

**Office of Enterprise Assessments Review of the
East Tennessee Technology Park
Emergency Management Program**



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Acronyms

BDBE	Beyond Design Basis Event
CRAD	Criteria, Review, and Approach Document
CROET	Community Reuse Organization of East Tennessee
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
EMG	Emergency Management Guide
EMT	Emergency Management Team
EPHA	Emergency Planning Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERAP	Emergency Readiness Assurance Plan
ERO	Emergency Response Organization
ETTP	East Tennessee Technology Park
HAZMAT	Hazardous Material
OE	Operational Emergency
OFI	Opportunity for Improvement
OREM	Oak Ridge Office of Environmental Management
ORO	Oak Ridge Office
ORR	Oak Ridge Reservation
PAC	Protective Action Criteria
PSS	Park Shift Superintendent
UCOR	URS-CH2M Oak Ridge, LLC

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent review of the emergency management program at the East Tennessee Technology Park (ETTP) during the period of January 27 to March 11, 2015. URS-CH2M Oak Ridge, LLC (UCOR) operates ETTP, with oversight by the DOE Oak Ridge Office of Environmental Management (OREM). OREM is the lead site office over emergency management and the Oak Ridge Office provides support to OREM when requested. This review focused on ETTP's technical planning basis documents, program administration, exercises, and readiness assurance.

DOE terminated uranium enrichment operations in Oak Ridge and closed the site in 1987. The predominant UCOR activities for the area that now constitutes ETTP consist of restoration of the environment, decontamination and decommissioning of site facilities, surveillance and maintenance of other site facilities, and management of legacy wastes. Simultaneously, the Oak Ridge Office is engaged in the process of reindustrialization, in which areas of the site are available for lease or purchase by private businesses. The Oak Ridge Office leases unused and unneeded site assets to the Community Reuse Organization of East Tennessee, which subleases the assets to private industry. A number of private tenants are currently on site, either in DOE-leased facilities or in privately-owned facilities. This arrangement presents unique planning challenges for OREM and URS-CH2M Oak Ridge, LLC.

Overall, the technical planning basis for ETTP, which forms the foundation of the emergency management program, is sound. Onsite protective actions and offsite protective action recommendations are adequate to protect the health and safety of the onsite and offsite populations. Emergency plan implementing procedures provide necessary details for effectively executing the response to an Operational Emergency. The exercise program tests many aspects of the emergency management program, and UCOR includes a shift turnover during its annual exercise to increase the number of participating players. UCOR and DOE conduct required annual self-assessments and complete timely corrective actions for identified issues. The Oak Ridge Office has appropriately integrated the ETTP reindustrialization leased facilities into the site emergency management program.

Despite these strengths, EA identified three primary areas of emergency management weaknesses:

- The unique and dynamic conditions resulting from reindustrialization have not been reevaluated. The site emergency plan has not been updated since 2011 to reflect UCOR as the responsible site contractor or the current status of site facilities.
- UCOR has not broadened the scope of exercises to include more scenarios, facilities, and hazards. UCOR does not rotate the basis for the annual site exercise between all of the facilities with emergency planning hazards assessments. Therefore, emergency response organization personnel do not practice responding to emergencies at all facilities that could have hazardous material releases with significant consequences.
- OREM assessors have not consistently used the evaluation criteria issued by the Director, Office of Emergency Operations. Contractor and DOE assessments do not always contain objective evidence to determine if personnel were adequately performing actions required by procedures. EA noted several cases where corrective actions for issues identified in the assessments did not resolve the issue or would not prevent recurrence of the issue. Further, OREM assessors use incomplete evaluation criteria that can lead to incomplete assessments of line management responsibilities.

With some exceptions, the emergency management elements assessed comply with DOE Order 151.1C. The emergency management program has an adequate technical planning foundation implemented

through adequate emergency plan implementing procedures and the exercise program. Increased emphasis on the site emergency plan, emergency readiness assurance plan, exercise program, issues management system, and UCOR and OREM assessments will further improve the program.

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Emergency Management Program**

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted a review of the emergency management program at the East Tennessee Technology Park (ETTP). EA conducted this review in accordance with DOE directives, including DOE Order 227.1, *Independent Oversight Program*, which establishes the foundation for the Independent Oversight Inspection Program. The purpose of this EA review was to evaluate the ETTP technical planning basis and implementation of the emergency management program elements for program administration, exercises, and readiness assurance.

This review occurred over the period of January 27 to March 11, 2015. This report discusses the background, scope, methodology, results, and conclusions of the review. A summary of the findings and opportunities for improvement (OFIs) identified by the review team is also included.

2.0 SCOPE

This EA review provided an assessment of the effectiveness and implementation of the emergency management program established by DOE's cleanup contractor for the DOE Oak Ridge Reservation (ORR), URS-CH2M Oak Ridge, LLC (UCOR), as well as oversight conducted by the DOE Oak Ridge Office of Environmental Management (OREM). The *Plan for the Office of Enterprise Assessments Review of Emergency Management at the East Tennessee Technology Park*, dated December 29, 2014, describes the specific focus of this review.

The primary areas of interest are the identification of needed site response capabilities and their state of readiness. The ETTP facilities of interest include:

- K-27 Building
- K-1065 Waste Management Complex.

The scope of this review includes portions of the following emergency management program elements:

- Technical planning basis
- Program administration
- Exercises
- Readiness assurance.

EA conducted this review to determine whether the ETTP site has established the appropriate emergency management program based on the technical considerations and methodologies required by DOE Order 151.1C, *Comprehensive Emergency Management System*. This review evaluated the effectiveness of both the contractor and OREM programs in managing and maintaining the emergency management program. The scope of this review is consistent with EA Criteria, Review, and Approach Document (CRAD) 33-01, *2015 Emergency Management Program Review*.

3.0 BACKGROUND

The uranium enrichment plant and associated process facilities were constructed during World War II for the enrichment of uranium through the gaseous diffusion process. DOE terminated uranium enrichment operations in Oak Ridge and closed the site in 1987. The predominant UCOR site activities for the area that now constitutes the ETTP consist of restoration of the environment, decontamination and decommissioning of site facilities, surveillance and maintenance of other site facilities, and management of legacy wastes. Simultaneously, the DOE Oak Ridge Office (ORO) is engaged in the process of reindustrialization, in which areas of the site are available for lease or purchase by private businesses. ORO leases unused and unneeded site assets to the Community Reuse Organization of East Tennessee (CROET). CROET then subleases the property to private industry. Subsequently, private tenants are currently on site, either in DOE-leased facilities or in privately-owned facilities. Because OREM is lead site office over emergency management and ORO only provides support to OREM when requested, this arrangement presents unique planning challenges for OREM and UCOR because of the potential hazards introduced by the tenants. Although enrichment of uranium was ceased, significant quantities of radioactive material and chemicals (i.e., uranium, uranium hexafluoride, and sodium) remain that require ETTP to have an Operational Emergency (OE) hazardous material (HAZMAT) program per DOE Order 151.1C. UCOR manages the site-level ETTP emergency management program, and OREM provides Federal oversight.

The EA program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management performance in safety and security and other critical functions as directed by the Secretary. DOE Order 227.1 and a comprehensive set of internal protocols, operating practices, inspector's guides, and process guides describe and govern the EA program.

4.0 METHODOLOGY

EA evaluated whether the ETTP site has established the appropriate emergency management program based on technical considerations and methodologies required by DOE Order 151.1C. The order identifies the functional emergency response requirements for a DOE site/facility, and the emergency management guides (EMGs) associated with DOE Order 151.1C provide guidance for implementing these requirements. EA used the order and EMGs as the basis for determining whether DOE and UCOR met the requirements and expectations. EA also referenced applicable DOE, Federal, state, and local requirements when determining compliance with the order.

EA reviewed the documentation that establishes and governs ETTP emergency management program processes, including emergency plans, procedures, program implementing checklists, records of program activities, and memoranda of agreement; interviewed key personnel; and performed walkdowns of facilities.

5.0 RESULTS

The objective of this review was to verify that ETTP has an adequate emergency management program in place that contains the major elements specified in DOE Order 151.1C. The focus of this review was implementation of the program elements to ensure identification and analysis of facility-specific hazards, and integration of the results into the hazards surveys, emergency planning hazards assessments (EPHAs), the emergency plan and associated procedures, exercise program, and readiness assurance to ensure

effective emergency responses. EA identified 3 findings and 10 OFIs, based on the following review criteria from EA CRAD 33-01.

5.1 Technical Planning Basis

Review Criteria:

The ETTP analyzes plausible scenarios to determine capabilities needed for an effective emergency response and has a means for determining quickly whether an event results in the loss of a significant quantity of HAZMAT. (DOE Order 151.1C and paraphrased from CRAD 33-01.)

DOE Order 151.1C requires development of a hazards survey to examine the features and characteristics of the facilities and activities and to identify generic emergency events and conditions, including beyond design basis events (BDBEs), such as earthquakes and tornadoes, and the potential impacts of such emergencies. If the hazards survey identifies HAZMAT that could create an airborne health hazard (and ultimately an OE), the order requires the potential release of this material to be further analyzed in an EPHA. DOE Guide 151.1-2, *Technical Planning Basis EMG*, recommends that analyses in the EPHA calculate the consequences at specific receptors of interest (i.e., facility boundary, onsite receptor locations, site boundary, and offsite locations of interest) and calculate the maximum distances at which consequences exceed the applicable protective action criteria (PAC) used to develop default initial protective actions.

Overall, UCOR appropriately analyzed a wide-spectrum of plausible scenarios in the EPHAs and factored the results into the determination of assistance capabilities needed for an effective emergency response. Additionally, UCOR can quickly establish whether an event results in the loss of a significant quantity of HAZMAT. Further, UCOR can quickly establish whether a BDBE results in the loss of a significant quantity of HAZMAT that is beyond the site's capability to respond using the BDBE emergency action levels (EALs).

UCOR has appropriately implemented a procedure for developing hazards surveys, EPHAs, EALs, and protective actions that incorporates the provisions of DOE Order 151.1C and the EMG. The procedure provides an adequate technical basis for preparing hazards surveys, EPHAs, and EALs. The procedure dictates that hazards external to the facility/site (e.g., HAZMAT in nearby facilities, transportation accidents, and accidents involving multiple utilities) be identified as generic emergency conditions for each facility and that an appropriate range of accident scenarios, including offsite events, and barrier analyses be incorporated into the EPHAs. The procedure requires the event scenario development, initiating events, and failure mechanisms in the EPHAs to include traditionally defined accidents as well as events arising from external causes. The procedure also requires EALs to include each analyzed scenario that results in a classifiable emergency.

The K-27 Building and K-1065 Waste Management Complex hazards surveys appropriately reflect the provisions of the procedure and the HAZMAT inventory databases and respective facility administrative limits reflect actual facility conditions. The hazards surveys provide information stipulated by DOE Order 151.1C such as the screening process, potential impacts, applicable regulatory requirements, and the need for a quantitative assessment. The screening process uses HAZMAT inventory databases as well as maximum anticipated inventory limits identified in the facility-specific documented safety analysis. In addition, the hazards surveys identify the threats from emergency conditions such as fires, work place accidents, and natural phenomena.

The K-27 and K-1065 EPHAs identify the hazards and consequences from unplanned releases of HAZMAT using accepted assessment techniques. The EPHAs are well organized, consistently formatted,

and contain information and methodologies prescribed by the EMG. Further, the EPHAs contain a wide spectrum of release scenarios. For example, UCOR used the facility maximum anticipated inventory limits to develop the worst-case release of the entire facility inventories and analyzed additional release scenarios for various areas/equipment within the buildings. Consequence assessment analyses in the EPHAs determine the consequences (e.g., radiation dose or peak concentration of a toxic chemical) of each release at each receptor of interest. UCOR used the calculated distances to PAC and thresholds for early lethality for developing the EALs and the facility emergency planning zone (EPZ). Further, the EPHAs identify emergency response capabilities needed to mitigate analyzed events and describe the size of the EPZ.

In addition to developing facility-specific EPHAs, UCOR has developed a stand-alone EPHA and corresponding EALs to address BDBEs. UCOR developed the EPHA to meet the guidelines for planning and preparedness activities identified by DOE's Operating Experience Level 1 (OE-1: 2013-01), *Improving Department of Energy Capabilities for Mitigating Beyond Design Basis Events*. The EPHA identifies facility capabilities and limitations on mitigating the analyzed events, identifies locations for life-saving materials (i.e., water, food, and medical supplies), and includes a map depicting the PAC distances for each facility. UCOR developed the map with help from the park shift superintendents (PSSs) to ensure that PSS personnel could use it. Additionally, the EPHA developers worked with each facility manager to determine facility capabilities and limitations.

EA also reviewed the K-27, K-1065, and BDBE EALs. UCOR developed EALs for the wide-spectrum of potential OEs analyzed in the EPHAs. The EALs provide excellent descriptions of protective actions to implement during an emergency event. For example, the EALs indicate that the protective action decision maker (i.e., PSS, emergency manager, incident commander) should perform the following:

- Assess meteorological conditions and determine safe evacuation routes.
- Evaluate the appropriate use of assembly stations.
- Evaluate the need to shelter or evacuate onsite personnel who are downwind.
- Evacuate within a radial distance of the PAC (EALs include the distance) from the event scene/area.

UCOR has also implemented an accurate and timely method for tracking changes in operations, processes, or accident analyses that involve HAZMAT. This method allows sufficient time for emergency management personnel to review the EPHA and modify plans and procedures, as necessary. Facility managers contact the emergency management department prior to increases in facility HAZMAT inventories. The EPHA developers are part of the unreviewed safety question determination process. As such, they are notified of any significant HAZMAT quantity changes (e.g., greater than anticipated holdup of materials in facility piping and equipment) and changes to facilities that may increase hazards (e.g., changed processes or HAZMAT configuration that could increase the potential or mechanism for the release of HAZMAT).

5.2 Program Administration

Review Criteria:

The ETTP establishes and maintains the authorities and resources necessary to plan, develop, implement, and maintain a viable, integrated, and coordinated comprehensive emergency management program. (DOE Order 151.1C and paraphrased from CRAD 33-01.)

DOE Order 151.1C requires emergency planning to include development and maintenance of emergency plans and procedures, including the identification of personnel and resources needed for an effective response. The order also requires emergency plans and procedures to be prepared, reviewed annually, and updated as necessary. The site emergency plan defines and conveys the management philosophy, organizational structure, administrative controls, decision-making authorities, and resources necessary to maintain the site's comprehensive emergency management program. The site-specific implementing procedures should conform to the plan and provide the necessary detail, including decision-making thresholds, for effectively executing the response to an emergency, irrespective of its magnitude. These plans and procedures must be closely coordinated and integrated with offsite authorities that support the response effort and receive DOE emergency response recommendations. Further, the order requires that sites submit an emergency readiness assurance plan (ERAP) by the end of each fiscal year. The ERAP is a planning tool to identify and develop needed resources and improvements and to highlight changes and achievements in the site emergency management program. DOE Guide 151.1-3, *Programmatic Elements EMG*, provides guidance on the recommended content for an emergency plan that provides a comprehensive description of the emergency management program elements and fully describes the concept for responding to an OE.

Overall, the UCOR emergency plan implementing procedures (EPIPs) provide sufficient detail for effectively executing the response to an OE. DOE ORO has appropriately integrated the ETTP reindustrialization leased facilities into the site emergency management program. The ETTP emergency plan documents the emergency management program and describes the provisions for response to an OE. However, UCOR has not updated the site emergency plan since being awarded the ETTP contract in August 2011 to appropriately reflect UCOR operations. Further, the 2014-2015 ERAP does not provide information consistent with the content of the EPHAs.

UCOR has designated a trained and technically capable individual to administer the facility/site or activity emergency management program. This designated individual has the responsibility and authority to verify the development and maintenance of the emergency plan, EPIPs, hazards surveys, EPHAs, and site EPZ. This designated individual also verifies the development of the annual ERAP, development and conduct of the training and exercise programs, and the coordination of assessment activities and emergency resources. Further, formal review and approval processes ensure that the emergency plan, hazards surveys, EPHAs, and EPIPs receive sufficient oversight by staff, management, and DOE to ensure consistency, correctness, and completeness.

Because of the ETTP reindustrialization project, UCOR has established building emergency plans that consider the site's unique hazards and facility configurations. Building emergency plans are formally and consistently developed using an institutional process guide and are readily available at key locations to describe important considerations for workers such as shelter-in-place protective actions, evacuation routes and assembly stations, and building-specific personnel accountability protocols.

UCOR has prepared EPIPs that are reviewed annually, updated as necessary, and integrated within the overall site emergency management program. The EPIPs adequately describe the implementation of the emergency response plans. These procedures address all of the response functions, including the

important functions of categorizing and classifying emergency events; formulating protective actions and protective action recommendations; notifying onsite personnel and offsite agencies; providing command, control, and communication; and specifying required record-keeping. The EPIPs assign procedure action steps to members of the emergency response organization (ERO) to establish clear roles and responsibilities. Furthermore, UCOR has developed ERO position checklists to enable trained ERO members to quickly execute assigned tasks.

ORO has appropriately integrated the ETTP reindustrialization leased facilities into the site emergency management program. ORO has assigned a safety advocate for all ETTP leased facilities who is informed of all HAZMAT in the facilities. The safety advocate ensures that the city fire department personnel tour each facility and are familiar with the location of HAZMAT. Additionally, the safety advocate verifies that leased facilities meet the Occupational Safety and Health Administration requirements in 29 CFR 1910 Subpart E, *Exit Routes and Emergency Planning*. Per the signed lease-facility requirements document, the lessees are required to give integration descriptions for each of the lessee's emergency management program elements into the sitewide program. All leased facility personnel are subject to the same sitewide protective actions as onsite personnel. Additionally, the lessees are required to report HAZMAT inventories annually to the site emergency management organization and report any significant changes to the facility or HAZMAT inventories before the changes occur. Further, lessees must attend an annual safety council meeting conducted by the DOE reindustrialization manager involving the DOE ORR entities, UCOR emergency management, and CROET personnel.

Although the ETTP emergency plan currently meets most requirements of DOE Order 151.1C, UCOR has not conducted annual updates to the site emergency plan since taking over operation of the ETTP in August 2011. (See **Finding F-ETTP-1** and Section 8.0, **OFI-ETTP-1**.) UCOR is revising the emergency plan and indicated that the revision should be finalized and approved by September 30, 2015. However, the current ETTP emergency plan does not appropriately reflect UCOR operations. For example, the emergency plan does not:

- Reflect UCOR as the responsible site contractor.
- Reflect the UCOR emergency notification protocols.
- Indicate the current status of site facilities (e.g., the plan incorrectly indicates the K-25 building as a high-hazard facility).
- Indicate UCOR ERO position responsibilities.
- Include severe event considerations.
- Address correlation with the DOE integrated safety management system.

Finding F-ETTP-1: Contrary to DOE Order 151.1C, UCOR has not conducted an annual update/revision to the emergency plan.

UCOR updates the ETTP ERAP annually; however, the 2014-2015 ERAP is not consistent with information contained in the EPHAs. For example, the ERAP indicates that the dominant OE at the K-27 Building would result in a General Emergency classification; however, the K-27 Building EPHA indicates that the dominant OE would only result in a Site Area Emergency. (See Section 8.0, **OFI-ETTP-2**.)

5.3 Exercises

Review Criteria:

The ETTP validates all elements of an emergency management Program using an effective, structured approach and realistic scenarios. (DOE Order 151.1C and paraphrased from CRAD 33-01.)

DOE Order 151.1C requires that the contractor validate all elements of their emergency management program over a 5-year period and invite offsite response organizations to participate in a site-wide exercise at least once every 3 years. The order further requires that the contractor exercise its emergency response capability annually and rotate the basis for the exercises among its facilities with EPHAs. In addition, site-level ERO elements must participate in at least one exercise annually. The order also requires that the contractor fully document each exercise and include specific objectives, scenario, scope, list of participants, timelines, injects, controller instructions, and evaluation criteria. The contractor must complete an exercise after-action report within 30 working days.

Overall, the UCOR exercise program appropriately tests many aspects of its emergency management program. The UCOR procedures contain the relevant exercise requirements, and UCOR successfully conducts one exercise per year. Notably, UCOR includes a shift turnover during its exercises to increase the number of participating players. In addition, UCOR produces timely after-action reports and resolves issues identified in the reports. However, EA noted a few weaknesses in exercise planning and conduct. The *ETTP Five Year Exercise Validation Plan* does not show when UCOR will test several key aspects of their emergency management program. Further, UCOR did not include all of the HAZMAT or initiating events that can lead to classifiable emergencies in their exercises over the past few years. More significantly, UCOR does not rotate the basis for the site exercise between the facilities with EPHAs as required, which limits the ERO's ability to correctly respond to all of the possible hazards and the facilities that can have HAZMAT releases with significant consequences.

UCOR appropriately includes the emergency management program elements and a variety of scenarios in the *ETTP Five Year Exercise Validation Plan*, but the plan does not include when UCOR will test other key aspects of their emergency management program. The UCOR procedures contain the relevant exercise requirements from DOE Order 151.1C, and UCOR successfully conducts one exercise per year. UCOR uses the *ETTP Five Year Exercise Validation Plan* to show how the exercises will incorporate the emergency management program elements. However, the plan does not include any of the EPHA facilities and site-level ERO elements, when the offsite organizations will be invited to participate, or how the basis of the site exercise will be rotated among the EPHA facilities. In addition, the plan does not show when significant HAZMAT (i.e., uranium, uranium hexafluoride, and sodium) or initiating events (i.e., transportation accidents, natural phenomena events, mass casualty events, and criticality accidents) will be included to ensure exercises cover all hazards and situations. UCOR recognized that the exercise program was not testing all required aspects of their program and recently started an evaluated operational drill program intended to supplement the exercise program. However, during this review, UCOR could not show how they will integrate the exercise and drill programs to ensure UCOR tests all required aspects of the emergency management program at the appropriate frequency. (See Section 8.0, **OFI-ETTP-3.**)

UCOR adequately documents most aspects of each exercise and clearly designs the exercises to test the site's integrated emergency response capability. The UCOR exercise packages contain all required information, such as specific objectives, scenario, injects, and controller instructions. Further, the UCOR exercise packages contain adequate provisions for stopping an exercise because of safety or a real world occurrence, but do not describe the expected actions for exercise players (such as stopping all exercise-related work and not interacting with other players). (See Section 8.0, **OFI-ETTP-4.**)

UCOR adequately evaluates most aspects of its exercises and issues timely exercise after-action reports. The UCOR plans and procedures contain appropriate requirements for evaluating player performance and gathering feedback from the exercise participants. Additionally, the exercise scenarios are consistent with the exercise objectives. The evaluation criteria are observable, measurable, and support evaluation of the exercise objectives. Further, UCOR completes exercise after-action reports within 30 working days and enters issues regarding contractor performance into the UCOR corrective action tracking system. UCOR also forwards issues regarding DOE performance to OREM for resolution. Although minimally described in exercise program documents, the controller at each venue conducts a critique with the players at the end of an exercise. UCOR evaluates all site players (Federal and contractor), but not specifically the adequacy of documents produced during the exercise (such as situation reports sent to DOE Headquarters). (See Section 8.0, **OFI-ETTP-5**.)

UCOR successfully exercises the site's emergency response capability annually, but does not test all aspects of their emergency management program. The UCOR exercise after-action reports demonstrate that the ten response elements and most site-level ERO organizations have been appropriately included in exercises over the past few years. UCOR also includes an ERO shift turnover during their exercises to increase the number of players able to participate in the annual exercise. In addition, UCOR invites offsite organizations to participate in a site exercise every three years. However, EA noted several weaknesses in the UCOR exercises. UCOR recently reduced the role of UCOR health services to provide emergency medical support, but did not modify ORR 150B.0 Volume 3, *DOE ORR Emergency Plan ETTP*, to correctly state that UCOR health services no longer provide site-level ERO services. Further, as previously mentioned, UCOR did not include all of the HAZMAT or initiating events that can lead to classifiable emergencies in their exercises over the past few years. More significantly, UCOR does not rotate the basis for the site exercise between the facilities with EPHAs as required. UCOR operates four facilities that require EPHAs, but did not use two of these facilities (K-27 and K-1313) as the basis for the site exercise for the past few years. Consequently, UCOR does not ensure the ERO is familiar with all of the possible hazards and the facilities that can have HAZMAT releases with significant consequences. (See **Finding F-ETTP-2** and Section 8.0, **OFI-ETTP-3**.)

Finding F-ETTP-2: Contrary to DOE Order 151.1C, UCOR does not rotate the basis for the site exercise between all of the facilities with EPHAs.

5.4 Readiness Assurance

Review Criteria:

The ETTP assures that emergency plans, implementing procedures, and resources are adequate through evaluations and exercises and that appropriate and timely improvements are made in response to needs identified by the evaluations and exercises. (DOE Order 151.1C and paraphrased from CRAD 33-01.)

DOE Order 151.1C requires that the contractor and cognizant field element conduct annual self-assessments of their emergency management programs and that the cognizant field element conducts an evaluation of the contractor emergency management program every three years, using the specific standards and criteria issued by the Director, Office of Emergency Operations. In addition, the contractor and cognizant field element must develop corrective action plans within 30 working days of receipt of a final evaluation report or exercise after-action report. The order further requires that contractors and cognizant field elements complete corrective actions as soon as possible and before the next annual self-assessment for corrective actions involving revision of procedures or training of personnel. Lastly, the contractor and cognizant field element must use a verification and validation process, independent of those who performed the corrective action, which verifies that the corrective action has been implemented and validates that the corrective action has been effective in resolving the original issue.

Overall, UCOR conducts annual self-assessments of the emergency management program and provides detailed descriptions of how order requirements are captured in procedures and plans. UCOR ensures the timely completion of most corrective actions and provides generally adequate closure evidence. However, UCOR assessors did not consistently provide objective evidence that personnel were performing required actions. In addition, EA noted several cases where corrective actions did not resolve the issue or would not prevent recurrence of the issue.

For Federal line management responsibilities, the ORO Emergency Management Team (EMT) supports OREM by performing annual self-assessments and shadowing the UCOR assessments. EMT noted several findings in their self-assessments and identified a few findings that were not included in the UCOR assessment reports. However, EMT did not document the adequacy of these UCOR assessments, why the findings identified by EMT were not included in the UCOR reports, or the effectiveness of corrective actions for previously identified findings. EMT completes most corrective actions within one year and provides adequate closure evidence. OREM also recently issued an issues management procedure that establishes a structured process for resolving future findings. However, EA noted several readiness assurance weaknesses. EMT does not document the objective evidence used during assessments to determine that evaluation criteria are met in their assessments of OREM and UCOR. Furthermore, the EMT issues management process (captured only in draft procedures) does not cover several key aspects of an effective program. EA noted several cases where corrective actions did not resolve the issue or would not prevent recurrence of the issue. Most significantly, EMT does not use the evaluation criteria required by DOE Order 151.1C, leading to incomplete assessments of whether line management is meeting their responsibilities.

5.4.1 Contractor Assessments

UCOR appropriately requires annual self-assessments of the emergency management program, but gives limited guidance on how to perform and document assessments. The UCOR emergency plan and procedures require an annual assessment of the 15 emergency management program elements using the criteria in Appendix D of DOE Guide 151.1-3, with all criteria covered over a 3-year period. However, the UCOR procedures provide limited guidance on how to conduct a thorough emergency management assessment, and most significantly, do not specifically require assessors to review or document the objective evidence that personnel are performing the actions necessary to meet the evaluation criteria. A training course on assessment techniques is available, but not required for UCOR personnel performing emergency management assessments. (See Section 8.0, **OFI-ETTP-6**.)

UCOR conducts detailed self-assessments of the emergency management program, but EA noted some weaknesses. UCOR completed assessments of all emergency program elements in 2013, but three of these assessments reviewed only the UCOR activities at Oak Ridge National Laboratory and the Y-12 National Security Complex and did not include an assessment of these same activities at ETTP. UCOR then changed their assessment process to include assessments of all elements at ETTP annually, and UCOR completed self-assessments for all 15 elements in 2014. The UCOR assessors provide a detailed discussion in their assessments on how the UCOR plans and procedures require actions that will satisfy the evaluation criteria; however, EA noted several instances where assessors did not document whether personnel were performing the required actions. For example, the assessors did not document that they confirmed that required records were being kept, confirmed that drill and exercise participation was documented, or confirmed that shelter-in-place drills were provided. Furthermore, the assessors often did not reference exercise after-action reports in their self-assessment reports to support conclusions on adequate ERO performance. (See Section 8.0, **OFI-ETTP-6**.)

5.4.2 Contractor Issues Management and Corrective Actions

The UCOR issues management process facilitates the timely development of corrective actions, but EA noted a few weaknesses in UCOR's implementation of corrective actions related to emergency management. UCOR recently revised PROC-PQ-1210, *Issues Management Program*, and included a more structured process for categorizing and prioritizing issues into four levels (i.e., significant issue, adverse condition, broke/fix, and OFI). The procedure requires all priority levels be entered into the corrective action tracking system and stresses preventing recurrence during corrective action development. The procedure also requires objective evidence to document the completion of a corrective action, independent verification that corrective actions have been completed, and root cause analysis, but only for the highest two priority levels. Further, the procedure only requires effectiveness reviews for the highest priority level. UCOR's emergency management assessments and exercises over the past two years identified only one adverse condition related to overdue EPHA reviews. However, contrary to their procedure, UCOR did not document the apparent cause for the overdue EPHA reviews, and the corrective actions undertaken would not prevent recurrence of the adverse condition because the actions did not address why UCOR was not completing the required reviews.

For other, lesser priority issues, EA noted several examples where the corrective actions would not prevent recurrence or ensure resolution of the issue. For example:

- Providing required reading for specific ERO positions to address performance issues without ensuring new personnel in those ERO positions would receive the same information.
- Holding a meeting to address an exercise control issue, but not changing the controller pre-exercise instructions and training to address the issue.
- Identifying that the emergency plan required updating, but closing the issue after drafting the proposed changes and without ensuring the revised emergency plan was issued (the revised plan remains unapproved).
- Identifying that the joint information center was understaffed, but closing the issue after submitting the candidates' names, without ensuring that the candidates completed the required training.

Furthermore, UCOR did not enter the findings from the EMT assessments of the UCOR emergency management program into their issues management system, although UCOR subsequently resolved the issues associated with these findings. Although a training course on corrective action development is available on site, UCOR does not require personnel developing corrective actions for emergency management issues to complete the course. (See Section 8.0, **OFI-ETTP-7**.)

UCOR procedures provide a structured process for monitoring the status of corrective actions and ensure the timely completion of most corrective actions. UCOR closely monitors ongoing corrective actions through emails sent to issue owners when corrective actions are coming due and through weekly reports sent to senior managers showing near-term and overdue corrective actions. Further, UCOR closes most emergency management corrective actions on time. The UCOR emergency plan requires the prompt resolution of all issues; however, the *Issues Management Program* procedure does not stress completing emergency management corrective actions as soon as possible. EA noted one open corrective action involving a procedure revision with a due date of over 17 months from when UCOR identified the issue. (See Section 8.0, **OFI-ETTP-7**.)

Overall, UCOR independently verifies the completion of most corrective actions and provides generally adequate closure evidence, although EA noted a few cases where the closure evidence did not indicate that UCOR appropriately completed the action. UCOR independently verified the completion of all corrective actions for emergency management issues except for a few issues categorized at the lowest priority level. EA only noted 1 case (out of 14 closed corrective actions reviewed) where UCOR validated that corrective actions were effective in resolving an emergency management issue. (See Section 8.0, **OFI-ETTP-7**.)

5.4.3 DOE Assessments

OREM appropriately requires assessments of the OREM and UCOR emergency management programs, but the assessors use incomplete evaluation criteria and the procedures give limited guidance on how to perform and document the assessments. OREM procedure OREM-EP-IP-01, *Emergency Management Program Roles and Responsibilities*, requires an annual assessment of line management's responsibilities, but does not specify the evaluation criteria to be used. ORO EMT supports OREM in performing most of its line management responsibilities, including performing annual self-assessments of the line management responsibilities and shadowing most of the UCOR annual assessments. OREM and EMT procedures provide limited guidance on how to conduct a thorough assessment and do not require assessors to review or document the objective evidence that personnel are performing the actions necessary to meet the evaluation criteria. Further, EMT does not require assessors to complete training on assessment techniques. Most significantly, rather than use the evaluation criteria issued by the Director, Office of Emergency Operations (contained in DOE Guide 151.1-3, Appendix D), as required by DOE Order 151.1C, EMT uses ORO instruction EMT/ADM/I, *ORR Emergency Management Program Roles and Responsibilities*, as the evaluation criteria for the line management self-assessments. The instruction does not include several of the DOE cognizant field element responsibilities from the order, such as ensuring effective communication systems and protocols are coordinated and maintained with the Headquarters Operations Center and pre-designating DOE employees to serve as the On Scene Coordinator, the Senior Federal Official, and the Senior Energy Official. As a result, EMT performs an incomplete assessment of whether line management is meeting their responsibilities. (See **Finding F-ETTP-3** and Section 8.0, **OFI-EMT-1**.)

Finding F-ETTP-3: Contrary to DOE Order 151.1C, EMT does not use the evaluation criteria issued by the Director, Office of Emergency Operations for line management self-assessments.

EMT performs the required OREM self-assessments and shadows the UCOR self-assessments, but provides no information to support the conclusions made in the assessment reports and does not discuss the adequacy of the UCOR self-assessments or the effectiveness of corrective actions. EMT completed assessments of the OREM and EMT emergency management programs in 2013 and 2014 and noted several findings. EMT also shadowed most of the UCOR self-assessments in 2013 and 2014 and identified a few findings that were not included in the UCOR assessment reports. The EMT self-assessment reports appropriately document the specific objective evidence used to determine whether the evaluation criteria were met. However, the EMT assessments of the OREM and UCOR programs provide no such information and only note whether findings were identified. Further, the EMT assessment reports do not discuss the adequacy of the UCOR self-assessments, which is particularly relevant because EMT identified findings not found by UCOR while the EMT shadowed the UCOR assessments. The EMT assessment reports rarely discuss whether corrective actions were effective in resolving findings noted in previous EMT assessment reports. EMT recognized this weakness in their assessments and plans to add a line of inquiry to review previous findings during future assessments. (See Section 8.0, **OFI-EMT-1**.)

5.4.4 DOE Issues Management

OREM recently published OREM-QA-IP-04, *Issue Reporting and Resolution*, which provides a more robust issues management process. OREM's new procedure provides guidance on most key aspects needed for an adequate issues management program, but does not discuss the processes for managing changes to corrective actions, tracking corrective actions, and following up on overdue corrective actions. (See Section 8.0, **OFI-OREM-1**.) Before OREM issued the new procedure, EMT identified two observations during assessments of the OREM line management responsibilities. The OREM emergency management coordinator informally discussed the two observations with senior management, but did not document the corrective actions taken to resolve the observations in the OREM issues management system. Future observations and findings identified by EMT in their assessments of the OREM program would be subject to the new procedure's requirements for documenting and tracking corrective actions.

EMT identified several findings during their shadow assessments of UCOR, but did not follow up on the resolution of these findings. As previously mentioned, the EMT shadow assessments of the UCOR emergency management program identified a few findings that UCOR did not include in their assessments conducted at the same time. OREM and EMT staff expected that these findings would be tracked in the UCOR corrective action tracking system, but EMT did not follow up on what actions UCOR took for resolving these findings. (See Section 8.0, **OFI-EMT-1**.)

EMT uses a separate and informal issues management process for their issues that provides minimal guidance, and EA noted several weaknesses in EMT's implementation for issues affecting ETTP. EMT identified several findings during their self-assessments of line management responsibilities, but used their own issues management process, partially documented in draft procedures, to resolve these findings. EMT completes most corrective actions within one year and EMT provides adequate objective evidence that demonstrates the completion of corrective actions; however, the informal issues management process does not include several key aspects, such as performing root cause analysis and preventing recurrence during development of corrective actions. EA identified several cases where the corrective actions did not ensure resolution of the issue. For example, EMT identified that the seven OREM ERO members were delinquent on their required training, but closed the issue without ensuring these members completed training. EA also noted other cases where the corrective actions implemented would not prevent recurrence. For example, EMT is updating various out-of-date documents (such as an emergency plan, procedure, and external agreements) without determining why the documents were allowed to become outdated. In another case, EMT added more personnel to a joint information center position without addressing why the position had been allowed to become understaffed. (See Section 8.0, **OFI-EMT-2**.)

6.0 CONCLUSIONS

EA noted several positive practices during its review of the ETTP emergency management technical planning basis, program administration, exercises, and readiness assurance program elements. UCOR has developed an appropriate technical planning basis that provides a sound foundation for the emergency management program. The UCOR hazards surveys and EPHAs identify the HAZMAT requiring further analysis, specify the planning and preparedness requirements that apply to each identified hazard, and appropriately screen HAZMAT that could be eliminated from further analysis. Additionally, EALs used to provide onsite protective actions and offsite protective action recommendations have been fully developed and properly implemented. As a best practice, UCOR has developed a stand-alone BDBE EPHA to meet the guidelines for planning and preparedness activities identified by DOE's Operating Experience Level 1. UCOR has developed adequate EIPs that describe the emergency management program and provide the necessary detail for effectively executing the response to an OE. ORO has

appropriately integrated the ETTP reindustrialization leased facilities into the site emergency management program. The UCOR exercise program appropriately tests many aspects of its emergency management program, and UCOR includes a shift turnover during their annual exercise to increase the number of participating players. Additionally, UCOR produces timely exercise after-action reports and resolves issues identified in the reports. UCOR and ORO EMT conduct annual self-assessments of the emergency management programs and ensure the timely completion of corrective actions for most issues. Further, ORO EMT shadowed the UCOR assessments and identified a few findings not included in the UCOR assessment reports.

However, EA noted a few weaknesses in the development of the ETTP emergency plan, exercise program, and readiness assurance. UCOR has not conducted the required annual revision/update to the ETTP emergency plan since taking over the contract in August 2011. The current emergency plan does not reflect UCOR as the responsible site contractor or the status of site facilities. Further, DOE is engaged in the process of reindustrialization, and the emergency plan does not reflect the unique and dynamic conditions resulting from reindustrialization that needs to be frequently reevaluated. The information contained in the current ERAP is inconsistent with information contained in the EPHAs, resulting in inaccurate identification of the dominant OE for some facilities. The *ETTP Five Year Exercise Validation Plan* does not show when UCOR will test several key aspects of their emergency management program, and UCOR does not rotate the basis for the site exercise between the EPHA facilities as required. UCOR and site office assessments sometimes did not contain objective evidence that personnel were performing required actions. EA noted several cases where corrective actions for issues identified in the assessments did not resolve the issue or would not prevent recurrence of the issue. Additionally, EMT does not discuss the adequacy of the UCOR assessments or the effectiveness of corrective actions for previously identified findings in their assessment reports. Most significantly, EMT does not use the evaluation criteria required by DOE Order 151.1C, leading to incomplete assessments of whether line management is meeting their responsibilities.

Overall, ETTP has implemented an emergency management program that, with few exceptions, complies with DOE Order 151.1C. The ETTP emergency management program has a generally sound technical planning foundation implemented through adequate EPIPs and the exercise program. Increased emphasis on the ETTP emergency plan, ERAP, exercise program, and UCOR and ORO EMT readiness assurance program will further improve the program.

7.0 FINDINGS

As defined in DOE Order 227.1, 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.

Finding F-ETTP-1: Contrary to DOE Order 151.1C, UCOR has not conducted an annual update/revision to the emergency plan.

DOE Order 151.1C requires that site emergency plans be prepared, reviewed annually, and updated as necessary. UCOR obtained the ETTP contract in August 2011, but has not finalized a revision of the ETTP emergency plan to appropriately reflect UCOR operations.

Finding F-ETTP-2: Contrary to DOE Order 151.1C, UCOR does not rotate the basis for the site exercise between all of the facilities with EPHAs.

DOE Order 151.1C requires the basis for the site exercise to be rotated among the facilities with EPHAs. UCOR did not include two of the four facilities with EPHAs in their exercises held over the past few years and does not include rotating the basis of the exercise between facilities in the *ETTP Five Year Exercise Validation Plan*. As a result, the ERO does not practice responding to emergencies at all facilities that could have HAZMAT releases with significant consequences.

Finding F-ETTP-3: Contrary to DOE Order 151.1C, EMT does not use the evaluation criteria issued by the Director, Office of Emergency Operations for line management self-assessments.

DOE Order 151.1C requires that program evaluations be based on specific criteria issued by the Director, Office of Emergency Operations, which are contained in Appendix D of DOE Guide 151.1-3. Rather than use these criteria, EMT uses the ORO instruction *ORR Emergency Management Program Roles and Responsibilities*, which lacks some of the cognizant field element responsibilities, as the source for their evaluation criteria. Consequently, EMT, on the behalf of OREM, does not assess whether EMT and OREM meet all of the line management responsibilities for ETTP.

8.0 OPPORTUNITIES FOR IMPROVEMENT

This EA review identified ten OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by the EA review team that may 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 anticipated that these OFIs will be evaluated by the responsible line management organizations and either accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

EMT

OFI-EMT-1: To improve the ability of the assessment program to identify weaknesses in the emergency management program, consider:

- Using the applicable evaluation criteria contained in DOE Guide 151.1-3, Appendix D, for line management assessments
- Requiring assessment technique training for personnel who conduct emergency management assessments
- Using performance-based assessments when possible
- Documenting the objective evidence used to determine whether evaluation criteria were met for all assessments
- Discussing the adequacy of the UCOR assessment program, particularly when EMT identifies findings not noted by UCOR during the assessment

- Reviewing the effectiveness of corrective actions for findings identified during previous assessments.

OFI-EMT-2: To improve the EMT issues management process, consider revising the draft issues management procedures to include:

- Performing root cause analysis and stressing preventing recurrence of the issue as part of developing comprehensive corrective actions
- Completing timely corrective actions
- Formally managing changes to corrective actions
- Following up on overdue corrective actions
- Specifying the objective evidence required to close a corrective action
- Prohibiting actionees from closing their own corrective actions
- Closing corrective actions based only on programs or documents that are approved and implemented
- Requiring someone who did not perform the corrective action to verify that the corrective action has been implemented and validate that the corrective action has been effective in resolving the original finding.

OREM

OFI-OREM-1: To further enhance the OREM issues management process, consider revising the *OREM Issue Reporting and Resolution* procedure to include:

- Formally managing changes to corrective actions
- Tracking the status of corrective actions
- Following up on overdue corrective actions.

UCOR

OFI-ETTP-1: To further enhance the UCOR emergency management program, increase emphasis on finalizing and obtaining DOE OREM approval of the ETTP emergency plan.

OFI-ETTP-2: To improve the UCOR ERAP, consider revising the document to indicate the appropriate level of classifiable OEs as identified in the EPHAs.

OFI-ETTP-3: To improve UCOR's ability to test all aspects of their emergency management program at the appropriate frequencies, consider:

- Modifying the *ETTP Five Year Exercise Validation Plan* to include information on the exercises and operational drills conducted over the previous year and planned for the next five years with details such as:
 - Initiating event
 - EPHA facility and HAZMAT involved
 - Emergency response program elements included
 - Participating site-level ERO elements and offsite organizations.
- Describing the integration of the evaluated operational drill program in UCOR-4464, *ETTP Emergency Management Training, Drill, and Exercise Plan*
- Modifying the *DOE ORR Emergency Plan ETTP* to reflect the diminished role of UCOR health services
- Including all HAZMAT and initiating events that can lead to classifiable emergencies in the *ETTP Five Year Exercise Validation Plan*
- Rotating the basis of the annual exercise among all of the EPHA facilities.

OFI-ETTP-4: To improve the ability of UCOR to appropriately conduct exercises, consider revising the *ETTP Emergency Management Training, Drill, and Exercise Plan* to fully describe the method for placing and releasing administrative holds on exercises. Also consider revising the expectations for player actions during these holds.

OFI-ETTP-5: To enhance the consistency and thoroughness of exercise evaluations, consider:

- Modifying the controller instructions in the exercise package to more fully describe the process for conducting player critiques and promote a consistent process that fosters a critical assessment
- Expanding the exercise evaluation criteria to include the adequacy of documents produced for offsite distribution.

OFI-ETTP-6: To improve the ability of the assessment program to identify weaknesses in the emergency management program, consider:

- Documenting the objective evidence used to determine whether evaluation criteria were met
- Requiring UCOR assessment technique training for personnel who conduct emergency management assessments
- Requiring performance-based assessments whenever possible.

OFI-ETTP-7: To improve the issues management process, consider:

- Revising the *Issues Management Program* procedure to emphasize the timely completion of corrective actions
- Evaluating all proposed corrective actions to ensure that they will prevent recurrence of the issue

- Ensuring that corrective actions involving training are incorporated into initial and continuing training materials, as necessary
- Closing corrective actions based only on programs or documents that are approved and implemented
- Developing and tracking corrective actions for findings identified by external assessments
- Requiring UCOR corrective action development training for personnel who prepare corrective actions for emergency management issues
- Verifying that the objective evidence required to close a corrective action demonstrates adequate completion
- Ensuring that corrective actions incorporate activities for validating effectiveness.

Appendix A Supplemental Information

Dates of Review

Onsite Review: January 27-29, 2015

Offsite Telephone Interviews: February 23 – March 11, 2015

Office of Enterprise Assessments

Glenn S. Podonsky, Director, Office of Enterprise Assessments

William A. Eckroade, Deputy Director, Office of Enterprise Assessments

Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments

William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments

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Michael A. Kilpatrick

EA Reviewers

Randy Griffin – Lead

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Teri Lachman

Appendix B

Key Documents Reviewed, Interviews, and Observations

Key Documents Reviewed

- 29 CFR 1910 Subpart E, *Exit Routes and Emergency Planning*
- EA CRAD 33-01, *2015 Emergency Management Program Review Criteria Review and Approach Document*, Rev. 0, 12/29/14
- EAL-ET-DISC-0042, *Discretionary Emergency Action Levels for the East Tennessee Technology Park*, Rev. 2, 9/14
- DOE Guide 151.1-2, *Technical Planning Basis EMG*, 7/11/07
- DOE Guide 151.1-3, *Programmatic Elements EMG*, 7/11/07
- DOE Guide 151.1-4, *Response Elements EMG*, 7/11/07
- DOE Order 151.1C, *Comprehensive Emergency Management System*, 11/2/05
- DOE Order 227.1, *Independent Oversight Program*, 8/30/11
- EPHA-ET-K27-0007, *Emergency Planning Hazards Assessment for the K-27 Facility at the East Tennessee Technology Park*, Rev. 3, 9/12
- EPHA-ET-K1065-0019, *Emergency Planning Hazards Assessment for the K-1065 Waste Management Complex and the K-1066-K Yard at the East Tennessee Technology Park*, Rev. 5, 11/14
- EMT/ADM/I, *ORR Emergency Management Program Roles and Responsibilities*, Rev. 3, 5/9/14
- *ETTP Five Year Exercise Validation Plan*, 12/15/14
- HSS Operating Experience Level 1 (OE-1: 2013-01), *Improving DOE Capabilities for Mitigating Beyond Design Basis Events*, Rev. 0, 4/13
- OREM-EP-IP-01, *Emergency Management Program Roles and Responsibilities*, Rev. 1, 10/1/14
- OREM-QA-IP-04, *Issue Reporting and Resolution*, Rev. 0, 12/31/14
- ORR 150B.0 Volume 3, *DOE ORR Emergency Plan ETTP*, Rev. 5.0, 1/4/11
- *Plan for the Office of Enterprise Assessments Review of Emergency Management at the East Tennessee Technology Park*, 12/29/14
- PROC-PQ-1210, *Issues Management Program*, Rev. 5, 10/1/14
- PROC-NS-1001, *Unreviewed Safety Question Determinations for Nuclear Category 2 & 3 Facilities*, Rev. 3, 1/15/15
- UCOR-4464, *ETTP Emergency Management Training, Drill, and Exercise Plan*, Rev. 1, 10/13
- UCOR-4644, *Emergency Readiness Assurance Plan (2014-2015)*, 11/14
- UCOR-4586, *Beyond Design Basis Event Response Basis for the East Tennessee Technology Park*, Rev. 0, 7/14

Interviews

- OREM Emergency Management Program Coordinator
- ORO EMT
- UCOR Emergency Management Lead
- UCOR Emergency Management Manager
- UCOR Emergency Management Technical Lead
- UCOR K-27 Facility Manager
- UCOR K-1065 Facility Manager
- UCOR Operational Drills/Training
- UCOR Performance Assurance

- UCOR Site Drills & Exercises
- URS Technical Specialists

Observations

- K-1065 facility walkdown
- K-27 facility walk around
- Emergency operations center walkdown
- ETTP PSS walkdown