Independent Assessment of the 2024 Full-scale Emergency Management Exercise at the Oak Ridge National Laboratory

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U.S. Department of ENERGY | Office of Enterprise Assessments

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Acronyms

CAT	Consequence Assessment Team
CM	Crisis Manager
COA	Continuous Ongoing Assessment
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
EMCC	Environmental Monitoring Coordination Center
EOC	Emergency Operations Center
EOS	Emergency Operations System
EPHA	Emergency Planning Hazards Assessment
EPI	Emergency Public Information
EPZ	Emergency Planning Zone
ERO	Emergency Response Organization
FMT	Field Monitoring Team
HFIR	High Flux Isotope Reactor
IC	Incident Commander
ICP	Incident Command Post
JIC	Joint Information Center
KI	Potassium Iodide
km	Kilometer
LERC	Laboratory Emergency Response Center
LSS	Laboratory Shift Superintendent
MVPW	Melton Valley Process Wastewater
OE	Operational Emergency
OFI	Opportunity for Improvement
ORNL	Oak Ridge National Laboratory
OSO	ORNL Site Office
PA	Protective Action
PAC	Protective Action Criteria
PAR	Protective Action Recommendation
PIO	Public Information Officer
SIP	Shelter-in-Place
TEL	Threshold for Early Lethality
TEMA	Tennessee Emergency Management Agency
TIA	Timely Initial Assessment
UT-Battelle	UT-Battelle, LLC
WebEOC®	Web-based Emergency Operations Center Software

INDEPENDENT ASSESSMENT OF THE 2024 FULL-SCALE EMERGENCY MANAGEMENT EXERCISE AT THE OAK RIDGE NATIONAL LABORATORY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the emergency management program during the 2024 full-scale exercise at the Oak Ridge National Laboratory (ORNL) from July to September 2024. This assessment evaluated the effectiveness of the management and operating contractor, UT-Battelle, LLC (UT-Battelle) and the Office of Science ORNL Site Office (OSO) in managing and maintaining emergency response organization (ERO) performance via the full-scale emergency management exercise conducted on August 14, 2024. This assessment was based on DOE Order 151.1D, *Comprehensive Emergency Management System*, requirements. EA assessed the performance of the ERO at key decision-making venues to determine whether UT-Battelle and OSO responded effectively to a simulated Operational Emergency and took appropriate response measures to protect workers, responders, and the public.

EA identified the following strengths, including one best practice:

- UT-Battelle developed user-friendly casebook forms for each Operational Emergency scenario in ORNL emergency planning hazards assessments (EPHAs). The consequence assessment casebook includes detailed information needed by the consequence assessment team for each postulated incident. (Best Practice)
- UT-Battelle designed a challenging, high-consequence exercise based on a scenario analyzed in the EPHA that incorporated real-time meteorological conditions.
- OSO and UT-Battelle provided a well-organized and functional joint information center that was adequately provisioned and staffed.

EA also identified several weaknesses, including two findings, as summarized below:

- UT-Battelle has not fully identified predetermined onsite protective actions and offsite protective action recommendations consistent with the hazard and duration of the postulated radiological release established by the applicable EPHA. (Finding)
- UT-Battelle did not demonstrate an effective emergency operations system that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. (Finding)

In summary, the OSO and UT-Battelle emergency management program is capable of adequately responding to the hazards identified within the High Flux Isotope Reactor EPHA, and UT-Battelle conducted a challenging, high-consequence exercise to test the ERO's capabilities in a real-time environment. However, performance weaknesses in the response to the postulated incident warrant additional management attention. These weaknesses relate to the adequacy of predetermined onsite protective actions, situational awareness, and disseminating a common operating picture among response components. These weaknesses led to delays during the exercise in implementing time-urgent emergency response actions needed to protect workers, the public, and the environment. Until the concerns identified in this report are addressed or effective mitigations are put in place, responses to incidents at ORNL could present challenges to effective and timely response actions.

INDEPENDENT ASSESSMENT OF THE 2024 FULL-SCALE EMERGENCY MANAGEMENT EXERCISE AT THE OAK RIDGE NATIONAL LABORATORY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Emergency Management Assessments, within the independent Office of Enterprise Assessments (EA), assessed the 2024 full-scale emergency management exercise at the Oak Ridge National Laboratory (ORNL). This assessment was conducted as part of a series of assessments of emergency management exercises and programs at DOE sites. Assessment activities were conducted from July to September 2024.

This assessment evaluated the effectiveness of the management and operating contractor, UT-Battelle, LLC (UT-Battelle) and the Office of Science ORNL Site Office (OSO) programs in managing and maintaining emergency response organization (ERO) performance via the August 14, 2024, full-scale emergency management exercise. This assessment evaluated the performance of the ERO at key venues, including the incident command post (ICP), the Laboratory Emergency Response Center (LERC), joint information center (JIC), and the emergency operations center (EOC), with a focus on ERO decision-making positions, such as the incident commander (IC), laboratory shift superintendent (LSS), and EOC crisis manager (CM). Issues identified during the exercise evaluations were further examined to determine possible causes, such as a lack of training, insufficient procedural guidance, or misapplication of the emergency planning hazards assessment (EPHA) results. This assessment was conducted in accordance with the *Plan for the Independent Assessment of the Emergency Management Exercise at the Oak Ridge National Laboratory, July – September 2024*.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which EA implements through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms "best practices, deficiencies, findings, and opportunities for improvement (OFIs)" as defined in the order.

As identified in the assessment plan, this assessment considered requirements documented in DOE Order 151.1D, *Comprehensive Emergency Management System*. EA used the following sections of EA CRAD 33-09, Revision 0, *DOE Order 151.1D Emergency Management Program*: section 4.3, *Emergency Response Organization*; section 4.4, *Emergency Operations System*; section 4.6, *Offsite Response Interface*; section 4.7, *Emergency Categorization*; section 4.8, *Protective Actions*; section 4.9, *Consequence Assessment*; section 4.11, *Notifications and Communications*; section 4.12, *Emergency Public Information*; and section 4.15, *Exercises*.

EA examined key documents, such as the exercise package, exercise evaluation guides, emergency plans, the EPHA associated with the exercise scenario, checklists, procedures, and policies. EA also interviewed key personnel responsible for developing and executing the associated programs. EA observed the controller/evaluator pre-exercise brief, the exercise, and the post-exercise hotwashes and debrief activities. EA also walked down significant portions of the EOC, LERC, and High Flux Isotope Reactor (HFIR) facilities, focusing on exercise response execution. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

There were no previous findings for follow-up during this assessment.

3.0 RESULTS

UT-Battelle designed and conducted a full-scale exercise to evaluate emergency response capabilities and multiple processes used by key onsite ERO groups. Accordingly, the exercise focused on the use of appropriate plans, policies, and procedures, as well as the actions of ERO members involved in management, direction, and command and control functions. UT-Battelle conducted the exercise in a realistic, real-time environment in response facilities that necessitated actions by facility workers, the site-level ERO and some simulated offsite participants. The postulated incident, based on an EPHA scenario, involved an Operational Emergency (OE) at the HFIR facility that was classified as a General Emergency due to a radiological release. The postulated hazardous material release for the exercise consisted of several volatile fission products representing an acute whole-body exposure and a thyroid exposure from radioactive iodine. One person was postulated to be in a potentially high radiation area and was exhibiting abnormal behaviors. The ORNL Fire Department responded to the incident and assumed IC duties. The LSS received reports and information from the HFIR control room, classified the incident, and activated the EOC. Once the EOC was staffed and fully operational, the LSS turned over incident management duties to the EOC CM.

3.1 Technical Planning Basis

This portion of the assessment determined whether UT-Battelle has (1) established a technical planning basis for HFIR that appropriately identifies hazards and potential consequences from unplanned releases of hazardous material, and (2) developed emergency action levels (EALs) for the spectrum of potential OEs that include appropriate protective actions (PAs) corresponding to each EAL scenario.

The ORNL emergency plan adequately describes the technical planning basis used to define the provisions of the emergency management hazardous materials program, ensures that the program is commensurate with the hazards identified, and provides the basis for establishing a graded approach to meet program requirements in DOE Order 151.1D. The emergency plan appropriately describes the role of the EPHA as identifying and characterizing hazards associated with a facility, determining the incidents and conditions that could lead to releases, quantifying the potential onsite and offsite consequences of each postulated emergency incident/condition, and establishing the technical basis for EALs that identify the severity of the incident and corresponding protective measures.

The HFIR technical planning basis is documented in ORNL/7900/EPHA, *Emergency Planning Hazards Assessment for the High Flux Isotope Reactor, Building 7900*. The EPHA evaluates the potential accidents associated with HFIR operations and establishes the technical basis for facility-specific EALs that define the response actions required for specific accident scenarios. In addition, the EPHA identifies and analyzes six scenarios determined to represent the spectrum of possible incidents involving the release of hazardous material that could impact workers, the public, or the environment. The analysis accurately calculates potential consequences from the identified release scenarios; however, the response planning does not fully incorporate the potential consequences identified in the EPHA and did not include appropriate decision points for protection of onsite populations and determination of offsite protective action recommendations (PARs).

The exercise was based on EPHA scenario Core-2, which involves the loss of primary coolant in the pipe tunnel/heat exchanger cells, resulting in rapid heating of the reactor core leading to fuel damage and the release of volatile fission products. The EPHA assumes 24% of the volatile fission products are released from the core and 99.6% of the release occurs in the first two hours. The primary coolant carrying the

volatile fission products is released into heat exchanger cells where floor drains route the coolant into the Melton Valley Process Wastewater (MVPW) collection tanks. Interviews conducted following the exercise indicated that coolant flow to the collection tanks can be isolated by manually operated valves in two manholes outside the HFIR building; however, the EPHA does not consider isolation of coolant flow.

The source term for scenario Core-2 is divided into two components: a filtered release through the 7911 stack and an unfiltered, ground-level release through the MVPW collection tank vents. The EPHA analysis calculates dose consequences separately and combines them to determine the total dose for the incident. The worst-case, combined dose consequences presented in the EPHA include a distance to the threshold for early lethality (TEL) (100 rem) of 380 meters (0.24 miles), a distance to the iodine protective action criteria (PAC) (5 rem thyroid) of 2.0 kilometers (km) (1.2 miles), and a distance to PAC (1 rem) of 6.8 km (4.2 miles). An examination of the separate dose consequences presented in the EPHA reveals that the dose consequences of the ground-level release are significantly higher than the stack release. For example, the EPHA postulates doses greater than 1,000 rem within 100 meters of the unfiltered release from the MVPW tanks.

UT-Battelle has not provided a complete set of EALs or other preplanning documents for HFIR that includes predetermined observable thresholds for initiating conditions that, when met or exceeded, place the site at a specific severity threshold and are correlated with appropriate PAC. The EAL for scenario Core-2 (EAL 7900-02) includes the distance to the 1 rem PAC (6.8 km/4.2 miles) but does not include the distance to the TEL or the iodine PAC and does not consider the potential for significant radiological doses in the HFIR area due to the release from the MVPW collection tank vents. Additionally, neither the EAL nor any other UT-Battelle planning document identifies the potential to exceed the iodine PAC or a process for evaluating the need to issue potassium iodide (KI) for thyroid protection to workers in the HFIR area. Contrary to DOE Order 151.1D, attachment 4, paragraph 9.a, UT-Battelle has not fully identified predetermined onsite PAs and offsite PARs consistent with the hazard and duration of the release based upon the result of the EPHA. (See **Finding F-UTB-1**.) Consequently, preplanning for implementing HFIR protective actions is not complete or conservative, does not provide appropriate protection decision points to onsite and offsite populations, and does not prompt UT-Battelle emergency responders or offsite authorities to take appropriate actions to limit or prevent adverse health and safety impacts to first responders, workers, and the public.

Technical Planning Basis Conclusions

Overall, UT-Battelle has effectively developed a technical planning basis that evaluates the potential accidents associated with HFIR operations. However, UT-Battelle has not effectively used the results of the EPHA to identify adequate predetermined onsite PAs and offsite PARs, nor has it provided appropriate preplanning to prompt UT-Battelle emergency responders and offsite authorities to take conservative action to limit or prevent adverse health and safety impacts to first responders, workers, and the public.

3.2 Emergency Operations System

This portion of the assessment determined whether the UT-Battelle emergency operations system (EOS) provides centralized collection, validation, analysis, and coordination of information related to an ORNL incident response, and whether that information is used to obtain and maintain situational awareness and support a common operating picture among response components to achieve a well-coordinated, well-understood, and effective response.

During the exercise, UT-Battelle had adequate EOS capabilities to collect incident information, to provide needed expertise for incident analysis from a centralized EOC, and to ensure that the EOS was consistent with the operational concepts of the National Incident Management System. In addition, the ORNL

emergency plan and implementing procedures adequately establish the EOS to support the ERO structure, which consists of a three-tiered approach for responding to OEs. The first tier is the incident command system to mitigate the incident; the IC is responsible for all actions at the incident scene. The second tier consists of ORNL emergency response functions managed by the ORNL emergency director, including the LERC, EOC, ORNL media center, and ORNL field monitoring team (FMT). The third tier of the organizational structure is comprised of offsite facilities, organizations, and functions, including the JIC and other facilities outlined in the Tennessee multi-jurisdictional plan.

UT-Battelle appropriately used EPHA scenario Core-2 as the basis for the exercise that postulated the release from the 7911 stack and the MVPW collection tank vents. The incident results in a General Emergency condition based on a potential filtered radiological release through the 7911 stack and an unfiltered release through the MVPW collection tank vents. As discussed in section 3.1, significant radiation dose consequences are projected for the scenario requiring both onsite and offsite PAs. However, UT-Battelle's ERO incident response during the exercise focused solely on the filtered stack release, which resulted in an incomplete picture of the potential consequences, and adversely affected incident decision-making and response actions among response components and external partners. As a result, and contrary to DOE Order 151.1D, attachment 3, paragraph 4.b, UT-Battelle did not demonstrate an effective EOS that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. (See **Finding F-UTB-2**.) Consequently, the ERO did not fully understand the potential consequences of the incident or implement effective response actions for several key response elements.

Although the basis for the loss-of-coolant-incident scenario is well documented in the EPHA, the ORNL emergency director and EOC staff did not acquire adequate situational awareness. Importantly, three EPHA calculations for dose consequences are needed for decision-making, but only one, the distance to PAC for the stack release, is included in the EAL. Calculated consequences for the distance to TEL and to the iodine PAC, along with corresponding PAs, are omitted from the EAL and are not included in any other document that implements the necessary preplanned response actions to protect workers and first responders. The emergency director's situational awareness of potential consequences was further diminished because the EOC staff performed an incomplete timely initial assessment (TIA). The TIA was needed to confirm that EAL consequences were bounding using real-time meteorological conditions. Furthermore, the briefing provided by subject matter experts to the emergency director and EOC staff on EPHA scenario Core-2 did not convey that 99.6% of the release was expected to occur in the first two hours and that the volatile fission products were expected to be released through both the stack and the MVPW collection tank vents. The EOC did not demonstrate awareness of potential consequences from material entering the MVPW collection tank. Collectively, these EOS performance issues diminished the effectiveness of the overall emergency response, particularly related to response decision-making, PAs, consequence assessment, notifications, and emergency public information (EPI).

The following ERO performance weaknesses are directly related to the degradation of the EOS and are further discussed in corresponding response element sections of this report:

- Most importantly, the first tier ERO was not knowledgeable or informed of the potential worst-case consequences, which resulted in inadequate protective measures for first responders to enter the HFIR area because they were not informed of the potential distance to TEL (0.24 miles) or distance to the iodine PAC (1.2 miles).
- Implementation of the classification process did not result in prompt classification of the incident to initiate PAs and PARs.
- The TIA had an incomplete source term, and therefore, did not verify that potential consequences were bounding and appropriately correlated with EAL PAs.

- Lack of situational awareness resulted in inaccurate information being issued to offsite authorities on ORNL notification forms.
- There was an ongoing lack of awareness about the incident within the JIC that delayed the release of information to the media and the initial news conference.

Inadequate situational awareness also affected the response to an injured employee who was in a potentially high radiation area and was exhibiting abnormal behaviors. The IC appropriately verified that the patient was not contaminated and ensured that a radiological control technician accompanied the patient when transported to the hospital. However, the first responders did not determine that the patient's symptoms were potentially indicative of a high dose of radiation. In addition, other ERO members did not inquire as to whether the patient was in high dose rate areas long enough to experience radiation sickness, or request that the patient's radiation dosimetry be evaluated to determine exposure. Consequently, the ERO treated the injury as a non-emergency and reported it as such in offsite notifications as well as in the initial news conference.

Emergency Operations System Conclusions

Overall, the UT-Battelle EOS is structured consistent with the operational concepts of the National Incident Management System, and UT-Battelle had adequate capabilities to collect incident information from centralized and well-equipped facilities. However, UT-Battelle did not demonstrate an effective EOS that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. Observed EOS performance issues diminished the effectiveness of the overall emergency response, particularly related to response decision-making, PAs, consequence assessment, offsite notifications, and EPI.

3.3 Emergency Classification

This portion of the assessment determined whether the UT-Battelle LSS, as the predetermined decision-maker, correctly categorized and classified the incident as promptly as possible, but no later than 15 minutes after incident identification, and no more than 30 minutes from initial discovery.

UT-Battelle has appropriately established plans and procedures for categorizing and classifying an incident. EAL 7900-02 has two entry criteria: large loss of coolant in pipe tunnel/heat exchanger cells, and indication of fuel damage. The second criterion gives the following examples for indication of fuel damage: failed fuel element detector, cladding failure detection system, abnormally high radiation levels in the high bay, or high radiation levels near the MVPW collection tanks. At the start of the exercise, the LSS received the HFIR alarm exercise inject, which visually simulated the HFIR area alarms' screen typically displayed in the LERC. The LSS immediately called the HFIR shift supervisor to confirm the alarms. The HFIR shift supervisor confirmed that the alarms received in the LERC were associated with an indication of fuel damage (HFIR facility radiation alarm, and rate of change and failed fuel element detector alarms both indicated by the reactor scram) and provided the first EAL entry criterion, "loss of primary coolant in pipe tunnel/heat exchanger cells." At 0801, the LSS had acquired all necessary information related to EAL entry criteria and reviewed EAL 7900-02 but did not categorize the incident.

Nevertheless, sixteen minutes after the LSS discussion with the HFIR shift supervisor, the HFIR plant manager contacted the LSS to discuss the incorrect HFIR area evacuation PAs that were based on an inaccurate exercise control inject and requested that the LSS apply the appropriate PAs for the HFIR area. During that conversation, the HFIR plant manager stated that fuel damage had occurred based on the initial alarms the LSS had received. (See **Finding F-UTB-2**.) See section 3.2 for further discussion. Based on this discussion, the LSS classified it as a General Emergency, although not within the required

time limits for classification. The LSS waited for the plant manager to interpret the EAL fuel damage examples instead of acting on the available EAL indicators. As a result, and contrary to DOE Order 151.1D, attachment 3, paragraph 8.b, UT-Battelle did not categorize the OE as promptly as possible, or no later than 15 minutes after identification by the predetermined decision-maker for the categorization, in accordance with the emergency management plan. (See **Deficiency D-UTB-1** and **OFI-UTB-1**.) Importantly, the 17-minute delay in classification slowed rapid communication of critical PA information and the initiation of appropriate time-urgent emergency response actions. See section 3.1 for the discussion about TEL and PA information not currently in the EAL and section 3.5 for the importance of this information to onsite workers and responders.

Emergency Classification Conclusions

Overall, UT-Battelle has developed plans and procedures for categorizing and classifying an incident. However, due to the LSS not acquiring adequate situational awareness of the incident to enable the determination of fuel damage based on available alarms, the LSS did not classify the incident within the DOE Order 151.1D response time requirements. Consequently, the delay in classification slowed rapid communication of critical PA information and the initiation of appropriate time-urgent emergency response actions.

3.4 Notifications and Communications

This portion of the assessment determined whether UT-Battelle provided initial and follow-up notifications promptly, accurately, and effectively to all appropriate stakeholders, and whether the ERO maintained effective communications throughout the response.

UT-Battelle promptly notified field responders, workers, the ERO, and offsite agencies. The offsite agencies included the City of Oak Ridge, Tennessee; Anderson, Loudon, and Roane counties; and the Tennessee Emergency Management Agency (TEMA). The LERC staff, as directed by the LSS as the Laboratory Emergency Director, promptly notified and dispatched field response teams within minutes after confirming the HFIR alarms. In addition, the LERC staff promptly issued PAs to site workers and activated the ERO after classifying the incident, including providing safe routing information to the ERO. Furthermore, the LSS notified the offsite agencies verbally after categorizing and classifying the incident and appropriately followed up with the ORNL electronic notification form. Finally, the EOC coordinator promptly notified the offsite agencies of changes in site conditions, such as PARs, media releases, and airborne release status. UT-Battelle used dedicated and redundant systems to ensure that all required onsite and offsite notifications occurred. The UT-Battelle radio, Everbridge, telephone, ringdown phones, and Web-based Emergency Operations Center software (WebEOC®) communication systems generally operated as expected and any malfunctions were quickly addressed.

However, the situational awareness weaknesses resulted in incomplete and inaccurate information in ORNL notifications sent to offsite authorities. (See **Finding F-UTB-2**.)

The notification process involves information being transferred verbally through multiple ERO positions prior to the completion of ORNL notification forms. A limited causal analysis completed by the assessment team revealed that deficiencies in ORNL notifications may be caused by excessive duties assigned to the EOC coordinator and a lack of management approval of the notifications. The EOC coordinator is responsible for notifications after the initial notification but was not able to obtain accurate information about the ongoing incident for use in communications. For example:

- The information related to the injured person was provided to offsite organizations more than two hours after the injury was known to the field response, HFIR operations center, LERC, and EOC staff. Of significance, the ERO and JIC staff maintained that the injury was not related to the

emergency even though the employee was at the scene of the initial incident and was potentially exposed to high radiation.

- The incident description on the notification form did not fully capture the actual incident as it only included the EAL scenario incident initiator as a "loss of primary coolant in HFIR involving tunnel/heat exchanger cells," versus adding "resulting in fuel damage and fission product release from 7911 stack and MVPW collection tanks," which describes the significant concern for offsite agencies.
- The ORNL notification form listed "improving conditions" during the same timeframe that the EOC CM indicated that conditions were not improving.
- The status of offsite assistance was not updated to reflect current known offsite responses, including offsite agency support of the site evacuation and external roadblocks.

Contrary to DOE Order 151.1D, attachment 3, paragraph 11, UT-Battelle did not provide accurate and complete initial and follow-on notifications to all appropriate offsite stakeholders. (See **Deficiency D-UTB-2**.) Consequently, initial and follow-up notifications to offsite agencies were inaccurate, including required information such as injured personnel, an adequate description of the incident, and current incident conditions.

Notifications and Communications Conclusions

Overall, UT-Battelle promptly notified field response teams, workers, the ERO, and offsite agencies. In addition, communication systems generally functioned as intended. However, UT-Battelle did not acquire adequate situational awareness of the incident to adequately ensure that some of the key ORNL notification information was complete and accurate. Consequently, initial and follow-up notifications to offsite agencies did not provide an up-to-date situational awareness about the significance or extent of the incident. As a result, offsite agencies were not provided an adequate description of the incident and were not aware of worsening incident conditions or an incident-related injury.

3.5 Protective Actions

This portion of the assessment evaluated whether UT-Battelle correctly identified and implemented PAs and PARs to minimize the consequences of an emergency and to protect the health and safety of workers and the public.

As discussed in section 3.1, UT-Battelle has not provided a complete set of EALs for HFIR that includes predetermined observable thresholds for initiating conditions that, when met or exceeded, places the site at a specific severity level correlated with appropriate PACs. Although the approved EAL used by the LSS did not address all potential consequences of the incident, the LSS correctly implemented the EAL as written. Initially, upon confirming with HFIR facility personnel that an incident had occurred, the LSS determined that nonessential personnel in Building 7900 had evacuated, based on the building radiation and scram alarms, and directed those personnel to be relocated to Building 1505. When the incident was classified as a General Emergency, the LSS directed implementation of the predetermined EAL PAs and made a public address announcement for the entire ORNL site, including the HFIR 7900 area, to SIP in accordance with the EAL. In addition, the ORNL public warning siren system was activated, EPZ sector-specific PARs for the public to SIP in identified downwind sectors were issued to TEMA, and specific ORNL road closures were directed per the EAL. During the exercise, the EOC CM and EOC staff confirmed that UT-Battelle responders implemented the initial predetermined onsite PAs per the EAL. Approximately two hours after incident discovery, the EOC CM and EOC staff decided to evacuate

the entire HFIR area of all non-essential personnel, and ultimately decided to evacuate the entire ORNL site of non-essential personnel using a site evacuation procedure.

The LSS initially determined the offsite PARs specified in the EAL and provided them to TEMA in the initial offsite notification form; later, the EOC staff modified and provided revised PAR information to TEMA, as needed. Actual meteorological conditions were used during the exercise, which were light and variable wind conditions (<3 meter per second wind speed), resulting in several wind shifts during the exercise. The EPHA specified a distance to PAC of 6.8 km (4.2 miles) for this incident, resulting in potential PAR impacts for the downwind predetermined offsite EPZ sectors. Following each wind shift, the EOC coordinator and EOC cadre reviewed the associated consequences and correctly determined that no additional onsite PAs were necessary. However, the wind shifts did affect potential offsite downwind EPZ sectors, resulting in two revised PARs to SIP in new downwind EPZ sectors in addition to the two initially identified sectors. All PARs for the identified downwind sectors remained in effect for the duration of the exercise.

As discussed in section 3.2, the first tier ERO was not aware of the potential worst-case consequences of this incident. As such, UT-Battelle first responders entered the HFIR area without knowledge of the potential consequences. (See **Finding F-UTB-2**.) Upon initial dispatch to the HFIR facility for the incident, the IC reported to Building 7900 from an upwind direction and received a briefing from facility radiological control technicians and HFIR operations personnel regarding the location and condition of the injured employee, as well as dose rate survey results taken inside and outside of the facility. After also receiving an incident briefing, the IC departed from the facility to establish an ICP at an upwind location. Although the LSS's initial dispatch of the fire department included information about the HFIR reactor scram alarm and associated radiation alarms, the potential consequences as defined in the EPHA were not provided to the fire department and security responders. After incident classification, information concerning the radiological release and distance to iodine PAC (2.0 km/1.2 miles) and TEL (380 meters/0.24 miles) was also not provided to the fire department or security responders. Follow-up interviews with the IC revealed that, although the IC is familiar with fire pre-plans for Building 7900, the IC was not aware of the distance to iodine PAC and TEL for the incident or that there was the potential for extremely high doses within 30 meters of the MVPW tanks (i.e., 18,000 rem total effective dose), as identified in the EPHA. This information is critical to allow the IC to make informed decisions about the location of the ICP, provide safe distance information to responders including security personnel, and determine whether it is safe for first responders to enter the facility. As a result, and contrary to DOE Order 151.1D, attachment 3, paragraph 9, UT-Battelle did not develop or implement predetermined PAs for first responders that serve to minimize emergency-related consequences and maximize life safety and health. (See **Deficiency D-UTB-3** and **OFI-UTB-2**.) Consequently, first responders were not aware or adequately informed of potential hazards and were not provided protective measures based on the potential impacts on responder safety and health.

Similarly, inadequate knowledge of the potential consequences affected decision-making on PAs for personnel located in the HFIR area. As discussed in section 3.1, for the exercise scenario, the EPHA identified a high radiological dose incident with a radiological release occurring for approximately two hours. The predetermined onsite PAs defined in the EAL instruct staff in Building 7900 to evacuate and for the remainder of the HFIR area personnel to SIP. Consistent with UT-Battelle preplanning, the LSS used buses to quickly relocate evacuated personnel from Building 7900 to an area outside the HFIR area. However, the adequacy of SIP for the HFIR area personnel inside both the distance to the TEL and the iodine PAC was not established, and the potential for significant radiological doses in the HFIR area due to the release from the MVPW tank vents was not considered. (See **Finding F-UTB-1**, **Finding F-UTB-2** and **OFI-UTB-3**.)

Additionally, protective measures for the incident did not identify the potential to exceed the iodine PAC, including the consideration for administering KI to HFIR area workers and ORNL first responders as a supplemental PA. KI, also called "stable iodine," is a thyroid blocking agent that can be administered to personnel during radiological emergencies for protection of both onsite workers and the surrounding public from a radioiodine exposure. Although not a requirement, the use of KI as a supplemental PA is a common practice in the nuclear industry for radioiodine releases, including other DOE sites, and its use is discussed in the Environmental Protection Agency's *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*. TEMA recommends KI administration for public populations downwind of HFIR for incidents that could result in a committed dose equivalent to the thyroid of 5 rem or greater, as documented in the *State of Tennessee Multi-Jurisdictional Emergency Response Plan for the United States Department of Energy Oak Ridge Reservation*. It is critical that KI's use be determined quickly during an incident, as it is best taken prior to or just after exposure, with the protective effect of a single dose lasting approximately 24 hours. There were no discussions with the EOC CM on the possible use of KI as a supplemental PA for ORNL personnel and responders in addition to the evacuation or SIP actions, which were directed. (See **OFI-UTB-4**.)

Protective Actions Conclusions

Overall, UT-Battelle demonstrated the ability to protect workers and the public effectively by implementing the initial EAL-identified predetermined onsite PAs, closing predetermined roads, and providing PARs to the state for potentially impacted downwind sectors, both initially and as wind direction changed, as required by procedures. However, UT-Battelle has not provided a complete set of EALs for HFIR incidents that includes predetermined thresholds for initiating conditions that, when met or exceeded, places the site at a specific severity level and is correlated with appropriate PACs. The hazardous material consequence analysis for the exercise scenario contained in the EPHA was not provided to first responders and does not support the initial EAL onsite predetermined PA of SIP for personnel outside Building 7900 but in the HFIR area due to the potentially high radiological exposure hazard.

3.6 Consequence Assessment

This portion of the assessment determined whether UT-Battelle's consequence assessment activities provided a conservative TIA, accurate projections using incident conditions, and supportive assessments throughout the emergency.

During the exercise, UT-Battelle had adequate consequence assessment capabilities to compute and correctly assess in a timely manner the estimates of onsite and offsite consequences of actual or potential releases of hazardous materials considering site-specific characteristics (e.g., topography, meteorology). In addition, the ORNL emergency plan adequately describes the consequence assessment process and its primary objective of providing timely, useful information for emergency managers when making decisions to protect first responders, workers, and the public.

In accordance with LPD-EM-ADM-0620, *Plume Modeling Casebook Development and Maintenance*, plume modeling casebook forms have been developed for each scenario in ORNL EPHAs that generate a classifiable OE. The casebook forms contain detailed information about each incident as identified in the EPHA, including a brief description, the type of material released, the release location and dynamics (e.g., size of release, stack height, plume velocity) and the airborne source term. Each casebook form includes the EPHA scenario number as well as the EAL reference number to allow the consequence assessment team (CAT) to quickly locate the correct information to run as the worst-case model. This process is cited as a **Best Practice** because it provides detailed information from the EPHA to allow consequence assessment personnel to efficiently compute and assess the estimates of onsite and offsite consequences of actual or potential releases of hazardous material.

However, the CAT did not effectively analyze the loss-of-coolant accident. The CAT dispersion modelers reviewed the EAL and identified the corresponding worst-case source term in the consequence assessment casebook for the purpose of developing the TIA plume projection. The consequence assessment casebook provided separate casebook forms for the stack release (Core 2.1) and the ground-level release (Core 2.2), along with instructions indicating that both components of the release must be modeled and combined. However, the CAT modelers prepared a TIA plume projection using the stack release component of the source term but did not include the ground-level release component, as required by the casebook forms, because UT-Battelle had not established an effective EOS that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. In addition, the potential for a ground-level release from the MVPW collection tanks was not considered during continuous ongoing assessments (COAs). As a result, and contrary to DOE Order 151.1D, attachment 4, paragraph 10.e, UT-Battelle did not conduct a TIA with the worst-case source term from the EAL to determine onsite and offsite consequences and did not perform adequate COA. (See **Deficiency D-UTB-4**.) Consequently, UT-Battelle's consequence assessment activities were not conservative and did not accurately indicate the distance to which PAC was potentially exceeded, which had the potential to adversely impact PA decision-making for the public, workers, and first responders and initial and ongoing field monitoring activities.

Following the TIA, the CAT conducted COA for the duration of the emergency as additional information became available. Initial plume projections were based on the EPHA assumption that 24% of the core volatile fission products were released. Calculations by HFIR personnel estimated that 20-22% of the core volatile fission products had been released. The CAT recalculated the stack release source term based on a 22% release and prepared incident-based plume projections. The CAT demonstrated the ability to use the National Atmospheric Release Advisory Center dispersion model as part of near real-time consequence assessment. Meteorological data from ORNL towers is available to the National Atmospheric Release Advisory Center and is used to facilitate near real-time computations.

Consequence assessment activities throughout the exercise focused on the stack release component of the source term, with no discussion concerning the possible ground-level release from the MVPW collection tank vents. Consequently, the CAT did not effectively support dissemination of a common operating picture among response elements. As discussed in section 3.1, the ground-level release component of the source term produces the most significant dose consequences including a distance to TEL (100 rem) of 380 meters (0.24 miles) and a distance to the iodine PAC (5 rem thyroid) of 2.0 km (1.2 miles) for worst case meteorology. The CAT did not identify the potential dose consequences associated with the ground-level release component, functioning and non-functioning control measures (e.g., valves that could isolate the flow of coolant), or possible mitigative features that could lessen the radiological consequences, such as administering KI to HFIR workers.

Consequence Assessment Conclusions

Overall, the CAT demonstrated the ability to provide a TIA and COA using appropriate dispersion modeling tools. However, the CAT did not accurately compute and correctly assess the potential onsite and offsite consequences of the potential volatile fission product release from the HFIR stack and the MVPW collection tank vents. The CAT calculated potential consequences using one portion of the source term but did not include the entire source term identified in the EPHA. As a result, the CAT did not fully identify potential dose consequences of the HFIR release

3.7 Offsite Response Interfaces

This portion of the assessment evaluated the effectiveness of UT-Battelle and OSO in establishing and maintaining interfaces with local, state, and Federal organizations responsible for emergency response.

Within the first few minutes of the exercise, the IC requested mutual aid and the LSS ensured that simulated offsite resources were dispatched. No interfaces with offsite agencies occurred at the ICP because no mutual aid role-players reported to the ICP. Following the declaration of an emergency, the LSS notified and interfaced with offsite agencies. Once the EOC was operational, most offsite interface activities transitioned to the EOC, in accordance with the emergency management plan. However, because this was a full-scale exercise versus a full-participation exercise, most offsite interfaces were simulated. As a result, UT-Battelle could not fully test and validate offsite interface capabilities.

During the exercise, the TEMA liaison in the ORNL EOC interacted with the EOC CM and consequence assessment manager. Each time a new sector was added to the offsite PAR and each time a new plume was posted to WebEOC, the consequence assessment manager coordinated consequence assessment information with TEMA to explain changes to PARs and consequence assessment plume models. However, as explained in section 3.4, offsite interactions were affected by the EOC coordinator's inability to obtain full situational awareness.

The DOE emergency manager notified and briefed OSO management on two occasions so that the Program Office could be kept apprised of emergency response activities. Also, the emergency manager requested support from the Region 2 Radiological Assistance Program via the Oak Ridge Operations Center. Three situation reports were prepared and transmitted by the DOE liaison to DOE Headquarters. While these reports contained more information than was provided on previous notification forms, they contained most of the same inadequate or inaccurate information that had been transmitted, as explained in section 3.4. Although TEMA FMTs did not participate in the exercise, site monitoring data, which indicated no radiation or contamination levels above background, were relayed to the Environmental Monitoring Coordination Center (EMCC) through an FMT liaison located at the EMCC in Knoxville, Tennessee.

Offsite Response Interfaces Conclusions

Overall, UT-Battelle and OSO interfaces with offsite agencies during the exercise were adequate. Mutual aid was requested, the LSS interacted with offsite agencies effectively as part of the initial notifications process, the EOC regularly briefed offsite agencies on PARs and response actions, FMTs coordinated with the EMCC, situation reports were transmitted to DOE Headquarters, Region 2 Radiological Assistance Program support was requested, and OSO briefed the DOE Office of Science. However, problems with situational awareness affected the accuracy and completeness of some information provided to offsite agencies.

3.8 Emergency Public Information

This portion of the assessment evaluated the effectiveness of UT-Battelle and OSO EPI and JIC staff in providing accurate, candid, and timely information to workers, the media, and the public.

UT-Battelle uses ORNL/LPD-EP/PLAN-007, *Oak Ridge National Laboratory Emergency Public Information Plan*, to guide actions by EOC EPI and JIC personnel. UT-Battelle maintains a well-organized and equipped multi-room JIC that was adequately provisioned and staffed. The JIC is located outside of the five-mile EPZ in Powell, Tennessee, and is located near major transportation routes that facilitates media collaboration with JIC staff.

EPI activities during the exercise resulted in the issuance of routine communications with appropriate media counterparts and other stakeholders. UT-Battelle and OSO followed EOC EPI-related plans, procedures, and position-specific checklists to ensure that the JIC processed and disseminated relevant information to external stakeholders and the media. The EPI staff in the EOC produced multiple products, such as the media advisory for the opening of the JIC and talking point bullets regarding the incident. Additionally, EPI staff in the EOC approved and issued multiple public address announcements. The JIC staff actively conducted rumor control via their phone team and social media platforms. The phone team manager/media monitor also provided media monitor alert forms to the JIC operations manager and JIC contractor public information officer (PIO). All issues were discussed to gain consensus, and only approved messaging was released. JIC exercise participants also initiated and conducted a second news conference after the end of the exercise so that they could practice and utilize Argonne National Laboratory media training.

While EPI-related plans, procedures, and position-specific checklists were followed, there was some uncertainty about JIC processes, technology, and products. For example, JIC personnel were uncertain about the process for media advisories/new releases and whether the JIC Federal and contractor PIOs are required to review and provide feedback prior to approval within the EOC. Checklists indicate that the EOC EPI news writer drafts the advisory, then the JIC Federal and contractor PIOs are required to review it and provide any comments within 15 minutes of receipt. After comments are incorporated as needed, the advisory is then approved in the EOC for release. Because the initial media advisory and subsequent news releases were sent to the JIC via email, JIC personnel were unsure whether these products had already been approved and were being sent as a final product for dissemination, or if the EOC was requesting that JIC staff review and provide feedback per established checklists. Multiple products were received in the JIC from the EOC and each time the JIC staff had to confirm the purpose of the product and whether it was for review or distribution, causing unnecessary delays. (See **OFI-UTB-5**.)

Several position-specific checklists were outdated, and JIC staff members were unsure of how or why to use hand-held radios. There were no written/verbal instructions for the radios and radio usage was very limited. There was also uncertainty among JIC staff regarding who maintains and monitors the JIC WebEOC displays. Furthermore, the social media coordinator did not have access to a position-specific email account, and other JIC personnel had delays logging into their email accounts and WebEOC. (See **OFI-UTB-5**.)

Most significantly, the JIC staff did not acquire adequate situation awareness of the incident and did not provide accurate and timely information to the media. Information flow between the EOC and JIC was intermittent. Because there were no regular updates from the EOC, JIC staff had difficulty obtaining adequate information about the incident. The JIC technical advisor provided limited details to the JIC after consultation with the EOC, but there was an ongoing lack of situational awareness in the JIC that affected the common operating picture. (See **Finding F-UTB-2**.) Consequently, the information released to the media and the public was limited in content and the first news conference was delayed. Additionally, the JIC Federal PIO misinterpreted information from the EOC regarding the injured employee, concluding that "non-emergency" meant the injury was not related to the incident, and provided this incorrect information during the initial news conference.

Appropriately, the JIC Federal PIO initiated interaction with media outlets to make a correction related to evacuation misinformation, and did so through an informal discussion in the briefing room as well as formally through a live interview. The JIC social media coordinator confirmed that the correction was made by related media outlets.

Emergency Public Information Conclusions

Overall, UT-Battelle and OSO followed EOC EPI-related plans, procedures, and position-specific checklists to ensure that the JIC disseminated relevant information to external stakeholders and the media. OSO and UT-Battelle provided a well-organized and functional JIC that was adequately provisioned and staffed. However, there were issues regarding outdated checklists, inconsistent information sharing, and gaps in situational awareness that hampered a common operating picture between the JIC and EOC. The JIC staff was also uncertain about the review and approval process for media advisories and news releases, as well as how to operate some equipment. Most issues, including the provision of incorrect information during the first news conference, were overcome through energetic, positive collaboration among JIC staff members.

3.9 Exercise Design and Conduct

This portion of the assessment evaluated the ability of the UT-Battelle exercise program to validate emergency response capabilities and test and validate emergency plans and procedures for hazards identified in the EPHA.

UT-Battelle adequately maintains documents that control the design, conduct, and evaluation of emergency management exercises, such as ORNL/LPD-EP/PLAN-003, *ORNL Emergency Management Exercise Program Plan*; LPD-EM-ADM-1310, *ORNL Emergency Management Exercise Program Administration*; associated checklists; and exercise evaluation guides. UT-Battelle designed and conducted the exercise to evaluate the multiple functions of key onsite ERO groups. Accordingly, the exercise focused on the use of appropriate plans, policies, and procedures, as well as the actions of ERO members involved in management, direction, and command and control functions. In accordance with procedures, UT-Battelle held player hotwashes at all venues immediately following the exercise and a controller/evaluator debrief the next day.

UT-Battelle's design and conduct of the exercise validated most response elements as well as emergency plans and procedures. UT-Battelle designed a challenging, high-consequence EPHA-based scenario at HFIR with a significant hazardous materials release due to damage to the core, which kept the HFIR emergency response team fully engaged throughout the exercise. To promote realism, actual wind conditions were used, which provided significant challenges for the CAT due to the light and variable wind speeds experienced during the exercise. Additionally, UT-Battelle employed the services of the Argonne National Laboratory's Exercise Training Network to effectively challenge its PIOs and JIC organization during the exercise.

However, some aspects of the exercise design and conduct were unrealistic and, as a result, HFIR capabilities were not tested in conditions that as nearly as possible replicated the incident described in the EPHA. Most notably, despite the exercise package stating that fission products are routed to the MVWP collection tanks, UT-Battelle did not model this source term when calculating simulated radiation dose rates or realistic contamination levels. (See **OFI-UTB-6**.) HFIR operators isolated the tanks following the incident, but the company that operators would have contacted to determine MVWP tank levels did not participate in the exercise. As a result, no estimate of the amount of fission products released to the tanks could be determined. Depending on how much material was simulated to enter the MVWP tanks via gravity feed prior to the isolation of tank valves outside of the HFIR building, dose rates and contamination levels would likely have been very high near HFIR, and dose rates and contamination would also have been detectable downwind by FMTs, as discussed in section 3.1. In addition, because areas surveyed by the FMT were all less than detectable limits, exercise designers did not provide FMT players the opportunity to demonstrate appropriate actions when radiation and contamination above background levels were encountered.

Two additional issues that detracted from the effectiveness of the exercise are described below (See **OFI-UTB-6**):

- Controller/evaluators for the LSS provided the wrong code, as an exercise inject, to the LSS assistant prior to incident classification, resulting in an incorrect PA announcement being initially transmitted. Although an evacuation of the HFIR facility commenced before the mistake could be corrected, both the controller and player organizations recognized the error and took immediate action to stop the evacuation and implement a SIP PA instead.
- Exercise designers did not provide contingency injects to ensure that players understood the injured employee was potentially exposed to significant levels of radiation and needed to be evaluated for acute radiation poisoning. As a result, two objectives for the Radiation Emergency Assistance Center/Training Site could not be demonstrated.

Exercise Design and Conduct Conclusion

UT-Battelle designed an EPHA-based full-scale exercise in accordance with its plans, procedures, and checklists that challenged ERO capabilities and resources. However, UT-Battelle did not model all of the fission products postulated to be released in this scenario and did not include contingency injects necessary to ensure players had an opportunity to demonstrate all of the objectives in the exercise package.

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 and contractor organizations for implementation. The following best practice was identified as part of this assessment:

- UT-Battelle developed plume modeling casebook forms for each scenario in ORNL EPHAs that generate a classifiable OE. The casebook forms contain detailed information about each incident as identified in the EPHA, including a brief description, the type of material released, the release location and dynamics (e.g., size of release, stack height, plume velocity) and the airborne source term for CAT use.

5.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

UT-Battelle, LLC

Finding F-UTB-1: UT-Battelle has not fully identified predetermined onsite PAs and offsite PARs consistent with the hazard and duration of the release based upon the result of the EPHA. (DOE Order 151.1D, att. 4, par. 9.a)

Finding F-UTB-2: UT-Battelle did not demonstrate an effective EOS that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. (DOE Order 151.1D, att. 3, par. 4.b)

6.0 DEFICIENCIES

Deficiencies are inadequacies in the implementation of an applicable requirement or standard. Deficiencies that did not meet the criteria for findings are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

UT-Battelle, LLC

Deficiency D-UTB-1: UT-Battelle did not categorize the OE as promptly as possible, or no later than 15 minutes after identification by the predetermined decision-maker for the categorization, in accordance with the emergency management plan. (DOE Order 151.1D, att. 3, par. 8.b)

Deficiency D-UTB-2: UT-Battelle did not provide accurate and complete initial and follow-on notifications to all appropriate offsite stakeholders. (DOE Order 151.1D, att. 3, par. 11)

Deficiency D-UTB-3: UT-Battelle did not develop or implement predetermined PAs for first responders that serve to minimize emergency-related consequences and maximize life safety and health. (DOE Order 151.1D, att. 3, par. 9)

Deficiency D-UTB-4: UT-Battelle did not conduct a TIA with the worst-case source term from the EAL in order to determine onsite and offsite consequences and did not perform adequate COA. (DOE Order 151.1D, att. 4, par. 10.e)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFIs shown below to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

UT-Battelle, LLC

OFI-UTB-1: Consider revising the EAL process to improve the promptness of categorization of OEs by:

- Assigning the HFIR shift manager to categorize and classify HFIR incidents.
- Clarifying the LSS authority to categorize and classify a HFIR OE directly after confirmation of the EAL indicators with the control room staff that the alarms and EAL entry criteria are valid.
- Revising the EAL indicators for clarity for the LSS as the laboratory emergency director.

OFI-UTB-2: Consider formalizing a process to provide first responders with distances to hazardous material PAC and TEL for EPHA facilities when responding to an incident and also include the PAC and TEL distance information in the facility pre-fire plans.

OFI-UTB-3: Consider revising EAL 7900-02 to require the entire HFIR area to evacuate rather than SIP for this incident based on the distance to iodine PAC and TEL for worst case meteorology, and preplan for the evacuation and relocation of these personnel.

OFI-UTB-4: Consider developing a plan for administering KI as a thyroid blocking agent to ORNL personnel as a supplemental PA for a radioiodine exposure as part of the pre-planned response to a HFIR incident.

OFI-UTB-5: Consider updating and expanding ORNL/LPD-EP/PLAN-007 to include additional details regarding position-specific checklists, EPI and JIC use of technology, processes for product development and approval, and management and execution of news conferences/briefings; and conduct subsequent related training.

OFI-UTB-6: Consider improving exercise design and conduct by:

- Developing a process to provide a second check when developing exercise material to ensure that the technical basis for the scenario is correctly simulated in the exercise.
- Developing a process to provide a second check to ensure that exercises provide an opportunity to demonstrate all evaluated objectives, and to ensure all necessary contingency injects are included.

Appendix A
Supplemental Information

Dates of Assessment

July 30 to Sept 12, 2024

Office of Enterprise Assessments (EA) Management

John E. Dupuy, Director, Office of Enterprise Assessments
William F. West, Deputy Director, Office of Enterprise Assessments
Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments
David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments
Thomas E. Sowinski, Director, Office of Nuclear Safety and Environmental Assessments
Kimberly G. Nelson, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
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