. The incident commander correctly categorized the event using the established criteria for responding to a tornado that causes structural damage and injuries, and appropriately assessed and prioritized the emergency response activities. Further, the incident commander continually reassessed the response strategy as he received additional information, and he prioritized the order of response to reported injuries to ensure that the most critically injured patients were treated first. The incident commander appropriately established a unified command at the mobile incident command trailer with representatives from security, radiation protection, the facilities management and operations center, and the Kirtland Air Force Base Fire Department.

Despite these strengths, EA identified several performance issues. Throughout the exercise and in multiple venues, EA observed inadequate communications and information management that degraded situational awareness and prevented a common operating picture among onsite and offsite organizations. Most significantly, information flow processes were not effective in acquiring, recording, and disseminating timely and accurate event information among the onsite emergency response organization and offsite agencies. Additionally, the incident commander did not promptly and accurately classify the emergencies based on the actual and potential releases of hazardous material in that he did not use the emergency action levels to determine the appropriate event classification and protective actions, and did not implement the classification recommended by the consequence assessment team. Further, the incident commander did not modify protective actions when the situation changed after the potential and simulated releases of hazardous material became known. The SNL/NM emergency response organization erroneously informed offsite agencies that a General Emergency was declared, implying that there were offsite consequences to the public. Additionally, the emergency response organization did not adequately track the status of injured personnel.

Many of the adverse conditions that EA noted met the criteria for a finding, but EA did not issue any associated findings because the Sandia Corporation included the EA evaluators' input in the findings and observations noted in its exercise after-action report. Sandia Corporation plans to take corrective actions for the issues identified in its after-action report. EA will review the effectiveness of the corrective actions in a follow-up review of the SNL/NM emergency management program.

Office of Enterprise Assessments Review of the
Sandia National Laboratories/New Mexico
2014 Site-Level Emergency Management Exercise

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) evaluated a Sandia National Laboratories/New Mexico (SNL/NM) emergency management exercise that was conducted on September 10, 2014. EA's Office of Emergency Management Assessments conducted the review over the period September 8 to October 2, 2014.

EA performed this review to evaluate SNL/NM's preparedness for responding to a hazardous material (HAZMAT) event that exceeded the site's capabilities without the use of mutual aid and to assess compliance with DOE Order 151.1C, *Comprehensive Emergency Management System*. During this review, EA examined the ability of various site emergency response organizations (EROs) to recognize specific hazardous situations, notify appropriate onsite and offsite organizations and agencies, implement appropriate protective actions (PAs), establish command and control of the simulated emergency event, and mitigate the event in compliance with DOE requirements.

EA also collected many observations and identified some concerns regarding the planning and execution of the exercise, which EA provided to the Sandia Corporation shortly after the exercise was completed. In 2015, EA plans to further review the SNL/NM emergency management exercise program, including those elements, as well as the corrective actions taken to address issues identified during the exercise. EA's review of the SNL/NM annual exercise is the last of four reviews of site exercises that EA performed in 2014; EA also plans to publish a lessons-learned report reflecting analysis of results from all of its 2014 emergency management reviews.

2.0 Background

The Sandia Corporation is the operating contractor for the SNL/NM site. The National Nuclear Security Administration Sandia Field Office (SFO) provides direction to and oversight of the Sandia Corporation.

The Sandia Corporation performed its annual exercise to test and demonstrate the integrated emergency response capability of the SNL/NM ERO in accordance with DOE Order 151.1C and SNL/NM emergency plans and procedures. The Sandia Corporation also used the exercise as an opportunity to demonstrate progress in planning and preparedness activities identified in the Office of Health, Safety and Security Operating Experience Level 1 (OE-1:2013-01), *Improving DOE Capabilities for Mitigating Beyond Design Basis Events*. The following paragraphs provide a brief overview of the exercise scenario and EA's role as evaluators during the exercise.

As the initiating event for this site-level exercise, the Sandia Corporation postulated a tornado that caused moderate to heavy damage to multiple SNL/NM buildings and site utilities, including the transfer of normal power to an alternate power feed in the emergency operations center (EOC). Upon learning of the tornado warning, the incident commander (IC) directed the telecommunicators in the communications center to instruct all site personnel to shelter in place for a severe weather event; this instruction remained in place until the exercise director terminated the exercise. Once the tornado touched down on site, the telecommunicators received numerous alarms and calls reporting the simulated damage to multiple facilities and numerous injuries. Two HAZMAT facilities sustained significant damage: the Auxiliary Hot Cell Facility (a missing container of irradiated reactor fuel, a contaminated vacuum cleaner blown

outside the facility, and several personnel with severe injuries), and the Hazardous Waste Handling Unit (an unknown chemical spill). In response, the IC declared an Operational Emergency not further classified, deployed the SNL/NM emergency response team (ERT), activated the SNL/NM EOC, and initiated offsite notifications. The EOC received power from an alternate power feed and uninterruptible power supply systems, and all players used backup communications when simulated storm damage to a cell phone tower affected cell phone usage during the first hour of the exercise. The IC requested mutual aid assets, with only one fire response squad from the Kirtland Air Force Base Fire Department available.

EA personnel served as evaluators for the exercise at the communications center, incident command post, EOC, consequence assessment team (CAT), and facilities management and operations center (FMOC). The Sandia Corporation and SFO provided evaluators for emergency medical services, media relations and communications, and security protective forces. Using input from its own and EA's evaluators, the Sandia Corporation developed an exercise after-action report that included 8 findings and 13 observations, which included all of the significant EA concerns. The Sandia Corporation included those findings and observations in its issues management system and corrective actions will be developed and tracked to closure. As a result, EA did not issue findings for any issues that the Sandia Corporation had already identified as a finding or observation in its after-action report.

3.0 Assessment of Site Performance

This section provides EA's assessment, based on this exercise, of positive aspects and areas of weakness in the SNL/NM ERO's ability to respond to severe events impacting multiple facilities. Appendix B details EA's reviews of the individual ERO exercise objectives, including the communications center, incident command post, EOC, CAT, and FMOC.

Telecommunicators in the communication center performed assigned tasks in accordance with site protocols until overwhelmed by the volume of exercise-related phone calls and the large number of smoke, fire, and fire suppression flow alarms. To the extent they could, telecommunicators answered emergency calls, monitored alarm displays for building alarm conditions, dispatched responding units, recorded incoming information, and provided information to site workers and offsite authorities. However, the overwhelming number of calls and alarms received at the communications center kept telecommunicators from recording all incoming information, dispatching response units within the required time frame, and providing the IC with information in a timely manner, as specified by site procedures. (See **OFI-SANDIA-1**.) The inability to answer calls also kept the ERO from determining the status of personnel accountability over the approximately six hours of the exercise. (See **OFI-SANDIA-2**.) Additionally, a miscommunication between a telecommunicator and the deputy IC led to an offsite notification sent to offsite authorities declaring a General Emergency when the IC had only declared an Operational Emergency that did not require further classification. (See **OFI-SANDIA-3**.)

Immediately after the exercise began (at the time of the postulated tornado warning), the IC instructed the telecommunicators to tell all site personnel to stay away from doors and windows and go to an interior room or basement in preparation for a possible tornado. Once the severe weather passed, approximately ten minutes later, the IC relocated to the mobile incident command trailer located near the EOC. The IC correctly categorized the event using the criteria for a tornado with structural damage and injuries and appropriately assessed and prioritized the emergency response activities, with the top priorities being removal of endangered occupants and treatment of injured personnel. Further, the IC continually reassessed the response strategy as he received additional information and prioritized the order of response to reported injuries to ensure that the ERT treated the most critically injured patients first. Additionally, the IC appropriately established a unified command at the mobile incident command trailer

with representatives from security, radiation protection, FMOC, and the Kirtland Air Force Base Fire Department.

However, EA noted several weaknesses in incident command operations. The IC was not immediately aware of the CAT's initial classification recommendations of an Alert for the missing fuel container and a General Emergency for the unknown chemical spill because the CAT sent the recommendations to the IC via email due to the cell phone outage, but did not follow up to ensure that the IC was aware of the email. (See **OFI-SANDIA-7**.) Further, the IC and deputy IC did not document all required response information, and the deputy IC did not adequately communicate the information that the telecommunicators needed to make the required offsite notifications (miscommunication that a General Emergency had been declared and no information provided for the missing fuel container). (See **OFI-SANDIA-3** and **OFI-SANDIA-6**.) In addition, the Site Area Emergency classification declarations for the two HAZMAT events were not timely (fifty minutes after the unknown chemical spill, an hour and twenty minutes after the fuel container went missing), were not technically based on emergency action levels (EALs), and were not adequately communicated to the telecommunicators. (See **OFI-SANDIA-5**.) More significantly, the IC did not review the readily-available EALs for the two damaged HAZMAT facilities to see whether additional PAs were warranted (different from the PAs in place for a severe weather event). The IC also did not revise the PAs to adequately protect personnel from HAZMAT releases when the IC learned that a fuel container was missing and that the status of the remaining material within the facility was unknown, or when the ERT detected simulated elevated chemical readings upwind at the site of the unknown chemical spill, but did not consider that elevated readings might exist at a greater distance in the downwind direction. Further, during exercise play, the players did not resolve the inherent conflicts in the PAs implemented by the IC. As a result, personnel were ordered to shelter in place for a tornado, but some personnel would have self-evacuated because of building damage with indications of structural fires. (See **OFI-SANDIA-4**.) The Sandia Corporation also noted the issues regarding offsite notifications, classification, and PAs in their after-action report as an observation and two findings.

The EOC became operational and provided support to the IC and established communications with state, local, and Federal officials. EOC personnel also made executive notifications, prepared and sent worker notifications, and developed press releases. Additionally, the emergency director (ED) and EOC manager effectively determined goals, tasks, and priorities for EOC operations and tracked the completion of assigned tasks. During the exercise, the Sandia Corporation established a virtual EOC because, due to their proximity to the unknown chemical spill and the PAs that were in place, the EOC ED, security condition manager, and the security manager had to remain in their building. The exercise director had not anticipated a virtual EOC concept and had not included it in the design of the exercise, so EA provided only a limited evaluation of the concept. Nevertheless, the absence of the ED in the EOC degraded communications and contributed to not having adequate situational awareness in the EOC. The EOC cadre prepared and distributed internal situation reports (SITREPs), and the SFO Senior Federal Official requested DOE assets. SFO also talked often with the DOE Headquarters emergency management team (EMT) and the DOE Headquarters Watch Office, assisted by the temporary assignment of an additional SFO staff member in the EOC. However, the EOC cadre did not send a SITREP to the DOE Headquarters EMT as required by DOE Order 151.1C. Importantly, the Sandia Corporation does not give DOE Headquarters access to the SNL/NM incident management tool, WebEOC, and instead relies on the SITREP as the primary method for sending emergency status updates and ensuring effective communications between the site and DOE Headquarters throughout the emergency. Consequently, DOE Headquarters would not be able to satisfy the demands of Departmental senior management and meet the requirements associated with requests from the White House. (See **OFI-SFO-1** and **OFI-SANDIA-10**.)

Throughout the exercise and in multiple venues, EA observed inadequate communications and information management that degraded situational awareness and prevented a common operating picture

among the site, DOE Headquarters, and offsite organizations. Most significantly, information flow processes were not effective in acquiring, recording, and disseminating timely and accurate event information among the ERO and offsite response organizations. For example, the ERO did not adequately track the status of injured personnel and had accounted for only 31 of the 40 injured personnel at the end of the exercise. (See **OFI-SANDIA-8**.) Likewise, the EOC cadre did not consistently demonstrate the ability to collect event information and maintain situational awareness throughout the ERO and offsite response organizations. This lack of information and awareness led to EOC personnel incorrectly responding to and advising offsite authorities of a GE declaration, while field response teams were reacting to a Site Area Emergency. Furthermore, WebEOC lacked relevant emergency information and did not enable the ERO to share important event information among the response facilities and field response elements. WebEOC provided a partial chronology (mostly created by a system administrator located in the EOC) of significant event information and did not provide an incident management tool to capture, distribute, and assess emergency information throughout the entire ERO. In addition, communications between the SNL/NM EOC and the local, state, and DOE Headquarters EOCs were sometimes ineffective because the offsite officials could not see the WebEOC data or the site's technical products, which the offsite officials need for timely and accurate decision-making. (See **OFI-SANDIA-9**.) The Sandia Corporation noted these significant issues in communications and emergency status updates as findings in its after-action report.

The CAT demonstrated general familiarity with team assignments and efficiently documented initial assessments of the unknown chemical spill and missing fuel container on timely initial assessment (TIA) and ongoing TIA forms, made appropriate WebEOC entries, and effectively communicated with the EOC cadre and field elements. The CAT generally used appropriate facility-specific EALs as the source for their consequence assessments. Additionally, the CAT continuously monitored ongoing weather conditions using site weather towers and periodically checked the weather forecast throughout the exercise. The CAT produced TIA maps showing the isolation zone, PA zone, and downwind PA areas and made them available to emergency responders via WebEOC, but did not discuss the maps with the ED or display them in the EOC. (See **OFI-SANDIA-14**.)

Nevertheless, the CAT could not use the available plume projection tools for modeling the unknown chemical spill and did not provide plume projections for the missing fuel container. The Sandia Corporation developed the emergency planning hazards assessment (EPHA) and EALs for the chemical spill using information from the Emergency Response Guidebook (ERG) rather than appropriately identifying the chemicals stored at the facility. Use of the ERG is contrary to DOE guidance because the ERG is generally less accurate and usually less conservative. Because the chemical was unknown, the CAT could not use the Areal Location of Hazardous Atmospheres, Emergency Prediction Information code, or National Atmospheric Release Advisory Center (NARAC) modeling programs to determine the projected chemical exposures at receptors of interest and ensure the safety of personnel. (See **OFI-SANDIA-11** and **OFI-SANDIA-12**.) The exercise inject for the missing container provided non-credible simulated source term data (did not contain fission products), and the CAT correctly recognized the error. To compensate, the CAT referred to the facility EPHA, which had no information about the missing fuel container. Thus, the CAT had to develop an appropriate source term during the exercise; this activity significantly delayed the development of plume projections for the missing fuel container. The CAT did not complete the development of the plume projection until after the missing fuel container was found. (See **OFI-SANDIA-13**.) The Sandia Corporation also noted the issue regarding the accuracy of EPHA source term data as an observation in its after-action report.

FMOC personnel performed their duties in accordance with the *FMOC Emergency Operations Plan for SNL/NM*. However, this exercise demonstrated that although this plan is adequate for events involving a single facility, it is insufficient for responding to a multi-facility severe event. Further, the plan addresses only FMOC integration with the SNL/NM EOC and does not address communications with the IC. (See

OFI-SANDIA-15.) The FMOC recovery manager prioritized facility response/recovery efforts based on the limited information he received, and his activities were not well integrated with the rest of the ERO. (See **OFI-SANDIA-16** and **OFI-SANDIA-18**.) In addition, the industrial hygienist assigned to ensure the safety of repair crews was unsure of her role and responsibilities. (See **OFI-SANDIA-17**.)

4.0 Findings

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

EA identified several important conditions during this review but did not issue any associated findings in this report because the Sandia Corporation included the EA evaluator's input in the findings and observations noted in its exercise after-action report. The Sandia Corporation's issues management system requires corrective actions for both findings and observations, with findings also requiring a root cause analysis. These conditions, and their reference numbers in the Sandia Corporation report, include:

- Contrary to DOE Order 151.1C, the Sandia Corporation did not provide accurate notifications on the extent of the emergency at the site (the IC did not include the missing fuel container in offsite notifications). (SNL/NM Issue Report #: 14-EX-EXRPT-01-020 observation)
- Contrary to DOE Order 151.1C, the Sandia Corporation did not reassess and modify the PAs throughout the emergency based on changing conditions (the IC did not instruct personnel to take appropriate PAs when the IC received new information on the unknown chemical spill). (SNL/NM Issue Report #: 14-EX-EXRPT-01-006 finding, 14-EX-EXRPT-01-007 finding, and 14-EX-EXRPT-01-012 observation)
- Contrary to DOE Order 151.1C, the Sandia Corporation did not promptly and accurately classify the emergencies (the IC did not use EALs to quickly classify the emergencies for the missing fuel container and unknown chemical spill and did not adequately inform the telecommunicators of classification decisions). (SNL/NM Issue Report #: 14-EX-EXRPT-01-008 finding)
- Contrary to DOE Order 151.1C, the Sandia Corporation did not provide continuous, effective, and accurate communications among response components (the IC, communications center, EOC, and DOE Headquarters EOC did not share a common operating picture of the event, resulting in different understandings of the event at the incident scene and the EOC). (SNL/NM Issue Report #: 14-EX-EXRPT-01-001 finding)
- Contrary to DOE Order 151.1C, the Sandia Corporation did not provide emergency status updates to the next-higher EMT on a continuing basis (the Sandia Corporation did not provide the DOE Headquarters EMT with a SITREP, does not use the recommended SITREP form provided in DOE Guide 151.1-4, *Response Elements, Emergency Management Guide*, and did not communicate all of the requested information). (SNL/NM Issue Report #: 14-EX-EXRPT-01-002 finding)
- Contrary to DOE Order 151.1C, the Sandia Corporation does not have an accurate and timely method for tracking changes in HAZMAT operations (the Sandia Corporation did not appropriately identify the HAZMAT in the Hazardous Waste Management Facility EPHA and

did not revise the Auxiliary Hot Cell Facility EPHA before moving the irradiated reactor fuel into the facility). (SNL/NM Issue Report #: 14-EX-EXRPT-01-009 observation)

5.0 Opportunities for Improvement

This EA review identified 19 opportunities for improvement (OFIs). These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by EA to assist site management in implementing best practices, or provide potential solutions to minor issues identified during the conduct of the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is expected that the responsible line management organizations will evaluate these OFIs and accept, reject, or modify them as appropriate, in accordance with site-specific program objectives and priorities.

National Nuclear Security Administration Sandia Field Office

OFI-SFO-1: Consider assigning dedicated Federal staff in the EOC to maintain connectivity and communications with the DOE Headquarters EOC and compile the DOE Headquarters SITREP.

Sandia Corporation

OFI-SANDIA-1: Consider additional planning for severe events by evaluating the adequacy of the communication center's current systems, staffing, and procedures for events that affect multiple facilities and include mass casualties.

OFI-SANDIA-2: Consider setting up a positive personnel accountability system to more quickly identify missing personnel by:

- Implementing an accountability system, such as one that makes use of paper rosters or badge readers
- Mustering personnel, during sheltering or evacuation, at designated rally points equipped with all means necessary to perform personnel accountability
- Naming backup personnel to perform accountability functions if evacuation captains are not at their rally points
- Establishing procedure requirements to complete personnel accountability within 45 minutes as recommended in DOE Guide 151-1.4, *Response Elements Emergency Management Guide*.

OFI-SANDIA-3: Consider enhancing the offsite notification process by:

- Modifying procedures to ensure that offsite notification forms include information on all HAZMAT events when emergencies involve multiple facilities
- Enhancing the use of repeat-backs to ensure the correct transmission of information
- Sending offsite notifications via email to preclude issues associated with facsimile machine functionality problems at the receiving organization
- Including verification checks of information on notification forms to ensure that they are complete and accurate
- Emphasizing, in telecommunicator training, the need to verify and record that all offsite authorities received the event notification forms, as required by site procedures
- Providing additional opportunities for deputy ICs to practice filling in the *Incident Command Checklist* and providing notification information to the telecommunicators.

OFI-SANDIA-4: Consider modifying the PA decision-making process by:

- Using separate terms to describe the PAs needed for a severe weather event (e.g., take cover) in contrast to a HAZMAT release (e.g., shelter in place)
- Clarifying that the IC should immediately implement PAs associated with an appropriate EAL upon learning that a HAZMAT release has occurred or is suspected
- Frequently reviewing the implemented PAs to verify that they are still appropriate – for example, when the emergency is classified without using the EALs, when additional information is received (such as the CAT's recommendations or updates on the status of materials at risk), when field readings indicate that a HAZMAT release is larger than expected, or when personnel self-evacuate because of building damage or fires.

OFI-SANDIA-5: Consider improving the IC's emergency classification decision-making process by:

- Immediately reviewing the facility's EALs to determine an appropriate classification
- Incorporating the CAT's emergency classification recommendation unless compelling evidence indicates their recommendation is incorrect
- Discontinuing the practice of waiting until the ERT has arrived and sized up the scene before classifying an emergency
- Ensuring that the IC notifies the telecommunicators of all classification determinations.

OFI-SANDIA-6: Consider improving ERO decision-making for a broad range of emergency response events by:

- Describing, in emergency plan implementing procedures, the ERO's expected actions to ensure that the ERO can act decisively using a criteria-based rationale that minimizes experience-based decision-making
- Revising procedures, checklists, and forms that serve as response records to require the time of occurrence and person creating the record
- Requiring the ERO to use checklists.

OFI-SANDIA-7: Consider changing the CAT's process for providing emergency classification recommendations to the IC by including alternate verbal means of communicating with the IC when cell phone service is unavailable (e.g., radio or satellite telephone).

OFI-SANDIA-8: Consider developing a more comprehensive process for tracking injured workers by:

- Ensuring that all information on reported injuries is shared with the IC, the onsite medical facility, and the EOC
- Confirming that it is safe for personnel to exit facilities and report to a triage area or onsite medical facility before directing personnel to do so
- Providing the onsite medical facility access to the SNL/NM's incident management tool
- Assigning an ERO position within the EOC the responsibility for tracking all injured personnel
- Documenting planning for mass injuries/casualties and tracking of injured workers in appropriate plans and procedures.

OFI-SANDIA-9: Consider improving communications among response facilities, field response elements, and offsite command centers to provide a common operating picture of the emergency response and shared situational awareness among all teams by:

- Installing and fully implementing the incident management tool (WebEOC) or similar tool in all response locations and venues
- Defining information flow processes within the SNL/NM response facilities and field response elements
- Fostering interoperability with offsite response facilities (joint information center, local and state EOCs, and the DOE Headquarters EOC) and enabling access to unclassified emergency response information, such as notification forms, emergency status updates, plume projections, significant events data, and field monitoring data
- Expanding the use of a computerized incident management tool, capable of rapidly interfacing with other systems that may be vital during an emergency response, to communicate a common operating picture and shared situational awareness by:
  - Providing a real-time perception of what is occurring at the incident scene
  - Providing awareness of what the ERO is doing in relation to the incident
  - Enabling the ERO to predict changes to the incident
  - Supporting ERO objectives that forecast future actions
- Defining expected actions for achieving and maintaining situational awareness among all teams.

OFI-SANDIA-10: Consider improving the usability, timeliness, and accuracy of emergency status updates to DOE Headquarters by:

- Providing all the information required by DOE Headquarters in the SNL/NM SITREP
- Sending the SNL/NM SITREP electronically rather than via facsimile
- Ensuring that each emergency status update to DOE Headquarters contains the latest data by conferring with EOC personnel or referring to the following sources of information:
  - WebEOC
  - News releases
  - Offsite notification forms
  - Plume projections
- Providing an explanation when the site changes information in a subsequent update
- Allowing DOE Headquarters to have access to the SNL/NM WebEOC.

OFI-SANDIA-11: Consider ensuring the accuracy of facility EPHAs by:

- Developing an accurate and timely method for tracking changes in facility operations and storage/use of HAZMAT
- Ensuring that all HAZMAT is effectively identified for use in available plume projection modeling programs
- Developing consequence assessments for identified facility HAZMAT requiring analysis
- Developing EALs corresponding with all EPHA identified release scenarios.

OFI-SANDIA-12: Consider ensuring that the CAT makes effective and efficient PA determinations by using the Areal Location of Hazardous Atmospheres, Emergency Prediction Information code, HotSpot, and/or NARAC modeling programs to produce real-time plume projections.

OFI-SANDIA-13: Consider improving the quality of ongoing consequence assessments by emphasizing in CAT drills and refresher training:

- The purpose and use of the plume projection products
- The importance of using the plume modeling information for PA decision-making

- The importance of providing real-time meteorological plume projections for all HAZMAT releases to determine event-specific estimates of the consequences
- The importance of acknowledging and understanding authorities in performing responsibilities in a timely and efficient manner.

OFI-SANDIA-14: Consider implementing a new standard practice to ensure that consequence assessment maps are displayed and discussed with the ED.

OFI-SANDIA-15: Consider revising the *FMOC Emergency Operations Plan for SNL/NM* to better define the expected interface between the EOC, IC, and FMOC.

OFI-SANDIA-16: Consider revising the *FMOC Emergency Operations Plan for SNL/NM* to clarify that the FMOC response director at the EOC is responsible for making decisions about the prioritization of facility recovery efforts, and the FMOC recovery manager is responsible for implementing and directing those recovery efforts.

OFI-SANDIA-17: Consider revising the *FMOC Emergency Operations Plan for SNL/NM* to clarify the roles and authority of the radiation protection and industrial hygiene personnel on the repair crews.

OFI-SANDIA-18: Consider improving the situational awareness of the FMOC recovery manager by providing access to WebEOC.

Appendix A
Supplemental Information

Dates of Review

September 8 – October 2, 2014
Exercise: September 10, 2014

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APPENDIX B
Independent Assessment of Exercise Objectives

The Sandia Corporation designed, coordinated, conducted, and documented the Sandia National Laboratories/New Mexico (SNL/NM) emergency management exercise in accordance with NM-EX-PD-01, *Emergency Management Exercise Program*. The Sandia Corporation had recently developed several draft severe event response related procedures and checklists, and used the exercise to validate their effectiveness before finalizing them. The Sandia Corporation developed the exercise using 119 exercise objectives.

The Office of Enterprise Assessments (EA) Office of Emergency Management Assessments selected 39 of these objectives for independent review in the following areas:

- Communications center
- Incident command post (ICP)
- Emergency operations center (EOC)
- Consequence assessment team (CAT)
- Facilities management and operations center (FMOC).

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

Communications Center

COM-02 – Given a 911 emergency call, telecommunicators process the call in accordance with the call taking standard operating procedure (SOP) and the 911 memorandum of agreement between Sandia Security and the EOC.

Telecommunicators processed calls in accordance with site protocols, but system and staffing limitations adversely impacted their abilities. The three telecommunicators in the communications center appropriately responded to 911 and 311 calls per the SOP, and enforced restrictions of 911 phones to emergency calls. Security personnel in the central alarm station (CAS) supported the telecommunicators by answering calls when the high volume of calls rolled over to CAS operators. However, the high volume of calls overloaded the expanded system and the capability of the available phone operators. Because of the overwhelming call volume, the telecommunicators did not answer calls within ten seconds and, because of mass casualty conditions and unanswered calls, telecommunicators could not dispatch medical units to all injured personnel within 60 seconds, as required by the SOP. (See Section 5.0, **OFI-SANDIA-1**.)

COM-04 – Given a 911 emergency call, telecommunicators demonstrate proper call-handling following 911 call-taking procedures, and enter the information in the computer aided dispatch (CAD) (either by direct CAD entry or typing in the information from the Emergency Dispatch Call Cards call form into the CAD, MPDS SNL/NM Emergency Dispatch Call Cards, and Global Dispatch CAD).

The telecommunicators used 911 answering protocols, logged information received into the CAD, and dispatched response units; however, the high volume of calls and alarms received in the communications center overwhelmed the normal staffing of three telecommunicators. Even with the support of CAS operators, the telecommunicators could not answer all calls, which led to a backlog of voice mail

messages. The telecommunicators also could not acknowledge and properly record the numerous alarms from the fire detection, fire suppression, and security systems, as well as injury and damage reports injected by the exercise simulation cell, because other tasks, such as sending out tone alert radio (TAR) messages and interacting with the CAT lead, overwhelmed them. The forms used by the telecommunicators to record information do not account for damage at multiple buildings, as occurred during the exercise. Additionally, the communications center received a large number of phone calls from evacuation team captains obtaining or providing information about the status of personnel accountability. The Sandia Corporation uses a negative personnel accountability system, whereby evacuation team captains perform building sweeps and make reports if they observe personnel left inside a building. However, the telecommunicators could not complete negative personnel accountability, partly because many of the evacuation team captain phone calls went unanswered. (See Section 5.0, **OFI-SANDIA-2**.) Consequently, the telecommunicators did not acknowledge much of the information called into or alarmed in the communication center, did not document all information in CAD, did not consider self-evacuations, and did not relay all information to the incident commander (IC) or other response units. (See Section 5.0, **OFI-SANDIA-1**.)

COM-05 – Given an emergency requiring multiple units, telecommunicators establish additional tactical frequencies and ensure all responders are notified of the additional channels.

Per follow-up interviews, the telecommunicators established three radio channels during the exercise and notified responders accordingly.

COM-06 – Upon declaration by the IC that the event is an Operational Emergency (OE) and PAs [protective actions] for SNL/NM have been given, telecommunicators verify the PA information with the IC and make prompt notification via the TARs and other systems as needed, to locations recommended in the PA Plans.

One of the telecommunicators discussed PAs with the IC for the tornado warning and provided prompt notifications to site employees to shelter in place for severe weather using TARs. Approximately ten minutes later, a telecommunicator sent out an "all clear" exercise inject message using TARs, to release all non-emergency response organization (ERO) employees from the shelter-in-place PAs and all further exercise play. The telecommunicators simulated all other TAR messages.

COM-08 – Given an event in Tech Area V in which the IC is involved, telecommunicators make required notifications.

The telecommunicators made offsite notifications per U.S. Department of Energy (DOE) requirements, but not in accordance with site protocols. The telecommunicators completed three offsite notification forms using information provided by the IC during the exercise, and then faxed the forms to offsite authorities within 15 minutes of event classification. The first form indicated declaration of an OE categorization (incorrectly marked by the telecommunicator as a General Emergency (GE) classification), the second form indicated an Alert classification (made in error by the IC), and the third from indicated a Site Area Emergency (SAE) classification to correct the Alert classification error. The telecommunicators placed a bridge line phone call to alert offsite authorities of an incoming offsite notification form and to provide initial event information, followed by a fax of the notification form. The Sandia Corporation does not send offsite notifications via email, and the telecommunicators did not perform follow-up calls to verify receipt of the notification forms, as required by Sandia Corporation protocols. (See Section 5.0, **OFI-SANDIA-3**.)

Telecommunicators did not make required Tech Area V notifications because they considered the event a sitewide event, rather than a Tech Area V event. A site procedure requires these notifications for Tech Area V OEs.

Incident Command Post

ICS-01 – Given an incident, coordination and integration with offsite response agencies and organizations follow established, pre-arranged and documented plans and procedures, including, responsibilities and authorities, coordination of response, notifications, facility activations, communications, and EOC interfaces.

The IC followed the appropriate procedures and checklists for coordination with offsite response agencies (Kirtland Air Force Base Fire Department, or KAFB-FD), but EA noted that the information needed to make required offsite notifications was not always provided. Upon learning of the multiple fire alarms at the beginning of the exercise, the IC immediately directed the telecommunicators to notify the KAFB-FD, request their assistance, and ask a representative to report to the ICP. Coordination and integration of KAFB-FD assets continued throughout the exercise per established protocols. NM-FLD-SOP-2102, *Hazardous Material (HAZMAT) Operations*, requires the IC to provide information for offsite notifications, and the IC tasked the deputy IC with documenting the needed information on Form 1102, *Incident Command Checklist*, and providing this information to the telecommunicators. The deputy IC documented the required information for the unknown chemical spill and provided this information to the telecommunicators, but did not do so for the missing fuel container. As a result, the telecommunicators did not send out offsite notifications regarding the missing fuel container. (See Section 5.0, **OFI-SANDIA-3**.) The Sandia Corporation included this significant issue in their after-action report as an observation (SNL/NM Issue Report #: 14-EX-EXRPT-01-020).

ICS-03 – Given an incident, an IC is in charge at the incident scene and control and coordination at the scene is consistent with the National Response Plan and the National Incident Management System/Incident Command System, which integrates local agencies and organizations that provide onsite support.

The IC appropriately established a unified command consistent with the National Incident Management System, which included representatives from security, radiation protection, FMOC, and KAFB-FD.

ICS-04 – Given an incident, the incident is assessed and priorities are established with lifesaving, safety, and incident stabilization receiving top priority.

The IC appropriately assessed and prioritized the emergency response activities, and immediately dispatched the two squads of the emergency response team (ERT) to the two damaged HAZMAT facilities as soon as it was safe to leave their facility. The IC established the top priorities for the ERT: removing endangered occupants and treating injured personnel at those two locations. Once the ERT stabilized the patients at those facilities, the IC prioritized the order of response to other reported injuries to ensure that the ERT responded to the most critically injured patients first. The ERT also used site ambulances to transport critical patients to local hospitals when assistance from offsite ambulance services was unavailable.

The IC correctly categorized the event, but the deputy IC did not adequately communicate the information to the telecommunicators. Shortly after the first report of tornado damage, the IC used Form 1109, *Criteria for OE Identification*, to correctly categorize and declare an OE using the criteria provided for a tornado with structural damage and injuries. The deputy IC relayed this information to the telecommunicators for use in completing the offsite notification form, but also used the term “general

emergency" during that conversation, which the telecommunicators misinterpreted as declaration of a GE. As a result, the telecommunicators incorrectly noted the declaration of a GE on the first offsite notification form. (See Section 5.0, **OFI-SANDIA-3**.)

ICS-07 – Given an incident, the incident command team continually assesses the situation, develops a mitigation strategy, and requests additional assets as needed.

Throughout the exercise, the IC periodically reassessed his response strategy as he received additional information. The IC was in continuous contact with the ERT and received frequent updates on their response actions. The IC prioritized the order of response to reported injuries to ensure that the ERT responded to the most critically injured patients first. The IC worked with the FMOC representative and radiation protection specialists on mitigation strategies.

ICS-08 – Given an incident, incident command coordinates internal and external response assets.

The IC appropriately coordinated internal and external response assets. The IC immediately deployed the ERT to the two damaged HAZMAT facilities. The IC appropriately requested numerous mutual aid assets (including KAFB-FD assets and city of Albuquerque ambulances); however, exercise injects provided to the IC indicated that mutual aid assets would not be able to immediately respond to the site. A KAFB-FD representative arrived at the ICP three hours into the exercise, coordinated the simulated response by KAFB-FD assets to several damaged buildings, and assisted with treating injured personnel and searching for missing personnel.

ICS-13 – Appropriate facility/site-specific emergency action levels (EALs) are readily accessible to the IC.

EALs were readily available to the IC. Based on the initial information received by the IC, appropriate facility-specific EALs were available for the missing fuel container (indicating an Alert for either an extreme wind storm/tornado with building collapse and no fire or high wind debris impact), and for the unknown chemical spill (indicating a GE for a spill, fire, or explosion affecting one or both buildings at the facility). However, the IC did not use the EALs to classify the emergencies (discussed further in objective *ICS-43*).

ICS-26 – Given an incident, characteristics of the command post and other auxiliary facilities are adequate to reliably support the designated functions and assignments.

The mobile incident command trailer adequately supported ICP operations. The trailer had power, lights, air conditioning, and sufficient working space to accommodate the incident command team.

ICS-34 – Given an incident, fire/rescue personnel and equipment are assembled and deployed to the scene of the emergency in a safe and timely manner.

The IC immediately deployed the ERT once he received confirmation that the tornado had passed through the area and the threat of further severe weather ended. The ERT then reported to the exercise simulation cell for the remainder of the exercise.

ICS-38 – Given an incident, onsite PA/protective action recommendation decision-making is in accordance with procedures.

The IC implemented PAs immediately upon learning of the severe weather, but did not revise the PAs to adequately protect personnel from the actual and potential HAZMAT releases postulated in the exercise.

The Sandia Corporation used the term "shelter in place" to describe two distinct types of PAs for a severe weather event and a HAZMAT release, with each type of shelter-in-place PA indicating a different set of expected actions. Upon learning of the severe weather, the IC immediately asked the telecommunicators to tell all site personnel to shelter in place for a severe weather event (stay away from doors and windows, and go to an interior room or basement) in preparation for a possible tornado. When the IC received the initial information about the tornado damage at the Auxiliary Hot Cell Facility (AHCF) and the unknown chemical spill, he did not consult the EALs for those facilities to see whether immediate PAs were warranted (different from those in place for a severe weather event) as required by emergency plan implementing procedure (EPIP) NM/TTR-EM- EPIP-300, *Declaration of OEs and PAs*. The applicable EALs stated that for the AHCF, an Alert should be declared and personnel within 120 feet (ft) of the facility should shelter in place, and for the unknown chemical spill, a GE should be declared and personnel should evacuate within 1,000 ft of the facility and shelter in place within 9,510 ft. However, the IC did not change the PAs around these facilities to include evacuation of personnel or instruct personnel to close all doors and windows and turn off ventilation systems to better protect personnel from a HAZMAT release.

The IC also did not change the PAs surrounding the two damaged HAZMAT facilities when he received the CAT's recommendations, when he declared SAEs for the AHCF and unknown chemical spill, or when he learned that there was a missing fuel container from the AHCF and the status of the remaining material within the facility was unknown. Furthermore, the IC did not change the PAs around the unknown chemical spill when the ERT detected elevated chemical readings at 300 ft upwind of the facility, and the IC erroneously interpreted the meaning of those readings (he did not consider that elevated readings might exist at a greater distance in the downwind direction). Also, the responders did not consider the conflict between the shelter-in-place PAs ordered by the IC and the self-evacuations that occur when a building's fire detection and suppression systems are alarming. (See Section 5.0, **OFI-SANDIA-4**.) The Sandia Corporation included these significant issues in their after-action report as findings (SNL/NM Issue Report #: 14-EX-EXRPT-01-006, 14-EX-EXRPT-01-007, and 14-EX-EXRPT-01-012).

ICS-43 – Given an incident, the current classification is modified (if required) based on continuous monitoring for event degradation or a reassessment that indicates that the event is more severe than originally perceived.

The classification declarations for the actual and potential HAZMAT releases postulated for the exercise were not timely, were not based on EALs, and were not adequately communicated to the communications center. Although the CAT recommended declaration of an Alert for the damaged AHCF (20 minutes after the tornado) and relevant EALs were available for an immediate classification decision, the IC waited another hour for the ERT to arrive at the AHCF, size up the scene, and enter the facility entry before classifying the emergency as an SAE. The deputy IC did not document the time or the EAL used to determine the SAE declaration for the AHCF on the *Incident Command Checklist*, and did not notify the communications center of the emergency classification. After receiving recommendations from the CAT and the IC senior advisor regarding declaration of a GE, the IC classified the unknown chemical spill as a GE (50 minutes after the tornado). While the deputy IC gathered the information needed by the telecommunicators to prepare an offsite notification form, the IC cancelled the GE declaration because the ERT detected (and the IC erroneously interpreted) elevated chemical readings near the Hazardous Waste Handling Unit (discussed further in objective *ICS-38*). While the ERT collected additional information, the unknown chemical spill remained unclassified until the IC stated that he was declaring an Alert (two hours after the tornado), which the deputy IC relayed to the communications center. The IC quickly corrected that he meant to say an SAE instead of an Alert, again without using an EAL as the basis for this decision. (See Section 5.0, **OFI-SANDIA-5**.) The Sandia Corporation included this

significant issue in their after-action report as a finding (SNL/NM Issue Report #: 14-EX-EXRPT-01-008).

ERO-09 – Given an incident, procedures and/or checklists, which describe the major activation and initial response activities of key members of the ERO, are used.

The SNL/NM ERO had numerous response procedures and checklists available for key emergency response functions, but mostly used an experience-based approach rather than a process/procedure-based approach to decision-making. The ERO used some forms, such as notification forms and HAZMAT forms, for executing and documenting completed tasks. The CAT completed timely initial assessment (TIA) forms and incident information forms. However, the ERO did not document many aspects of the response activities on the required forms, including mandatory information for the IC to provide to the emergency director (ED) and the telecommunicators. Furthermore, the CAT and the telecommunicators did not use checklists. (See Section 5.0, **OFI-SANDIA-6**.) The Sandia Corporation included some of these issues in their after-action report as findings (14-EX-EXRPT-01-003 and 14-EX-EXRPT-01-004).

ERO-16 – Given an incident, subject matter experts supporting the emergency response staff provide timely information to the decision-making process.

The subject matter expert at the ICP provided timely information to the IC, but the CAT (located at the EOC) did not confirm that the IC received their classification recommendations. The CAT typically provides their recommendations to the IC via cell phone, with a follow-up email to the IC laptop. However, simulated storm damage to a cell phone tower did not allow the CAT and IC to use their cell phones during the initial phase of the exercise, so the CAT only sent an email to the IC laptop and did not use backup communications to ensure that the IC received the classification recommendations. (See Section 5.0, **OFI-SANDIA-7**.)

Emergency Operations Center

EOC-02 – Given an incident, offsite officials, the cognizant field element, and DOE Headquarters emergency management team (EMT) are communicated to or with at least two times during the incident duration.

The Sandia Field Office (SFO) Senior Federal Official talked frequently with the DOE Headquarters EMT, and the DOE Headquarters Watch Office received three offsite notification forms. Before the exercise, SFO decided to add a temporary EOC support position to assist with communications and information management. Based on the communications issues encountered during the exercise (discussed further in objective *EOC-42*), the additional SFO support position could assist with these important tasks. (See Section 5.0, **OFI-SFO-1**.)

EOC-08 – Given an incident, a formally established communication chain for reporting and notification within the facility, site-wide, and to offsite organizations is properly followed.

The IC, EOC, and the communications center, in accordance with draft NM-EM-EPIP 100, *EOC Operations*, and draft NM-EM-EPIP 400, *Executive Management Notification*, appropriately used the Sandia Corporation communication chain for reporting and notification. EOC personnel made executive notifications, prepared and sent worker notifications, and distributed press releases. Additionally, the EOC cadre prepared and distributed internal situation reports (SITREPs), and SFO personnel made requests for DOE assets to DOE Headquarters personnel.

EOC-12 – Given an incident, continuous, effective, and accurate communications among response components and/or organizations are reliably established and maintained throughout an OE.

The EOC cadre partially demonstrated proper communications in accordance with *EOC Operations*. Importantly, the Sandia Corporation provided EA with draft EPIPs and checklists on the morning of the exercise, with the expectation that EA would evaluate the performance of the players against these draft documents. The intent of using the draft EPIPs was to determine whether the changes in the draft documents were effective for responding to the simulated emergency. One of the draft EPIPs allowed for a new virtual EOC concept that uses conference calling and WebEOC. During the exercise, the Sandia Corporation established a virtual EOC because, due to their proximity to the unknown chemical spill and the PAs that were in place, the EOC ED, security condition manager, and the security manager had to remain in their building. The exercise director had not anticipated a virtual EOC concept and had not included it in the design of the exercise, so EA provided only a limited evaluation of the concept. The Sandia Corporation included this issue in their after-action report as an observation (SNL/NM Emergency Management Issue Report #: 14-EX-EXRPT-01-018).

The EOC cadre provided adequate support to the IC and appropriately interfaced with affected offsite organizations. EOC personnel effectively managed crisis communications with employees, the news media, and the public. The ED and EOC manager effectively determined goals, tasks, and priorities for EOC operations, and tracked the completion of assigned tasks in the EOC action plan. Additionally, EOC personnel successfully demonstrated the use of properly working pagers, desktop radios, telephones, and computer systems. However, EA observed several instances of inadequate communications among the site, DOE Headquarters, and offsite organizations. For example, the EOC cadre did not adequately track the status of injured personnel during the emergency. At the conclusion of the exercise, the EOC cadre had only accounted for 31 of the 40 postulated injured personnel. The Sandia Corporation partially attributed this issue to the onsite medical facility's first time participating in a mass casualty exercise of this magnitude and that the medical facility has not planned for an event with this many injuries. Currently, SNL/NM has no written process or procedure to ensure clear responsibility for tracking, documenting, and communicating casualty information. Additionally, no information management tool exists to allow the exchange of injured personnel information between the onsite medical facility and the EOC. (See Section 5.0, **OFI-SANDIA-8**.) The Sandia Corporation included this issue in their exercise after-action report as an observation (SNL/NM Emergency Management Issue Report #: 14-EX-EXRPT-01-013).

The SNL/NM incident management tool, WebEOC, lacked relevant emergency information and did not enable the SNL/NM ERO to share event information among all onsite response facilities and field response elements. WebEOC provided a partial chronology of significant event information created by a system administrator located in the EOC, rather than providing an incident management tool to capture, distribute, and assess emergency information among the entire ERO. For example, the FMOC and onsite medical facility lack access to WebEOC, so they cannot generate, receive, and monitor significant event information, such as injuries and damages. EA also observed inadequate interoperability among the SNL/NM EOC and the local, state, and DOE Headquarters EOCs, as key personnel outside of the SNL/NM EOC were unable to view WebEOC information and technical products (such as consequence assessment plume models); offsite officials need this information for timely and accurate decision-making. Importantly, the Sandia Corporation did not provide the DOE Headquarters EOC access to the SNL/NM WebEOC. Additionally, EOC personnel did not provide a SITREP to DOE Headquarters (discussed further in objective *EOC-42*). Furthermore, the initial notification form transmitted to offsite authorities and DOE Headquarters incorrectly stated a GE declaration (discussed further in objectives *COM-08* and *ICS-29*), and SFO confirmed the GE declaration in discussions with DOE Headquarters based on information posted in the EOC. The DOE Headquarters EMT then concluded that the ED downgraded the GE classification without providing an explanation, based on the subsequent offsite

notification forms. In general, EOC personnel did not consistently collect event information and maintain situational awareness throughout the ERO and offsite response organizations. As a result, numerous communication weaknesses degraded situational awareness among the site, DOE Headquarters, and offsite organizations, which prevented a common operating picture of the emergency among responders. (See Section 5.0, **OFI-SANDIA-9**.) The Sandia Corporation included this significant issue in their after-action report as a finding (SNL/NM Issue Report #: 14-EX-EXRPT-01-001).

EOC-20 – Given an incident, an emergency public information (EPI) communications system is established among DOE/National Nuclear Security Administration Headquarters, SFO, and the EOC.

EPI personnel effectively established communications among the EOC, SFO, and DOE Headquarters. The communications led to the EOC cadre issuing two news releases and two bullet point summaries for use by the joint information center.

EOC-42 – Given an incident, emergency status reports are forwarded to the next-higher EMT on a continuing basis throughout the OE.

The EOC cadre did not send an emergency status report to the DOE Headquarters EMT. In addition, the Sandia Corporation does not allow DOE Headquarters access to the SNL/NM WebEOC event information, but instead relies on the SITREP as the primary method to transmit emergency status updates and ensure effective communications between the site and DOE Headquarters throughout the emergency. Furthermore, the Sandia Corporation does not use the DOE Headquarters recommended SITREP form provided in DOE Guide 151.1-4, *Response Elements, Emergency Management Guide*. Consequently, DOE Headquarters would not be able to satisfy the demands of Departmental senior management and meet the requirements associated with requests from the White House. (See Section 5.0, **OFI-SFO-1** and **OFI-SANDIA-10**.) The Sandia Corporation included this significant issue in their after-action report as a finding (SNL/NM Issue Report#: 14-EX-EXRPT-01-002).

EOC-66 – Given an incident, information is distributed by EPI to workers, site personnel, and the public during an OE.

EOC EPI personnel sent the appropriate information to workers, site personnel, and the public. The EOC cadre issued four workforce messages, two news releases, two bullet point summaries for use by the joint information center, and maintained appropriate contact with DOE Headquarters EPI staff.

Consequence Assessment Team

CAT-05 – Given an incident, PAs reflect a conservative assessment of the level of health effect and extent of potentially affected/impacted area and populations.

The CAT appropriately developed TIA forms for each event as described in NM-CAT-SOP-4300, *CAT Operations.* The CAT developed the TIA forms in an accurate and timely manner, and each form indicated conservative PAs. The CAT provided the TIA forms to the IC, but did not confirm that the IC received the initial TIA forms (discussed further in objective *ERO-16*). Additionally, on the initial TIA forms, the CAT recommended an Alert classification for the missing fuel container and a GE classification for the unknown chemical spill. The CAT ensured that the IC received the ongoing TIA forms via telephone; however, the IC chose not to use the classification determinations (discussed further in objective *ICS-43*).

CAT-06 – Given an incident, modifications to initial PAs are developed and communicated to the IC based on updated and refined data generated from the ongoing assessment.

The CAT did not complete a refined consequence assessment for the missing fuel container before it was found and before radiological control technicians had confirmed that no radiological release occurred. The source term for the exercise was a container of irradiated reactor fuel with identified quantities of uranium and plutonium. The CAT exercise controller provided the CAT with the source term, but the CAT radiological dispersion modeler quickly realized that the source term was inaccurate because it contained no fission products. The CAT modeler knew that fission products posed a greater health and safety risk than the uranium and plutonium. The CAT then reviewed the facility emergency planning hazards assessment (EPHA) for source term information; however, the EPHA did not contain information on the missing fuel container, and the CAT concluded that the Sandia Corporation had not updated the EPHA before placing the irradiated reactor fuel in the facility. (See Section 5.0, **OFI-SANDIA-11**.) The Sandia Corporation identified this significant issue in their after-action report as an observation (SNL/NM Issue Report #: 14-EX-EXRPT-01-009).

This lack of source term information in the EPHA caused the CAT to develop an appropriate source term during the exercise, which led to an untimely ongoing assessment. The CAT used the National Atmospheric Release Advisory Center (NARAC) model to develop a plume projection, which showed that PA criteria were not exceeded. However, the plume projection was not used to modify the initial PAs because the IC notified the CAT that the lost container had been found (undamaged) before completion of the NARAC modeling.

The CAT did not complete a refined assessment of the unknown chemical spill before air monitoring confirmed that there were no elevated chemical readings detected at the facility. Additionally, the Sandia Corporation developed the EPHA and EALs for the building with the unknown chemical spill using information from the Emergency Response Guidebook (ERG) rather than appropriately identifying the worst-case chemicals stored at the facility. Use of the ERG is contrary to DOE guidance because the ERG is generally less accurate and usually less conservative. The ERG distances are a function of:

- The Lethal Concentration 50 (known as LC50) of the substance, which is the concentration of a material in air that will kill 50 percent of those exposed when administered as a single exposure (typically 1 or 4 hours)
- The quantity of the substance, which is categorized as either small (less than 200 liters) or large.

The EPHA does not contain appropriate identification of the chemicals stored at the facility for use by the CAT during exercises or emergency events. The Sandia Corporation identified this significant issue in their after-action report as an observation (SNL/NM Issue Report #: 14-EX-EXRPT-01-009). (See Section 5.0, **OFI-SANDIA-11**.)

Nevertheless, the facility manager for the building with the unknown chemical spill informed the CAT that only one 55-gallon acid drum (contents unknown) was breached in the acid bay; however, the CAT did not recommend that the IC modify the initial PAs. The modeler continued to reference the facility-wide EAL that assumed a release of the entire building inventory, rather than using another EAL relevant for a small spill (≤55-gallons). The facility-wide EAL indicated the need for PAs out to 9,510 ft, whereas the acid bay (small spill) EAL indicated the need for PAs out to 530 ft. Further, because the contents of the acid drum were unknown, the CAT modeler could not use Areal Location of Hazardous Atmospheres, Emergency Prediction Information code, or NARAC modeling programs to determine projected exposures and to ensure the safety of personnel, as required by Sandia Corporation protocols. Nonetheless, the IC chose not to use the initial PAs recommended on the TIA form because readings had

been taken around the building that did not indicate the need for the conservative PAs recommended by the CAT (discussed further in objective *ICS-38*).

Collectively, the delay in developing a NARAC plume projection for the missing fuel container, the use of an inappropriate EAL for the chemical spill, and the inability to develop a software-based (i.e., Areal Location of Hazardous Atmospheres, Emergency Prediction Information code, or NARAC) plume projection for the unknown chemical did not support accurate PA decision-making. (See Section 5.0, **OFI-SANDIA-12**.)

CAT-10 – Given an incident, consequence estimates for actual or potential releases of HAZMAT are made.

The CAT partially conducted consequence estimates as described in the *CAT Operations* procedure. The CAT appropriately documented consequence estimates for the actual and potential releases, obtained from facility-specific EALs on the TIA and ongoing TIA forms. Nevertheless, the CAT did not provide ongoing assessments for the missing fuel container, did not use available tools to develop plume projections for the unknown chemical spill, and did not provide all of the consequence assessment data, as described in the CAT protocols, to complete the ongoing assessment process. (See Section 5.0, **OFI-SANDIA-13**.)

CAT-11 – Given an incident, onsite and offsite receptors of interest are identified quickly and are readily available to emergency managers (e.g., receptor locations at the facility and site boundaries, to or beyond the emergency planning zone boundary, and populations with special needs) as requested by the ED.

The CAT partially identified onsite and offsite receptors of interest as described in the *CAT Operations* procedure. The CAT produced TIA maps that presented the isolation zone, PA zone, and downwind PA areas for the emergency events at the HAZMAT facilities. The CAT loaded the maps into WebEOC for viewing by emergency responders. The SFO representative in the EOC wanted the maps displayed in the EOC, but the ED overrode this request. The SNL/NM exercise director stated that it is standard practice in the EOC to not display the maps until the EOC manager confirms that the maps contain accurate event information. The emergency management department manager determined that the initial TIA map was too distracting for the EOC cadre and did not provide an accurate representation of the actual emergency events. Nevertheless, the CAT did not discuss the maps with the ED or IC to ensure consideration of appropriate PAs for the affected receptors of interest. (See Section 5.0, **OFI-SANDIA-14**.) The Sandia Corporation identified this issue in their after-action report as an improvement item (does not require formal corrective actions).

CAT-12 – Given an incident, a TIA of the actual or potential consequences of an emergency is performed shortly after initial classification, using any available real-time event and meteorological data to provide an event-specific estimate of consequences.

The CAT did not produce event-specific estimates of consequences as described in the *CAT Operations* procedure. The CAT appropriately developed TIA and ongoing TIA forms for each event, which contained event-specific estimates of the consequences. The CAT made use of current and forecasted weather information and identified the HAZMAT requiring analysis. However, as previously discussed, the CAT did not use available tools to provide plume projections to determine event-specific estimates of the consequences and could not refine the source term. (See Section 5.0, **OFI-SANDIA-13**.)

CAT-15 – Given an incident, provisions are made for requesting support from the DOE radiological emergency response assets to assist in accident and consequence assessments as well as to estimate the integrated impact of a HAZMAT release to onsite and offsite populations.

The CAT lead ensured that the ED requested DOE Radiological Assistance Program support for field monitoring information, as described in the *CAT Operations* procedure.

CAT-16 – Given an incident, facilities have access to NARAC or have procedures in place to activate or request NARAC capabilities.

The CAT modelers did not use NARAC to develop plume projections as described in the *CAT Operations* procedure. The CAT radiological modeler used NARAC to develop plume projections for the missing fuel container; however, as previously discussed, the CAT could not conduct accurate modeling because of the inaccurate source term provided by the exercise planners. Additionally, the CAT chemical modeler could not use NARAC to develop plume projections for the unknown chemical spill. (See Section 5.0, **OFI-SANDIA-12**.)

CAT-18 – Given an incident in which natural phenomena may result in or exacerbate an emergency condition at the facility, operation, and/or activity, the natural phenomena are monitored.

The CAT obtained real-time meteorological conditions and initial weather forecasts from the appropriate SNL websites, as described in the *CAT Operations* procedure. The CAT also continuously monitored ongoing weather conditions using meteorological data, and continuously checked the weather forecasts throughout the exercise.

CAT-22 – Given an incident, the type of hazard and source term for the release of a HAZMAT is successfully determined either with available and reliable facility system parameters and effluent monitors or with data that is not normally monitored and measured.

The type of hazard and source term for both HAZMAT releases could not be successfully determined. The CAT requested the type of hazards and source term information from the IC and applicable facility managers, as described in the *CAT Operations* procedure. However, the requests did not lead to correct and complete source term information. The exercise planners provided incorrect information about the missing fuel container, and the EPHA does not include an analysis of the fuel (discussed further in objective *CAT-06*). The CAT received only incomplete information about the unknown chemical spill (55 gallons of an unknown liquid). (See Section 5.0, **OFI-SANDIA-11**.)

ERO-14 – Given an incident, members of the ERO perform in their roles, functions, and interfaces and in their use of emergency equipment, facilities, and resources in a timely, effective, and efficient manner; clearly acknowledge and understand authorities and responsibilities.

The CAT radiological dispersion modeler did not appropriately acknowledge the authority of the CAT lead when asked to perform responsibilities in a timely, effective, and efficient manner, as described in the *CAT Operations* procedure. The CAT lead recognized identified errors with the source term provided by the exercise planners (discussed further in objective *CAT-06*) and that using the provided source term would produce overly-conservative plume projections, but asked the modeler to use HotSpot or NARAC to develop a plume projection for the missing fuel container. The modeler chose to not acknowledge the authority of the CAT lead and refused to develop the plume projection for the missing fuel container until he developed an accurate source term. (See Section 5.0, **OFI-SANDIA-13**.) The Sandia Corporation included this issue in their after-action report as a finding (SNL/NM Issue Report #: 14-EX-EXRPT-01-016).

Facilities Management and Operations Center

EM-02 – A mutual understanding of capabilities, especially the command and control system, supports an integrated and effective response.

The FMOC personnel generally followed PLN-012, *FMOC Emergency Operations Plan for SNL/NM*, for command and control. The IC, the FMOC response director (located at the EOC), and the FMOC recovery manager talked frequently via telephone to coordinate the recovery efforts. However, the plan addresses only FMOC integration with the SNL/NM EOC, and does not address communications with the IC. (See Section 5.0, **OFI-SANDIA-15**.) The Sandia Corporation included this issue in their after-action report as an observation (SNL/NM Issue Report #: 14-EX-EXRPT-01-011).

The recovery manager prioritized the facility recovery efforts, as stated in *FMOC Emergency Operations Plan for SNL/NM*, based on the limited information he received. The FMOC is located in a separate facility from the EOC, with limited access to the key sources of information needed to perform this function. During the exercise, personnel from over 21 buildings across the site reported damage or alarms. However, the recovery manager received minimal information about the emergency response, such as the PAs implemented, the status of building occupants (number of personnel inside each building and the number of injured), the safe travel routes repair crews should use, and the status of utilities. The recovery manager prioritized the recovery activities based on the information available to him, but the FMOC's activities were not well integrated with the rest of the ERO, which would have degraded the effectiveness of response/recovery efforts. (See Section 5.0, **OFI-SANDIA-16**.) The Sandia Corporation included these issues in their after-action report as observations (SNL/NM Issue Report #: 14-EX-EXRPT-01-010 and SNL/NM Issue Report #: 14-EX-EXRPT-01-019).

EM-06 – Control of operations, monitoring, and repair teams is clearly vested in a single ERO position or clearly defined between multiple ERO positions.

The FMOC recovery manager clearly controlled the deployment of repair crews and appropriately requested permission from the IC before sending craftsmen to the event scenes.

EM-08 – Facility and field repair and maintenance activities are carried out in a timely and efficient manner.

The repair crews received briefings before deploying, and prepared work packages for high voltage repairs. When the repair crews deployed, they reported to the exercise control cell rather than to the event scenes, in keeping with the exercise plan.

The *FMOC Emergency Operations Plan for SNL/NM* states that radiation protection and industrial hygiene personnel will be part of the repair crews and provide hazard assessments before allowing the repair crews to enter facilities. An industrial hygienist was present at the FMOC, but was not clear on assigned duties, had no monitoring or personal protective equipment, and did not accompany the repair crews when they deployed. (See Section 5.0, **OFI-SANDIA-17**.)

EM-09 – Given an incident, actual function(s) and operating characteristics of specific equipment adequately support the intended function(s) during emergency response.

The FMOC staff used a computer on a limited basis to exchange emails, but did not have access to WebEOC. The FMOC is located separately from the other command centers and received incomplete information, degrading situational awareness (discussed further in objective *EM-02*). (See Section 5.0, **OFI-SANDIA-18**.)

EM-10 – Given an incident, facilities and equipment adequate to support emergency response are available, operable, and maintained.

The FMOC and equipment were adequate.

EM-12 – Given an incident, facility systems and installed equipment are adequate to support facility functions and level of staffing.

Except for the inability to access WebEOC, the facility systems at the FMOC were adequate.