Independent Oversight Inspection of Emergency Management at the

Oak Ridge National Laboratory

October 2008

Office of Emergency Management Oversight
Office of Independent Oversight
Office of Health, Safety and Security
Office of the Secretary of Energy

HSS
Office of Health, Safety and Security

Table of Contents

Abbreviations Used in This Report

ACTS	*Assessment and Commitment Tracking System*
AMS	*Office of Assistant Manager for Science*
AMEM	*Assistant Manager for Environmental Management*
B&W Y-12	*Babcock & Wilcox Technical Services Y-12, LLC*
BJC	*Bechtel Jacobs Company, LLC*
CAPARS	*Computer Assisted Protective Action Recommendation System*
CAS	*Central Alarm Station*
CAT	*Consequence Assessment Team*
CCA	*Control Center Assistant*
DOE	*U.S. Department of Energy*
EAL	*Emergency Action Level*
EnergX	*EnergX TN, LLC*
EMG	*(DOE) Emergency Management Guide*
EMT	*Emergency Management Team*
EOC	*Emergency Operations Center*
EPHA	*Emergency Planning Hazards Assessment*
EPI	*Emergency Public Information*
EPZ	*Emergency Planning Zone*
ERO	*Emergency Response Organization*
ETTP	*East Tennessee Technology Park*
FY	*Fiscal Year*
HQ	*(DOE) Headquarters*
HS-64	*Office of Environment, Safety and Health Evaluations*
HSS	*Office of Health, Safety and Security*
Isotek	*Isotek Systems, LLC*
JIC	*Joint Information Center*
LED	*Laboratory Emergency Director*
LEM	*Local Emergency Manual*
LERC	*Laboratory Emergency Response Center*
LSS	*Laboratory Shift Superintendent*
LSPT	*Limited-Scope Performance Test*
MJERP	*Multi-Jurisdictional Emergency Response Plan*
ORNL	*Oak Ridge National Laboratory*
ORO	*(DOE) Oak Ridge Office*
ORR	*Oak Ridge Reservation*
OROC	*Oak Ridge Operations Center*
PAR	*Protective Action Recommendation*
SC	*Office of Science*
TRU	*Transuranic*
UT-Battelle	*University of Tennessee – Battelle, LLC*
Y-12	*Y-12 National Security Complex*

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1 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight inspected the emergency management program at DOE's Oak Ridge National Laboratory (ORNL) in August 2008. The inspection was performed by Independent Oversight's Office of Emergency Management Oversight. Independent Oversight reports to the Chief, Office of Health, Safety and Security (HSS), who reports directly to the Secretary of Energy. This report discusses the results of the review of the Oak Ridge Office (ORO) and University of Tennessee-Battelle, LLC (UT-Battelle) emergency management programs. Concurrently, the HSS Office of Environment, Safety and Health Evaluations (HS-64) conducted a focused inspection of selected engineered safety feature systems at ORNL's Radiochemical Engineering Development Center; the results of the HS-64 inspection are discussed in a separate report.

The DOE Office of Science (SC) has line management responsibility for ORNL. As such, it has overall Headquarters responsibility for programmatic direction, policy guidance, management overview, performance accountability, and funding of landlord activities and infrastructure operations, including emergency management. Additionally, the Office of Environmental Management provides program management and direction for environmental cleanup activities at a significant number of ORNL facilities. Responsibility for operation of ORNL falls under ORO. ORO reports directly to the SC Deputy Director for Field Operations and is responsible for providing direction and oversight for the emergency management program at both ORNL and East Tennessee Technology Park, which are located on the Oak Ridge Reservation (ORR). Within ORO, the Assistant Manager for Security and Emergency Management has responsibility for corporate-level management of the ORR emergency management program. The ORO emergency management team (EMT) leader exercises day-to-day management responsibility for the ORR program, including the operation of the ORO emergency operations center (EOC) and development of the associated reservation-level procedures. The EMT leader is responsible for the development and maintenance of non-security mutual aid agreements and memoranda of understanding with offsite agencies and for emergency public information. The EMT also provides specialized technical support in emergency management areas when requested by the line programs. Within ORO, the Assistant Manager for Science (who is also the manager of the ORNL Site Office) is responsible for oversight of UT-Battelle in its role as the "lead contractor" in the ORNL emergency management program; and the Assistant Manager for Environmental Management has oversight responsibility for Bechtel Jacobs Company, LLC (BJC), Isotek Systems, LLC (Isotek) and EnergX TN, LLC (EnergX) in their roles as "event contractors."

Under contract to DOE, ORNL is managed and operated by UT-Battelle. As noted above, some facilities and functions located at ORNL are managed and operated by other contractors, such as BJC, Isotek Systems, EnergX, and Wackenhut Services, Incorporated. The ORNL Emergency Management Department, under the Director for Facilities and Operations, is responsible for managing the Laboratory's emergency management program. UT-Battelle maintains overall sitewide responsibility for emergency response and manages the

basic equipment, facilities, staff, and procedures necessary to perform this activity. UT-Battelle personnel respond to fire, medical, and hazardous materials emergencies at all facilities located on the ORNL site. The event contractors are responsible for the emergency program within their respective facilities, including the development of hazards surveys and emergency planning hazards assessments (EPHAs) and facility-specific emergency preparedness procedures. The facility emergency programs are integrated with the overall ORNL emergency management program, as are the protective services and related security functions provided to the Laboratory by Wackenhut Services, Incorporated.

ORNL's primary mission, conducted by UT-Battelle, is basic and applied research and development in support of the DOE mission. As a multi-program laboratory, ORNL receives funding for specific projects from most DOE program offices, several other DOE sites, various other government agencies, and some commercial organizations. In addition, the site has an extensive environmental management program, conducted by BJC, Isotek, and EnergX, for the cleanup and disposal of legacy wastes from energy research and defense-related work. Activities at ORNL involve a variety of radiological materials and chemicals that pose potential hazards to site workers and the public.

The purpose of this Independent Oversight inspection was to assess the effectiveness of the emergency management program at ORNL, as implemented by UT-Battelle and supporting site contractors, under the direction of ORO. Independent Oversight used a selective sampling approach to assess a representative sample of facilities and emergency response organization (ERO) responders at ORNL. Specifically, the sampling approach was used to evaluate:

- The effectiveness of the hazards surveys and EPHAs in serving as an appropriate foundation for the ORNL emergency management program.
- The effectiveness of the ORO and ORNL emergency responders in applying their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public.

To evaluate response performance, Independent Oversight conducted limited-scope performance tests (LSPTs) for initial responders and decision-makers. The performance tests were designed to evaluate the ability of responders to effectively execute their assigned duties during postulated site-specific emergencies. Independent Oversight used trusted agents from the site to assist in developing and conducting the performance test scenarios and validating the results. This inspection also involved an examination of selected elements of the emergency management program at ORNL, including plans and procedures; training, drills, and exercises; and emergency public information. These activities, as well as reviews of assessments, corrective actions, and areas for improvement, provided insights into the effectiveness of ORO and UT-Battelle feedback and continuous improvement systems and SC's emergency management oversight and operational awareness activities at ORNL.

Emergency management at ORNL was last evaluated in October 2005. Overall, the 2005 inspection found that, since the previous 2002 follow-up inspection, ORNL had made noteworthy progress toward establishing an appropriate program foundation. Additionally, UT-Battelle Laboratory Protection Division managers and staff were knowledgeable of most of the remaining weaknesses and were committed to making the necessary improvements. However, that 2005 inspection identified that some critical procedures, training, and tools remained incomplete or were still evolving, resulting in weak ERO performance during LSPTs, particularly in the areas of protective-action development and dissemination, and corrective action mechanisms needed to be strengthened.

Section 2 of this report provides an overall discussion of the results of this 2008 review of the ORNL emergency management program elements that were evaluated. Section 3 provides Independent Oversight's conclusions regarding the overall effectiveness of ORO and UT-Battelle management of the emergency management program, and Section 4 presents the ratings assigned as a result of this inspection. Appendix A provides supplemental information, including team composition. Appendix B identifies the findings that require corrective action and follow-up. Appendices C through F detail the results of the reviews of individual emergency management program elements.

2 Results

2.1 Positive Program Attributes

ORO and UT-Battelle efforts over the past three years to improve the ORNL emergency management program are noteworthy in their breadth and effectiveness. Positive attributes of the emergency management program are discussed below.

ORO and UT-Battelle are committed to an ORNL emergency management program that is both comprehensive and continuously improving. To handle the potential issues arising from the numerous Federal line management and contractor organizations that have at least some emergency management responsibilities at ORNL, ORO and UT-Battelle have developed the mechanisms necessary to ensure that these responsibilities are clearly identified. Furthermore, ORO (in its line oversight role) and UT-Battelle (in its role as the lead contractor for emergency management program management and response purposes) have been effective in communicating the importance of a cooperative approach and coordinating the myriad of planning, preparedness, and response considerations. With few exceptions, ORO and UT-Battelle are effectively using well-defined mechanisms for identifying, tracking, and correcting program weaknesses, including significant ORO involvement in verifying the effectiveness of corrective actions from the 2005 Independent Oversight inspection and UT-Battelle's use of lessons learned from Independent Oversight inspections of emergency management programs at other sites. As discussed below, these practices have been effective in facilitating considerable program improvement.

ORO, UT-Battelle, and BJC have effectively corrected nearly all of the weaknesses identified during the 2005 Independent Oversight emergency management inspection. All of the corrective actions identified to address the 2005 inspection findings have been completed, as have other actions that were developed to correct specific, non-finding weaknesses identified in the same report. More importantly, based on the results of this 2008 inspection, these actions have been largely effective in correcting the underlying problems. In particular, substantial improvements to the response plans and procedures used to categorize and classify emergency events, identify appropriate protective measures, and disseminate event information to offsite agencies, an area rated as a "significant weakness" in 2005, directly contributed to much-improved performances by key decision-makers during LSPTs. Consequently, although some additional work is necessary, nearly every program element and LSPT response venue reviewed during this 2008 inspection are rated as "effective performance."

During LSPTs, nearly all key decision-making and response teams in the Oak Ridge operations center, Laboratory emergency response center, and the ORNL EOC responded appropriately to the postulated events. Responders accurately categorized and classified the emergency events and identified appropriate

protective measures for site workers and the public. With some exceptions for classification upgrades, the notifications to offsite agencies followed established protocols, were timely, and included the appropriate information. Key decision-makers in the ORNL EOC demonstrated effective command and control of response personnel, with the response benefitting from the frequent consultations between crisis managers and DOE emergency managers. As a result, EOC response strategies were successfully developed, prioritized, and implemented. Public information staff were effective in developing worker notification messages and press releases and ensuring that these messages were appropriately reviewed and approved. However, as discussed further below, the consequence assessment teams (CATs) experienced difficulty in providing information useful to crisis managers, DOE emergency managers, and other ORNL EOC support staff.

2.2 Program Weaknesses and Items Requiring Attention

Although the site's efforts to develop and implement a comprehensive emergency management program are largely complete, the Independent Oversight team identified a few areas where additional work is needed to address some response and programmatic concerns. Specific weaknesses are discussed below.

During LSPTs, the CATs experienced significant difficulty in developing timely and accurate projections of hazardous material releases. The CATs are staffed with an appropriate mix of individuals who have scientific and computer modeling expertise and, with some exceptions, are adequately equipped with the tools necessary to execute their emergency response functions. However, during LSPTs, the CATs were not consistently able to develop accurate, timely projections of the consequences resulting from worst-case and ongoing releases of chemical and radiological hazardous materials. Problems ranged from the development of projections that substantially exceeded worst-case results calculated in the applicable EPHA (due to an inadvertent use of the wrong hazardous material) to errors in unit conversion when calculating the source term. As a result, the EOC crisis managers were sometimes provided with consequence assessment projections that were either not valid or did not facilitate timely refinements in protective measures. Contributing factors included the absence of meaningful practice for the CATs over the full breadth of possible release scenarios, inconsistent staff familiarity with source term information available in the EPHA, primary modeling software that does not contain an explosive release algorithm, and the absence of a method to quickly and accurately calculate a source term.

Some additional items require attention by SC, ORO, UT-Battelle, and other event contractors to address the remaining program weaknesses and improve implementation mechanisms. SC closed its finding (that SC had not periodically reviewed the ORO and ORNL emergency management program) from the 2005 Independent Oversight inspection based on scheduling an assessment in 2008, but no such assessment was performed. Additionally, ORO has not approved a few BJC EPHAs or any of the UT-Battelle hazards surveys and EPHAs. ORO has also not completed full assessments of the emergency management programs associated with the environmental management contractors at ORNL or self-assessments of ORO emergency response capabilities and functions within the ORNL EOC. The material-at-risk assumed in the EPHA for the EnergX Transuranic Waste Processing Center is not conservative due to an inappropriate set of drum curie-content and drum involvement assumptions, and the UT-Battelle hazardous chemical screening process does not adequately consider the aggregate risk posed by multiple, small containers located in the same area of a facility. The offsite notification process, which involves a series of communication handoffs that potentially impact its effectiveness, needs additional simplification and clarification in roles and responsibilities to ensure that event classification upgrades are quickly and completely communicated to offsite agencies and that, more broadly, notifications are appropriately reviewed prior to transmission to ensure accuracy. Furthermore, the required notification form is inconsistently specified in several

documents, including the ORNL notification procedure and the emergency response agreement document with the state of Tennessee. While the exercise program is effective overall, some normally-manned facilities with EPHAs have not conducted annual facility-level evaluations of their emergency response capability. Finally, some program provisions need to be more formally defined or documented, including agreements with offsite medical facilities for the treatment of contaminated, injured persons; mechanisms for satisfying joint information center training requirements established by ORO; and training requirements for BJC and EnergX local emergency squads.

3 Conclusions

The October 2005 Independent Oversight inspection of the ORNL emergency management program concluded that ORNL had made noteworthy improvements in defining and implementing several key foundational areas of the site's emergency management program. However, significant weaknesses existed in the plans and procedures that supported the ability of the ERO to consistently develop, approve, and transmit accurate, timely protective measures, and there was a need to strengthen readiness assurance mechanisms applicable to the emergency management program. This 2008 inspection found that ORO and UT-Battelle, together with other site contractors, have implemented a comprehensive emergency management program that broadly protects site workers and the public in the event of a significant emergency at ORNL and that, with few exceptions, meets DOE requirements and expectations.

The inspection team identified many positive aspects of the ORNL emergency management program in every element evaluated. These attributes included, most notably, the commitment of ORO and UT-Battelle to a strong ORNL emergency management program. ORO and UT-Battelle built upon, and then completed, a long-term, extensive improvement effort that was already underway at the time of the previous inspection. In doing so, they repeatedly demonstrated the ability to successfully integrate the emergency planning activities of numerous Federal and contractor organizations that have emergency management responsibilities, find additional program weaknesses, critically examine the effectiveness of corrective actions already implemented, use lessons learned from other sites, and make adjustments where necessary. As a result, nearly all of the weaknesses identified during the 2005 Independent Oversight emergency management inspection have been effectively addressed. This includes the correction of critical deficiencies in the response procedures used to guide crucial, initial emergency response decision-making. These improved procedures, combined with improvements in the training area and the practice opportunities afforded by the drill and exercise program, directly contributed to effective, and in some cases much-improved, performances by responders at nearly all LSPT venues.

However, improvement is necessary with regard to the performance of the ORNL CATs. Although the CATs are appropriately staffed and, for the most part, adequately equipped, they did not demonstrate the ability to consistently develop information regarding hazardous material releases that would be useful to key EOC managers in making timely and accurate decisions about protective actions for site workers and the public. The inspection team identified several potential contributing factors in the training area and in some of the consequence assessment modeling practices and team protocols, but this area merits a careful evaluation of why existing assessment and corrective action processes were not successful in identifying this weakness. Another important weakness is the non-conservative nature of the EPHA for the Transuranic Waste Processing Center due to inappropriate material-at-risk assumptions.

Several other program aspects requiring improved implementation or additional definition were noted as well, although they did not materially impact the overall effectiveness of the associated elements. ORO has not approved any of the UT-Battelle hazards surveys and EPHAs, ORO has not performed all of their assigned emergency management program assessments, and SC inappropriately closed its assessment-related finding from the 2005 Independent Oversight inspection. Other isolated problems were found in the UT-Battelle hazardous chemical screening process; offsite notifications for event upgrades; evaluations of facility-level emergency response capability; the formality of the agreements with offsite medical facilities for the treatment of contaminated, injured persons; and mechanisms for satisfying joint information center training requirements.

Overall, the ORNL emergency management program adequately ensures that site workers and the public will be protected following a significant ORNL event. However, ORO and UT-Battelle line management attention is warranted to ensure that CATs have the necessary procedures, tools, training, and practice to consistently provide useful consequence assessment information to key EOC decision-makers.

4 Ratings

This inspection focused on a detailed assessment of six emergency management programmatic elements, as well as ERO performance during LSPTs. The individual element ratings reflect the status of each ORNL emergency management program element at the time of the inspection. The ratings assigned below to the readiness assurance category are specific to those assessment, corrective action, and performance monitoring mechanisms applicable to the emergency management area.

The ratings for the emergency management elements evaluated during this inspection are:

EMERGENCY PLANNING	
Hazards Surveys and EPHAs:	
UT-Battelle, BJC, and Isotek	EFFECTIVE PERFORMANCE
EnergX	NEEDS IMPROVEMENT
Program Plans and Procedures	EFFECTIVE PERFORMANCE
EMERGENCY PREPAREDNESS	
Training, Drills, and Exercises	EFFECTIVE PERFORMANCE
Emergency Public Information	EFFECTIVE PERFORMANCE
EMERGENCY RESPONSE	
Oak Ridge Operations Center Teams	EFFECTIVE PERFORMANCE
Laboratory Emergency Response Center Teams	EFFECTIVE PERFORMANCE
EOC Teams	EFFECTIVE PERFORMANCE
Consequence Assessment Teams	NEEDS IMPROVEMENT
READINESS ASSURANCE	
DOE Line Program Management	EFFECTIVE PERFORMANCE
Contractor Feedback and Improvement	EFFECTIVE PERFORMANCE

Ratings – Purpose

The Office of Independent Oversight uses a three-tier rating system that is intended to provide line management with a tool for determining where resources might be applied toward improving emergency

management. It is not intended to provide a relative rating between specific facilities or programs at different sites because of the many differences in missions, hazards, and facility life cycles, and the fact that these reviews use a sampling technique to evaluate management systems and programs. The rating system helps to communicate performance information quickly and simply. The three ratings are:

- Significant Weakness (Red)
- Needs Improvement (Yellow)
- Effective Performance (Green).

APPENDIX A
Supplemental Information

A.1 Dates of Review

Scoping Visit	May 14 – 15, 2008
Planning Visit	August 5 – 7, 2008
Onsite Inspection Visit	August 18 – 27, 2008
Report Validation and Closeout	September 16 – 18, 2008

A.2 Review Team Composition

A.2.1 Management

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Steven C. Simonson, Director, Office of Emergency Management Oversight (Team Leader)
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APPENDIX B
Site-Specific Findings

Table B-1. Site-Specific Findings Requiring Corrective Action Plans

FINDING STATEMENTS	REFER TO PAGES:
1. The UT-Battelle screening process does not ensure that hazardous chemicals stored in multiple, small, co-located containers are appropriately evaluated for inclusion in an emergency planning hazards assessment, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.	15
2. The EnergX emergency planning hazards assessment does not incorporate maximum allowable limits on hazardous material quantities to ensure the determination of appropriately conservative protective actions and protective action recommendations, as required by DOE Order 151.1C.	16
3. The offsite notification process does not ensure that consistent, timely, and accurate information is provided for upgraded events, as required by DOE Order 151.1C.	19
4. UT-Battelle and BJC have not conducted annual facility-level evaluations of the emergency response capability at facilities that have emergency planning hazards assessments, as required by the UT-Battelle Emergency Management Drill and Exercise Program procedure and DOE Order 151.1C.	27
5. The ORO process for implementing the training program for joint information center personnel does not ensure that the joint information center cadre is consistently and fully trained, as required by the ORR Emergency Public Information Plan and DOE Order 151.1C.	28
6. During limited-scope performance tests, ORNL consequence assessment teams did not consistently produce accurate and timely initial assessments and did not provide consequence assessment projections that ensured appropriate protective action decision-making, as required by DOE Order 151.1C.	37
7. ORO has not conducted full assessments of the contractor emergency management and self-assessment programs for environmental projects at ORNL, as required by DOE Order 151.1C.	41
8. SC has not implemented effective corrective actions to ensure that periodic evaluations of the ORO and ORNL emergency management program are performed, as required by DOE Order 414.1C, *Quality Assurance*, and DOE Order 151.1C.	42

APPENDIX C
Emergency Planning

C.1 Introduction

Two key elements of emergency planning are the hazards survey and emergency planning hazards assessments (EPHAs), which identify and assess the impact of site- and facility-specific hazards and threats and establish an emergency planning zone (EPZ). The hazards survey and EPHAs serve as the foundation of the emergency management program; consequently, their rigor and accuracy are keys to developing effective emergency response procedures and other elements of the program. The degree to which the EPHAs effectively serve this function is primarily dependent upon the completeness of the institutional processes for developing the hazards surveys and EPHAs, the effectiveness of the screening process by which hazardous materials are initially considered, and the rigor and accuracy of the analyses contained within the EPHAs.

U.S. Department of Energy (DOE) and National Nuclear Security Administration sites and facilities use the results of these assessments to establish emergency management programs that are commensurate with the identified hazards. 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. Specific implementing procedures are then developed that 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.

This evaluation included a review of the Oak Ridge National Laboratory (ORNL) hazards surveys and EPHAs and their assessment of hazards associated with the ORNL site. As part of the review, selected facilities that have an EPHA were walked down to ensure operations and inventories are consistent with descriptions and assumptions contained in the EPHA. Independent Oversight selected for review facilities that contain significant hazardous materials and represent the different ORNL contractor programs, as well as EPHAs observed to contain weaknesses during the 2005 inspection. Additionally, Independent Oversight reviewed, as part of the emergency planning process, sitewide and facility-specific emergency planning documents and associated implementing procedures.

C.2 Status and Results

C.2.1 Hazards Survey and Emergency Planning Hazards Assessments

The 2005 Independent Oversight inspection found that the University of Tennessee-Battelle, LLC (UT-Battelle) and Bechtel Jacobs Company, LLC (BJC) had significantly improved the content and rigor of their hazards surveys and EPHAs since the 1999 inspection and included technically accurate information in the EPHAs. As a result, the elements required to establish the site's emergency management program foundation were in place for current operations. Nevertheless, the 2005 inspection team found that UT-Battelle and BJC had not ensured that all hazardous materials requiring further analysis were assessed in the EPHAs, and errors were identified in EPHA scenarios for the Transuranic (TRU)/Alpha Low Level Waste Treatment

Project (then operated by Foster Wheeler Environmental Corporation and now operated by EnergX TN, LLC or EnergX). The composite EPZ also needed updating, and the transportation hazards survey required revision. Additionally, a DOE official did not approve the hazards surveys, EPHAs, and the site EPZ. This 2008 inspection found that actions have been taken to address all of the 2005 weaknesses, although one corrective action being implemented by the Oak Ridge Office (ORO) involving DOE approval of hazards surveys and EPHAs remains a work in progress. ORNL has also implemented the requirements of DOE Order 151.1C in its hazards surveys and EPHAs since the 2005 inspection.

UT-Battelle and BJC have company procedures that reflect DOE requirements and guidance for developing and maintaining hazards surveys, EPHAs, emergency action levels (EALs), and the EPZ. Since the 2005 inspection, these procedures have been revised to reflect DOE Order 151.1C and the revised Emergency Management Guide (EMG). Earlier this year, Isotek Systems, LLC (Isotek) self-identified the need to update their hazards survey and EPHA documents to meet DOE Order 151.1C provisions and is now drafting company procedures to implement the new requirements and guidance. After these procedures have been issued, Isotek indicated that their hazards survey and EPHA documents will be revised accordingly. EnergX does not have company procedures for developing hazards survey and EPHA documents but has adopted the UT-Battelle hazards survey and EPHA process guide and has collaborated with UT-Battelle emergency management department personnel in their development. Collectively, these procedures continue to reflect a rigorous process and contain the following significant attributes.

- The new DOE Order 151.1C screening criteria and preferred protective action criteria have been implemented.
- The analytical methodologies prescribed by the EMG are referenced.
- Facility personnel and emergency management personnel are involved in developing, reviewing, and approving ORNL hazards survey and EPHA documents.
- Mechanisms to identify significant changes to inventories and operations are in place, such as facility manager involvement, facility use agreements, chemical and radiological inventory databases (including periodic physical walkdowns and reviews), and/or the unreviewed safety question determination process.

ORNL hazards surveys appropriately implement the provisions of the site procedures governing their development and maintenance and provide information stipulated in DOE Order 151.1C, including the screening process, emergency conditions, potential impacts, applicable regulatory requirements, and the need for a quantitative assessment, where applicable. The hazardous material inventory processes and databases used to identify, record, and report hazardous materials at facilities (used in performing hazards surveys) are effectively implemented. Facility personnel rigorously inventory and control radioactive materials as they are received, transferred within, and removed from the facility to prevent exceeding design basis limits. The locations of these materials are reported and monitored through use of computer databases that are used to ensure inventories are below allowable limits; these databases and limits are monitored by emergency management personnel as part of the hazards survey process. Facility personnel also perform periodic walkdowns of their facilities to conduct physical inventories of chemical hazards. The results of these walkdowns are added to a chemical hazards inventory computer database that emergency management personnel use as a source of information for conducting hazards surveys. Independent Oversight found that the personnel responsible for this function were knowledgeable of the process and that the inventory database adequately reflects the inventories.

One exception to the rigorous hazards survey process was found at building 7925B, where nearly 2000 pounds of hydrochloric acid, contained in three hundred bottles stored in a single area, is not reflected in the hazards survey. This material is accurately identified in the chemical inventory database. However, during the development of the hazards survey and implementation of the new screening criteria contained in DOE Order 151.1C, this information was not directly used as an input to the hazards survey. Instead, the process used a computer-generated roll-up report, which automatically eliminated small quantities of materials from consideration (as allowed by DOE Order 151.1C). However, the report development process erroneously (in this case) assumed that individual containers were not co-located without segmentation (i.e., could not be affected by a single event). Consequently, this potential hazard was not appropriately considered in either a hazards survey or an EPHA. In response to this discovery, UT-Battelle took immediate action to re-program the roll-up report development process and initiated an extent-of-condition review of the chemical database. UT-Battelle subsequently discovered additional chemicals (approximately six) that are being stored together in small containers but that had been improperly screened out in the aggregate without fully considering the storage conditions or the total quantity involved.

Finding #1: The UT-Battelle screening process does not ensure that hazardous chemicals stored in multiple, small, co-located containers are appropriately evaluated for inclusion in an emergency planning hazards assessment, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.

Furthermore, Independent Oversight observed other minor weaknesses in the hazards surveys that illustrate examples of incorrect or incomplete records of screening decisions. Specifically:

- For building 3019A, thorium nitrate is listed as a retained radiological material hazard for further analysis without comparing its curie contents to the established curie limit. The EPHA contains an analysis for its chemical hazard and not its radiological hazard.

- Zinc bromide is screened out for buildings 7630 and 7631, but screened in for buildings 2026, 3025E, and 7930. Zinc bromide can be screened out because it has a National Fire Protection Association health rating of 2.

- For the TRU Waste Processing Center, the hazards survey simply states that polymeric methylene diphenyl diisocyanate is below thresholds, but does not provide a screening criterion.

- ORNL hazards surveys do not reflect many chemicals that are screened out based on the criteria of small quantities or common use by the public.

ORNL EPHAs effectively implement the provisions of site procedures governing their development and maintenance and provide the information stipulated by DOE Order 151.1C. EPHAs are well organized, consistently formatted, and contain information and methodologies prescribed by the EMG. Important outputs, such as distances to protective action criteria and thresholds for early lethality, are calculated and used for EAL and EPZ development. With the exception of one case in which an EAL at an Isotek facility had an incorrect protective action distance associated with it, EALs are accurately developed for each of the analyzed scenarios that resulted in a classifiable emergency, and the EPHA results are used appropriately as the basis for associated protective action distances. Similarly, the calculated distances to thresholds for early lethality are used appropriately to develop facility EPZs and serve as the technical basis for the site EPZ. Furthermore, ORNL has corrected the EPHA and EPZ weaknesses identified during the 2005 Independent Oversight inspection. For example, EnergX revised the TRU Waste Processing Center EPHA to correctly define facility and site boundaries; the ORNL Site Office approved a technically based site EPZ; and UT-

Battelle eliminated the need for a transportation EPHA through the use of Department of Transportation compliant transports and the Emergency Response Guidebook, as allowed by DOE Order 151.1C. However, the inspection team noted that ORO has approved all of the BJC hazards surveys and most EPHAs, but has not approved any of the UT-Battelle hazards surveys and EPHAs, although ORO is working to address the document backlog.

One important EPHA deficiency noted by the inspection team is that the assumptions made by EnergX for the material-at-risk quantities in the TRU Waste Processing Center EPHA are not always conservative with respect to allowable (and ongoing) operations. For example, the analyzed scenarios involving a single pallet of drums assume the 95 percentile inventory (6 curies per drum) rather than worst-case inventories (over 300 curies is reported to be in one drum that will be received at the facility and approximately 14 drums at ORNL that will be sent to this facility are known to exceed 80 curies). Furthermore, pallets are stored close together and stacked two high. Therefore, analyzed scenarios do not bound the amount of material allowed in a single drum or contained collectively in the drums stacked on one pallet. Furthermore, even though two buildings used to store these drums are open areas with no segmentation or storage arrays, each building having an inventory limit of 2500 curies, the "aircraft crash with fire" analysis assumes the material-at-risk quantity to be only 720 curies.

Finding #2: The EnergX emergency planning hazards assessment does not incorporate maximum allowable limits on hazardous material quantities to ensure the determination of appropriately conservative protective actions and protective action recommendations, as required by DOE Order 151.1C.

To summarize, ORNL has further improved its hazards survey and EPHA program since 2005 by correcting weaknesses identified at that time and by implementing the new DOE Order 151.1C requirements. UT-Battelle and BJC have implemented process procedures that reflect DOE requirements and guidance. These procedures implement many good practices, such as facility involvement in document development, making use of existing processes to identify significant changes in hazards and operations, and periodic physical inventories to enable emergency management personnel to monitor chemical inventories. EnergX has adopted UT-Battelle procedures, and Isotek is in the process of revising their procedures to meet DOE Order 151.1C requirements. After issuance, Isotek intends to update their hazards survey and EPHA accordingly. UT-Battelle, BJC, and Isotek hazards surveys and EPHAs, in nearly all cases, correctly implement procedure requirements; in most cases, appropriately identify and assess site hazards; and are correctly used to develop EALs for formulating event classification and protective measure decisions and for establishing the site EPZ. However, the EnergX EPHA for the TRU Waste Processing Center does not base consequence analysis on the maximum allowable material-at-risk and, therefore, does not provide for conservative predetermined protective actions. Also, the semi-automated screening process used by UT-Battelle does not adequately consider hazardous chemicals that are stored in the same area in multiple, small containers. In response to this discovery, UT-Battelle has corrected a programming flaw in the screening mechanism and has initiated a review to determine if there are any other affected facilities. Finally, of lesser significance, screening decisions are not always appropriately considered and documented, and ORO has not approved all of the site's hazards surveys and EPHAs.

C.2.2 Program Plans and Procedures

The 2005 Independent Oversight inspection found that the ORO and ORNL operating contractors had improved emergency planning in a number of key areas, with improvements in plans, procedures, and equipment and the implementation of an integrated emergency plan. In spite of these improvements,

Independent Oversight identified significant weaknesses in the content and usability of emergency procedures and associated tools that supported decision-makers, particularly in executing their time-urgent responsibilities for event categorization, classification, and protective action formulation. This 2008 inspection found that ORNL has made substantial improvements to emergency procedures and associated tools, which substantially improved the ability of decision-makers to execute critical time-urgent responsibilities.

Emergency planners have effectively implemented a "lead" and "event" contractor concept of operations at ORNL that considers the site's unique hazards, facility configurations, and contractual arrangements. As the lead contractor for ORNL, UT-Battelle is responsible for overall emergency response and ensures staffing of the site emergency response organization (ERO) assignments. Event contractors who operate facilities or perform activities at ORNL include the BJC, EnergX, Isotek, and Wackenhut Services, Incorporated. Lead and event contractors are responsible for the facility-level implementation of the site emergency management program, including development of local emergency manuals, hazard surveys, and EPHAs at facilities where they conduct operations. Additionally, the integration of UT-Battelle and the ORNL event contractors is clearly established in the Oak Ridge Reservation (ORR) Emergency Plan.

Overall, the emergency plan appropriately documents the emergency management program and describes the ORO and ORNL response to operational emergencies, consistent with the applicable DOE EMG. The emergency plan describes the ORO ERO, which includes response teams in the ORO emergency operations center (EOC) and joint information center, and a continuously manned Oak Ridge operations center (OROC). Additionally, the roles, responsibilities, and authorities of ORO personnel for both oversight and response to multi-site events are appropriately documented. The emergency plan also adequately describes the ORNL ERO, including the local emergency squad, incident commander, laboratory shift superintendent (LSS), ORNL EOC, and field monitoring teams. Lastly, roles and responsibilities for response, both initially and following activation of the ORNL EOC, are defined.

Most emergency plan implementing procedures (and associated checklists and job aids) effectively describe how emergency response plans are implemented. These response procedures and job aids address all of the response functions described in the emergency plan, including the important functions of categorizing and classifying emergency events; formulating protective actions and protective action recommendations; notifying onsite personnel and offsite agencies; and providing command, control, and communication. Additionally, command and control procedures establish clear roles, responsibilities, and authorities, including the key area of incident command, which is mutually staffed by UT-Battelle and Wackenhut Services, Incorporated. Furthermore, ORO and ORNL have developed ERO position checklists to enable trained ERO members to quickly execute assigned tasks, and mechanisms are in place to ensure that procedures are current and identify required records. Finally, UT-Battelle has improved the event categorization and classification process, which includes upgrading the event categorization and classification and the ORNL EAL matrix. An adequate protective action decision-making process is now integrated with the EAL matrix and documented in the implementing procedure for protective action decision-making, although one EAL weakness was noted. During the limited-scope performance tests conducted as part of this inspection, EOC personnel experienced difficulty using the building 7880 EAL to promptly reclassify the fire scenario when event conditions escalated. This difficulty resulted from wording in the fire EAL (EAL 7880-04) that did not clearly identify it as being applicable to a building 7880A event. Otherwise, EAL changes have improved the overall capability of ORNL decision-makers to make time-urgent decisions.

Emergency response support to ORNL from offsite organizations is managed (by ORO) through numerous assistance agreements, including security-related memoranda of agreement, mutual aid agreements, memoranda of understanding, and other response-related agreements contained in the ORR Emergency Plan.

Typically, ORO has established an agreement with each entity from which support will be needed, as suggested in the DOE EMG. However, a few arrangements are not appropriately documented. For example:

- ORO has not prepared formal, written agreements (required by DOE Order 151.1C) with offsite medical facilities (Methodist Medical Center of Oak Ridge and the University of Tennessee Medical Center) to accept and treat contaminated, injured personnel, although emails from each facility indicate that written agreements are not required by the hospitals.

- A previous mutual assistance agreement (*Oak Ridge Reservation Common Response Plan for Fire/Rescue, Ambulance, and Hazardous Material Release Emergencies*) documented mutual aid expectations among the East Tennessee Technology Park (ETTP), ORNL, and the Y-12 National Security Complex (Y-12). However, this agreement was cancelled in 2007 following the transfer of the ETTP Fire Department to the City of Oak Ridge, and there is no current documented agreement between ORNL and Y-12 to establish specific response services, protocols, and resources needed by the respective sites.

- The *ORO Wildland Fire Management Plan at the Oak Ridge Reservation* does not reflect cancellation of the Common Response Plan.

Finally, ORO and the National Nuclear Security Administration Y-12 Site Office have agreed with the state and local governments regarding the coordinated actions to be taken in response to a hazardous materials event on ORR, as documented in the *State of Tennessee Multi-Jurisdictional Emergency Response Plan* (MJERP) for the DOE ORR. By and large, most ORNL site response protocols are in agreement with the processes described in the MJERP; however, a few response provisions differ with the state's expectations. For example, ORNL does not require a written update notification to be transmitted within fifteen minutes following the verbal update or that initial protective action recommendations provide the distance to protective action criteria for worst-case accidents that go beyond the five-mile EPZ.

A more important weakness is that the offsite notification process does not always ensure that timely and accurate information is provided consistently to offsite agencies, particularly when the event classification or emergency conditions change. The process for conducting notifications of ORNL events is primarily contained within three procedures: the OROC duty officer notification checklist, the ORNL offsite notification procedure, and the ORNL EOC crisis manager checklist. Collectively, these procedures generally require the LSS to fill out a notification form and then verbally notify the state, City of Oak Ridge, and the OROC duty officer. The OROC duty officer then completes a separate notification form, verbally notifies the DOE Headquarters (HQ) Watch Office, and transmits the form via facsimile to the DOE HQ Watch Office and state and local offsite agencies. However, there are several ambiguities in the responsibilities and process for performing these notifications, particularly as they apply following the transfer of the emergency director function from the LSS to the EOC crisis manager, and the process is overly complex, requiring several information exchanges to fully execute, for example:

- There is no mechanism to ensure that the written notification form sent to offsite agencies by the OROC duty officer is consistent with the information provided verbally by the LSS.

- The requirement within the LSS verbal notification step to notify "DOE" within 15 minutes of event classification does not indicate if this is satisfied by notifying the OROC duty officer within the specified time frame (inasmuch as the DOE HQ Watch Office notification by the OROC duty officer is outside the direct control of the LSS).

- The ORNL EOC crisis manager checklist contains only very general guidance regarding the provision of updated verbal notification to the state (and other appropriate stakeholders) every 60 minutes or as necessary. There is no reference to using the LSS to perform these notifications, no step that ensures that the LSS has all of the necessary information, or any check by the crisis manager or EOC staff that the LSS verbal notification is consistent with the actual event status.

Finding #3: The offsite notification process does not ensure that consistent, timely, and accurate information is provided for upgraded events, as required by DOE Order 151.1C.

Finally, there is no provision to ensure that unclassified controlled nuclear information is not included in the notification process, and a revised notification form, that has been implemented by ORO and ORNL in cooperation with the state, is not consistent with older versions of the form that appear in the MJERP, the ORNL notification procedure and related checklists, and WebEOC (the official notification form).

ORNL line organizations have developed a number of local emergency manuals (LEMs) to govern emergency response at their facilities. LEMs describe facility-specific emergency response actions to emergency events that require the response of local emergency squads. LEMs also identify the local emergency supervisors (who direct the local emergency squad during emergencies); include maps of evacuation routes and assembly points; and provide procedures for handling emergencies within the facility. During several building walkthroughs, local emergency supervisors demonstrated clear understanding of their roles and responsibilities. In addition, three high-hazard ORNL facilities (7900, 3019A, and 7920) require positive personnel accountability procedures. For buildings 7900 and 3019A, the accountability process is clearly described in the respective LEM. For building 7920, positive accountability training has been provided to the local emergency squad; however, the associated LEM does not describe the specific actions covered in the informal training. Lastly, with the exception of the EnergX TRU Waste Processing Center, LEMs are not controlled documents, and several manuals contain numerous dated pen and ink changes.

To summarize, ORO and UT-Battelle have an appropriate emergency plan to support response to a postulated release of hazardous materials on or near the ORNL site. With few exceptions, response planning is well documented, comprehensive, and coordinated with nearby jurisdictions that can provide additional response assets. ORO and UT-Battelle have implemented effective procedures to define the roles and responsibilities of the ERO. Mechanisms are in place to activate response assets, perform emergency response functions, and provide notifications for the protection of site and offsite personnel. A noteworthy improvement is that ORNL has appropriately addressed the recurring weaknesses in technical quality and usability of several key ORNL procedures observed during the 2005 Independent Oversight inspection, thus improving the overall ability of ORNL decision-makers to make time-urgent emergency response decisions. However, a few weaknesses were noted in the offsite notification process, including multiple information exchanges and some notification responsibilities that are not clearly defined. In addition, a few formal arrangements with nearby hospitals and the remainder of the ORR are not suitably documented.

C.3 Rating

A rating of EFFECTIVE PERFORMANCE is assigned to the area of hazards surveys and EPHAs for UT-Battelle, BJC, and Isotek.

A rating of NEEDS IMPROVEMENT is assigned to the area of hazards surveys and EPHAs for EnergX.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of program plans and procedures.

C.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Oak Ridge Office

- Consider methods for expediting the review and approval of hazards surveys and EPHAs for those not yet approved by ORO, and prioritize their approval over hazards surveys and EPHAs that have been previously approved by ORO but are coming due for their triennial review.
- Consider documenting all emergency response support interfaces and update existing agreements as changes occur. Specific items to consider include:
  - Establish an arrangement with each entity from which support will be needed and prepare appropriate agreements.
  - Establish signed agreements with offsite medical facilities to accept and treat contaminated, injured personnel.
  - Determine if a support agreement between ORO and the Y-12 Site Office is needed to specify specific emergency response services, protocols, and resources needed by the respective sites related to fire, rescue, and hazardous materials emergencies.
  - Revise the *Wildland Fire Management Plan at the Oak Ridge Reservation* to reflect cancellation of the *Oak Ridge Reservation Common Response Plan for Fire/Rescue, Ambulance, and Hazardous Material Release Emergencies*.
- To further improve response planning with the state of Tennessee, consider implementing the following actions:
  - Identify and resolve the inconsistencies related to DOE response actions stated in the MJERP for the DOE ORR.
  - Ensure that applicable commitments established in the MJERP are conveyed to the ORNL lead and event contractors for inclusion in emergency plans and procedures.
  - Ensure that ERO personnel have received all necessary training for compliance with the MJERP.

UT-Battelle

- Enhance the quality and usefulness of the hazards surveys by including additional details. Specific actions to consider include:
  - Document all of the hazardous materials in the hazards survey that were evaluated to serve as a record of chemicals considered.
  - Fully document the screening decisions in the hazards survey by recording the chemicals evaluated against the screening criteria used for determination of further quantitative assessment.
  - Revise hazard survey procedures to require full documentation of screening decisions.
- Enhance the screening process by instituting a mechanism that further evaluates co-located, small container-sized, chemicals in the chemical inventory database. Specific actions to consider include:
  - Revise the chemical database reports to flag multiple chemical containers that are co-located within an inventory control area for further assessment.
  - Further assess chemical inventory areas by performing walkdowns of the storage facilities and ensure adequate inventory controls or segmentation are in place that will prevent multiple small containers from being co-located.
  - Revise the screening procedure to formalize further reviews of co-located containers.
- Strengthen the offsite notification process. Specific actions to consider include:
  - Simplify the initial notification process by adding the DOE HQ Watch Office to the ring-down telephone system.
  - Ensure that all roles and responsibilities for implementing the notification process are described in ORNL procedures and checklists, including responsibilities and required actions prior to and following the transfer of the laboratory emergency director function between the LSS and the EOC crisis manager.
  - Incorporate provisions for the laboratory emergency director or designee (whether filled by the LSS or the EOC crisis manager) to approve the release of notification information.
  - Ensure that all emergency-reporting messages for building 3019A are reviewed for unclassified controlled nuclear information and are protected accordingly. The review should be pre-planned and addressed in the training program, procedures, and notification form development so that classification considerations will not delay notification.
  - Ensure that notification process revisions adequately consider potential changes to other related plans, procedures, and checklists.
- Consider the following enhancements to the LEMs to ensure clearly defined requirements and expectations:

- Describe the process used by line supervisors to ensure that staff personnel have reviewed required elements of the emergency action plan in accordance with Occupational Safety and Health Administration 29 CFR 1910.38.
- Ensure that a process is established for LEM approval and change control that formalizes content changes within a specified period.
- Ensure that the LEM for building 7920 contains a facility-specific procedure to account for all employees after evacuation.

EnergX TN, LLC

- Enhance the rigor of the TRU Waste Processing Center EPHA rationales for assumptions regarding material-at-risk. Specific actions to consider include:
  - Consult with representatives from the ORO Office of the Assistant Manager for Environmental Management, the Carlsbad Field Office, and the management and operating contractor for the Waste Isolation Pilot Plant to obtain external perspectives on maximum material-at-risk assumptions for TRU waste.
  - Review the operational and design bases for building-specific limits on total curie content to determine if limits can be reduced.

Isotek Systems, LLC

- Consider developing a checklist that verifies appropriate application of important EPHA results in response documents, such as distance to protective action criteria, as part of the EPHA and EAL approval process.
- Ensure that EALs that represent more than one analyzed scenario utilize the farthest distance to protective action criteria of the analysis set for use in formulating protective actions.

APPENDIX D
Emergency Preparedness

D.1 Introduction

A coordinated program of training, drills, and exercises is necessary to ensure that emergency response personnel and organizations can effectively respond to emergencies impacting a specific facility or the site as a whole. This response includes the ability to make time-urgent decisions and take action to minimize the consequences of the emergency and to protect the health and safety of responders, workers, and the public. To be effective improvement tools, exercises should be used to validate all elements of an emergency management program over a multi-year period using realistic, simulated emergency events and conditions, and to provide emergency response organization (ERO) members an opportunity to practice their skills. An effective emergency public information (EPI) program provides the public, news media, and U.S. Department of Energy (DOE) employees with accurate, timely information during an emergency event. In part, effectiveness is based on having in place a long-term, documented program to educate the public and the media about actions that may be required during an emergency response.

The Office of Independent Oversight team evaluated the training, drill, and exercise program used to support the Oak Ridge National Laboratory (ORNL) ERO. As part of the programmatic review of the training, drill, and exercise elements, the Independent Oversight team evaluated the plans and procedures that support these elements and reviewed training and proficiency records for key site emergency responders. Drill documentation and exercise reports were also reviewed for indications that they are being used effectively to enhance responder proficiency and evaluate the level of the site's response preparedness. The Office of Independent Oversight team also evaluated EPI plans and applicable processes for an emergency at the ORNL site.

D.2 Status and Results

D.2.1 Training, Drill, and Exercise Program

During the 2005 Independent Oversight inspection, the inspection team found that the DOE Oak Ridge Office (ORO) and ORNL had implemented plans and procedures governing training, drills, and exercises, including several noted strengths in the laboratory shift supervisor training and qualification program. The drill and exercise program was implemented through a comprehensive procedure and characterized by numerous strengths. However, several implementation weaknesses were identified, including a heavy reliance on required reading, absence of detailed training courses, and lack of documented evaluations of proficiency. Additionally, the facility-level drills did not provide adequate opportunities for facility emergency responders to practice all of their assigned functions. This 2008 inspection determined that plans and procedures governing training, drills, and exercises were more fully implemented and that the exercise program continued to exhibit numerous strengths. However, consequence assessment team (CAT) training may not have the appropriate content or practice opportunities to develop plume models. Additionally, site exercises do not provide the ERO with experience on a wide variety of facilities and associated hazards, and the emergency response capabilities at facilities with emergency planning hazards assessments (EPHAs) are not being evaluated annually.

Training

ORNL has established a comprehensive program for ensuring that personnel are provided sufficient information on their responsibilities in an emergency. Personnel with access to ORNL complete site access training provided by University of Tennessee-Battelle, LLC (UT-Battelle), or equivalent training provided by their employing organization, that includes an emergency management section focused on emergency signals used at ORNL and expected emergency response actions. This training is provided when personnel are initially granted access to ORNL and every two years thereafter, with the exception of EnergX TN, LLC (EnergX), which provides this training to their personnel annually. In addition, all ORNL contractors provide annual refresher training to personnel who monitor facility conditions and are expected to recognize and report emergency events or conditions. Further, annual laboratory-wide protective action drills include a cadre of evaluators stationed at various ORNL facilities who evaluate the actual response of personnel to orders from the laboratory shift superintendent to evacuate, take cover, or shelter in place.

Local emergency supervisors and local emergency squads also receive appropriate training for their responsibilities. Local emergency supervisors, supported by local emergency squads, direct the immediate actions at a facility in response to an emergency until relieved by a fire or security incident commander. Local emergency supervisor training for UT-Battelle, Bechtel Jacobs Company, LLC (BJC), and Isotek Systems, LLC (Isotek) consists of an annual web-based course covering key aspects of the positions, which is also used by Isotek as training for their local emergency squad. UT-Battelle and BJC local emergency squads receive annual training from their local emergency supervisor that may consist of a web-based course, required reading, or a meeting. EnergX has their local emergency supervisors and local emergency squad read the local emergency manual and other related emergency procedures annually. Contractors track the completion of the local emergency supervisor and local emergency squad training in their respective training or facility record-keeping systems. UT-Battelle and Isotek clearly document the specific training requirements for local emergency supervisors and local emergency squads in the UT-Battelle Standards Based Management System and Isotek Emergency Plan, respectively. However, although BJC and EnergX local emergency supervisors and local emergency squads receive appropriate training, BJC and EnergX do not clearly document the specific training requirements in their respective plans and procedures.

UT-Battelle has a comprehensive and mostly well-documented training program for the ORNL ERO members. The UT-Battelle training program encompasses all contractor ORNL ERO members and includes the emergency operations center (EOC), laboratory shift superintendents and control center assistants, security and fire incident commanders and associated support personnel, field monitoring teams, and ORNL joint information center (JIC) personnel. ERO training consists of instructor-led training courses, required reading, and web-based Federal Emergency Management Agency courses and contains appropriate content. New ERO members complete initial training requirements and demonstrate proficiency, which is a requirement for ERO members added after September 2007, before being added to the ERO cadre roster. Annual requalification requirements consist of required reading of all relevant procedures and checklists and participation in a drill, exercise, or actual event. In addition, attendance at specialized team training is also required for key decision makers, CAT members, and field monitoring team members. Further, annual incident command system refresher training is also required for fire and security incident commanders and associated support personnel. UT-Battelle tracks the training status of ERO members using a computer database that is checked quarterly to ensure that no members are delinquent on training or proficiency requirements. Additionally, UT-Battelle frequently invites offsite responders to attend ERO training in order to become more familiar with emergency responses involving ORNL activities. One minor weakness regarding the ORNL ERO training program is that several instructor-led training courses do not have examinations, including courses on critical and time-sensitive tasks such as categorization and classification, emergency actions levels, and notifications. Additionally, the 2005 report noted that a formal needs analysis (which had been referenced in a procedure

for ERO training) had not been performed, which is still the case. As part of the training program plan, UT-Battelle tentatively plans to perform training task analyses in fiscal year (FY) 2010, which will be useful in verifying existing training requirements and identifying the need for any new training program content.

The UT-Battelle ORNL ERO training program is fully implemented and, with one notable exception, provides for a fully qualified cadre able to perform their assigned duties. UT-Battelle conducts a sufficient number of drills and exercises annually to ensure that all ORNL ERO members can maintain proficiency, and credit is given for participating in a drill, exercise, or actual event only when the duties of the assigned ERO position have been performed. Further, personnel on the ERO cadre roster have completed all training and proficiency requirements for their assigned positions. However, some drills used to demonstrate annual proficiency for a few cadre members are inadequately documented and do not clearly reflect that the duties of the assigned position were performed or that proficiency was demonstrated. More significantly, the specialized team training provided for the CAT does not include the development of plume models using the tools available in the EOC for the variety of facilities, hazards, and initiating conditions that exist at ORNL. The impact of this weakness was demonstrated in several drills and exercises in FY 2007 and FY 2008 and in the limited-scope performance tests discussed in Appendix E of this report. As a result, the CAT may not be able to successfully develop accurate plume models for the range of emergencies that could occur at ORNL.

To summarize, a comprehensive program is in place to provide personnel who have access to ORNL with sufficient information and opportunities to practice their emergency response actions for the types of emergencies that could occur. In addition, local emergency supervisors and local emergency squads receive adequate training on their responsibilities in an emergency and receive annual refresher training to ensure continued familiarity. Further, UT-Battelle has implemented a comprehensive training program for the ORNL ERO, which includes a broad range of ERO members including incident commanders, their support staff, and field monitoring teams. Training is accomplished through a variety of methods and is regularly offered to appropriate offsite responders. Additionally, UT-Battelle provides numerous opportunities for ERO members to participate in a drill or exercise annually. However, the specific training requirements for local emergency supervisors and local emergency squads are not always clearly stated, several ORNL ERO training courses do not have examinations to ensure that important tasks are understood, and documentation for proficiency demonstrations in drills is sometimes insufficient. Most notably, UT-Battelle CAT training does not include practice at developing plume models for the variety of emergencies that could take place at ORNL.

Drills and Exercises

The ORNL drill and exercise program is generally well defined and includes many positive attributes. Each contractor is responsible for the drills held at their respective facilities, while UT-Battelle is responsible for the site exercise program. All contractors have established facility drill programs that periodically include security and fire department organizations and provide for the correction of issues identified during drills. In addition, UT-Battelle exercise packages are well documented and include detailed information on scope, participants, simulations, timeline of expected events, controller injects, and evaluation criteria for all participants. Further, UT-Battelle specifies the requirements for the conduct of controllers, evaluators, and observers during exercises and includes topics such as appropriate interactions with players and responsibilities for providing appropriate contingency messages. Additionally, the method for conducting critiques of player performance is defined by UT-Battelle along with the steps taken to temporarily halt or terminate an exercise. Furthermore, BJC, EnergX, and Isotek have established procedures that specify the rules for conducting drills and the minimum content for drill packages and drill after-action reports; however, UT-Battelle procedures do not specify a similar level of detail for their drills, resulting in inadequate documentation for several

drills, primarily in the case of tabletop drills. In addition, one drill after-action report was completed one year after the drill had been conducted, and several other drill after-action reports remain to be completed, well beyond the 30 working days timeframe required by UT-Battelle procedure.

The ORNL Five-Year Exercise Plan establishes a schedule for conducting exercises that is designed to test a variety of emergency management program elements, hazards, and facilities, but inconsistencies in the plan reduce its effectiveness. The plan includes matrices that list the schedules for validating emergency management program elements and rotating the basis for exercises among the facilities with EPHAs and associated hazards. Most emergency management response program elements are scheduled to be exercised annually, with the remaining elements included every two to three years. UT-Battelle designed the plan to ensure that a variety of hazards and facilities are exercised and evaluated over a five-year period. This effort is commendable; however, the plan has not been fully implemented, and several limitations in the plan were noted. For example:

- The plan includes hazards that are no longer present at ORNL and omits some other hazards.
- Building 3047B is included in the facilities table in the plan, but does not have a year specified for when an exercise would be held for that facility.
- Some inconsistencies were noted between the facilities scheduled for future years and the schedule for the associated hazards.

Lastly, the plan does not include the information necessary to be able to readily determine which elements of the emergency management program were included in exercises held in previous years; the inclusion of this information would better enable staff to ensure that an appropriate mix of hazards and facilities are evaluated over a five-year span of time, even as actual exercise schedules deviate from the five-year plan.

While exercises test a significant portion of the ORNL emergency management program, a few planning weaknesses reduce the value of the exercises in validating the site's response capability. All emergency management response program elements were evaluated during exercises in FY 2007 and FY 2008. In addition, all site-level emergency response organizations participated in at least one exercise in FY 2007 and FY 2008, with the notable exception of security serving as the incident commander. A security event was planned for an April FY 2007 exercise, but was cancelled at the direction of ORO and has not been rescheduled. UT-Battelle conducted six exercises in FY 2007 and FY 2008, but five of the exercises involved the same facility, thus limiting the experience of the ERO with varied facilities and hazards. Consequently, the breadth of experience provided to the ORNL ERO is limited because some aspects of the emergency management program have not been included in exercises.

Annual facility-level evaluations of emergency response capabilities have been conducted for only some of the occupied ORNL facilities that have EPHAs and for which facility-specific actions that are performed during an emergency range from containment actions to a specialized facility emergency response team. For these remaining facilities, EnergX and Isotek conducted drills in FY 2007 and FY 2008 that included a documented evaluation of the specific facility emergency response actions taken, although the requirement to conduct this type of evaluation is omitted from their respective procedures. UT-Battelle conducted documented, facility-level evaluations for buildings 7900 and 7930 in FY 2007 and building 7900 in FY 2008. Additionally, other facility-level evaluations were conducted at buildings 3525 and 7920 in FY 2007 and FY 2008, but these evaluations were inadequately documented. However, in FY 2007 and FY 2008, no other facility-level evaluations were performed for the remaining UT-Battelle facilities that have an EPHA. In FY 2007 and FY 2008, BJC conducted emergency response drills for their occupied facilities with

facility-specific response actions, but did not evaluate all of these drills. As a result, annual facility-level evaluations were not performed for several UT-Battelle and BJC facilities that have EPHAs; consequently, the ability to implement appropriate facility-specific emergency response actions has not been demonstrated, as required.

Finding #4: UT-Battelle and BJC have not conducted annual facility-level evaluations of the emergency response capability at facilities that have EPHAs, as required by the UT-Battelle Emergency Management Drill and Exercise Program procedure and DOE Order 151.1C.

To summarize, ORNL has established a drill and exercise program that appropriately distributes the responsibilities for drills and exercises between the contractors. Numerous strengths were noted in the drill and exercise program, including provisions for the correction of issues identified during drills, preparation of comprehensive exercise packages, and expectations for exercise conduct. Further, UT-Battelle developed a five-year exercise plan that includes rotating exercises between different facilities and hazards at ORNL, and exercises have tested all emergency management program elements and site emergency response organizations during the last two years. Additionally, EnergX and Isotek conducted evaluations of the facility-specific response actions taken during drills held at their facilities. Although generally effective, several minor weaknesses were noted in the content of drill and exercise procedures and implementation of those procedures. UT-Battelle drill procedures specify few expectations for such items as the minimum content for drill packages and after-action reports, and an exercise with a security incident commander has not been conducted. Additionally, the six exercises held over the last two years focused on only two facilities and three hazards, and ORNL is still in the early stages of implementing its five-year exercise plan. Lastly, several ORNL facilities with hazardous materials sufficient to warrant an EPHA have not demonstrated the ability to perform facility-specific emergency response actions through an evaluated drill or exercise. While these items warrant additional consideration, they do not materially impact the effectiveness of this element.

D.2.2 Emergency Public Information

During the 2005 inspection, Independent Oversight inspectors found that DOE ORO and ORNL had implemented well-conceived EPI plans and procedures that, in most cases, appropriately documented the EPI program and actions. However, the inspection team also identified programmatic weaknesses that would potentially inhibit program execution, including a lack of appropriate guidance for the timing of the initial press release and the absence of an adequate public education program. This 2008 Independent Oversight inspection found that ORO and ORNL appropriately addressed the previous EPI programmatic weaknesses, and the EPI program is now comprehensive, integrated, and capable of serving the entire Oak Ridge Reservation (ORR). However, while the EPI program also includes a well-defined training component for the JIC cadre, there are weaknesses in the implementation of that training.

The EPI program is a coordinated effort among ORO, UT-Battelle, BJC, and Babcock & Wilcox Technical Services Y-12, LLC (B&W Y-12) public information and site emergency management offices. Event contractors, such as EnergX and Isotek, have for the most part integrated their EPI response roles into the ORNL response. The governing document is the ORR EPI Plan, which provides the framework for a comprehensive, integrated EPI program at ORNL and addresses all of the elements required by DOE Order 151.1C. The ORNL Emergency Plan and supporting procedures and the ORR supporting procedures implement the EPI processes, and, collectively, these documents identify needed personnel and resources, incorporate an integrated approval and rumor control process, and include provisions for a JIC. Supporting

the EPI program is an extensive well-developed public education component that effectively informs site workers and the public of emergency plans and protective actions. This program, which is primarily the responsibility of ORO, was developed in coordination with ORNL contractors, the Y-12 Site Office, B&W Y-12, and state and local offsite officials. It includes a proactive outreach strategy consisting of multiple public mailings and other routinely scheduled intergovernmental meetings and a JIC Working Group consisting of all organizations represented in the JIC to discuss issues and ensure resolution.

EPI plans and procedures further document a well-conceived process and mechanisms for developing, approving, and disseminating timely and accurate information. The initial news release process now makes use of a pre-formatted, pre-approved news release that is intended to be issued by the Oak Ridge operations center within one hour of declaration of an operational emergency. Since the 2005 inspection, ORO also implemented a new, effective news release writing and approval process for subsequent news releases: ORO develops the news release in the ORO EOC, forwards the release to the ORNL EOC and the state EOC for timely review and factual accuracy check, then sends the release to the Headquarters EOC for review. The ORO EOC then issues the approved new release. The EPI program also includes a comprehensive implementing procedure that clearly documents the activation, staffing, and operation of, and the coordination of information within, the JIC. ORO maintains, establishes, directs, and coordinates the JIC, which is a turnkey facility automatically activated for an event classified as a site area emergency or general emergency. ORO, UT-Battelle, BJC, and B&W Y-12 jointly staff the seventeen JIC cadre positions regardless of location of an emergency event.

The ERO training program implementing procedure describes the EPI training program that supports ORO and JIC operations. This procedure establishes the training requirements for the Federal and contractor members of the JIC cadre to ensure that personnel assigned to the JIC are qualified, trained, and proficient. It further assigns responsibility for developing and maintaining the training and associated records to each contractor with a JIC representative: UT-Battelle, BJC, and B&W Y-12. Further, those contractors are responsible for certifying to ORO the qualifications of each member of the cadre. The content of the training program appropriately consists of concept of operations, notification system, position checklist, facility/position orientation, and reading Section 2 of the appropriate ORR Emergency Plan volume or the JIC implementing procedure. All ORNL JIC cadre members, including new members of the cadre, have completed their assigned training. However, training provided by the different contractors to their JIC personnel is not standardized, and ORO has not consistently provided specialized training courses to the JIC cadre. For example, position-specific training for the JIC consists solely of reading the respective position checklist and walking through the JIC, but JIC cadre members are not required by ORO procedures to demonstrate their understanding and proficiency prior to being assigned to the JIC (although UT-Battelle personnel assigned to the JIC are required to do so by UT-Battelle procedures). Additionally, provision of specialized training for such important positions as the telephone operators and spokespersons is sporadic and not coordinated with the contractor program managers or their training organizations. Because the contractors cannot ensure the availability of all appropriate members of the JIC cadre for all ORO training, there is limited assurance that all members of the cadre, including new members, will receive the same level of training.

Finding #5: The ORO process for implementing the training program for joint information center personnel does not ensure that the joint information center cadre is consistently and fully trained, as required by the ORR Emergency Public Information Plan and DOE Order 151.1C.

To summarize, the EPI program is a coordinated effort among ORO, UT-Battelle, BJC, and B&W Y-12 public information and emergency management offices, and EPI documents provide the framework for a

comprehensive, integrated EPI program at ORNL that addresses all of the elements required by DOE Order 151.1C. Further, these plans and procedures document well-conceived processes and mechanisms for the development, approval, and provision of timely and accurate information, rumor control, and the coordination of information. The program includes a well-equipped JIC, supported by an extensive, well-developed public education component, that effectively informs the public of the appropriate emergency plans and protective actions before and during emergencies. However, while ORO has developed a comprehensive program that includes an appropriate structure for training and qualification for the ORO and JIC cadre, implementation of the training program contains some weaknesses that results in inconsistent training for the JIC cadre and does not ensure that the JIC are proficient in their duties.

D.3 Rating

A rating of EFFECTIVE PERFORMANCE is assigned to the area of training, drills, and exercises.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of emergency public information.

D.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Oak Ridge Office

- To ensure all EPI personnel are consistently trained and receive the same level of training, consider the following:
  - Inform all contractors of ORO expectations for contractor positions in the EOCs and JIC, and ensure that all position checklists are based on those expectations.
  - Develop lesson plans for each JIC position and include a demonstration of proficiency for all JIC cadre members.
  - Ensure that all specialized training is coordinated with the pertinent contractor training departments before it is scheduled.
- To ensure all future ERO trainees are provided with the required training, consider adding the following to the ERO training requirements:
  - Telephone operator training for both the media and the public telephone teams.
  - Spokesperson training for all individuals who have to speak to the media.
  - Training for the media monitors.

UT-Battelle

- Strengthen the ORNL ERO training program. Specific actions to consider include:
  - Implement student examinations for training courses that include critical and time-sensitive tasks such as categorization, classification, and notifications to ensure understanding of course material.
  - Develop specific completion milestones for the training task analyses discussed in the ORNL Emergency Management Training Program Plan.
  - Identify the required content for after-action reports used to demonstrate completion of the annual ERO proficiency requirements.
  - Implement additional training for the consequence assessment teams to ensure proficiency in the application and use of all modeling programs for the variety of facilities, hazards, and initiating conditions present at ORNL.
- Enhance the drill and exercise program development and administration process and procedures. Specific actions to consider include:
  - Specify the rules of conduct applicable to the different types of drills conducted at ORNL.
  - Identify the minimum expected content for drill packages and drill after-action reports, including annual ERO proficiency demonstrations.
  - Develop a process to ensure the timely completion of drill after-action reports.
- Strengthen the ORNL Five-year Exercise Plan to ensure that all elements of the emergency management program are evaluated over a multi-year period. Specific actions to consider include:
  - Update the hazards included in the plan to ensure consistency with the hazards identified in the EPHAs.
  - Specify the year(s) that exercises will be conducted at each of the EPHA facilities.
  - Reconcile the hazards with the associated facilities scheduled for exercises each year in the plan to ensure that they are correctly planned.
  - Incorporate information on the exercises conducted over the previous five years that specifies the initiating event, facilities, hazards, emergency response program elements, and site-level ERO elements that were included to ensure that all program elements are validated.
- Consider clarifying in plans and procedures the responsibilities for annual, facility-level evaluations of facility-specific emergency response actions, including content of appropriate drill documentation.

Bechtel Jacobs Company, LLC

- Consider formalizing, through written and approved descriptions, the specific training requirements for local emergency supervisors and local emergency squads.

- Consider clarifying, in plans and procedures, the responsibilities for annual, facility-level evaluations of facility-specific emergency response actions, including content of appropriate drill documentation.

EnergX TN, LLC

- Consider formalizing, through written and approved descriptions, the specific training requirements for local emergency supervisors and local emergency squads.

- Consider establishing requirements for annual evaluated drills or exercises for facilities that have an EPHA to use in demonstrating responder proficiency in facility-specific emergency response actions.

Isotek Systems, LLC

- Consider establishing requirements for annual evaluated drills or exercises for facilities that have an EPHA to use in demonstrating responder proficiency in facility-specific emergency response actions.

APPENDIX E
Emergency Response

E.1 Introduction

The ultimate objective of emergency planning and preparedness is to prepare emergency responders so that they can apply their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public. Critical elements of the initial response include formulating protective actions, categorizing and classifying the emergency, and notifying onsite personnel and offsite authorities. Concurrent response actions include re-entry and rescue, provision of medical care, and ongoing assessment of event consequences using additional data and/or field monitoring results.

The information provided in this section is based on observations from two sets of emergency management limited-scope performance tests (LSPTs) evaluated by the Office of Independent Oversight. Each set of LSPTs involved a combined assessment of response activities within the Oak Ridge operations center (OROC), laboratory emergency response center (LERC), and Oak Ridge National Laboratory (ORNL) emergency operations center (EOC). An ORNL control cell was used as the incident command decision-making team. The LERC participants included the laboratory shift superintendent (LSS) and control center assistant (CCA). The EOC teams were composed of an ORNL crisis manager and a U.S. Department of Energy (DOE) emergency manager for leadership and decision-making authorities, and their full support staff, including a consequence assessment team (CAT). The CAT consisted of a plume modeler and subject matter experts in the areas of meteorology, radiological safety, industrial hygiene, and environmental protection.

Two operational emergency scenarios were developed for the LSPTs: a bomb threat at a facility that involved the potential release of a hazardous chemical (nitric acid) and a facility operational event that resulted in the release of transuranic radioactive waste. During the first scenario, it was expected that the event would be classified as an Alert because of the potential release of nitric acid and associated consequences, in accordance with the ORNL emergency action levels (EALs). During the second scenario, it was expected that the event would initially be categorized as an Operational Emergency due to environmental concerns involving a fuel spill in the waterways and later classified as a General Emergency due to a large fire, in accordance with ORNL EALs. LSPT scenarios were developed by ORNL trusted agents in conjunction with Independent Oversight personnel and were presented to the participants by several trusted agents to ensure scenario validity and delivery of accurate event cues.

E.2 Status and Results

In the event of an emergency, initial direction and control of the ORNL emergency response organization (ERO) is provided from the LERC by an on-duty LSS supported by an on-duty CCA, both positions being staffed 24 hours a day. The LSS assumes the role of laboratory emergency director (LED) and performs initial event categorization and classification; activates the ERO and response units; initiates offsite notifications for general emergency events; determines and implements protective actions; and provides offsite protective action recommendations (PARs). The OROC duty officer and central alarm station (CAS) operator notify the DOE Headquarters (HQ) watch office and are the 24-hour notification point for the Oak Ridge Office (ORO)

events occurring on the Oak Ridge Reservation. After the ORNL EOC is operational, the LSS transfers LED authority to the ORNL EOC crisis manager. The ORNL EOC DOE emergency manager coordinates with DOE HQ elements, the ORO EOC emergency manager, and state government officials. The ORNL crisis manager and DOE emergency manager review and concur with the press releases for technical accuracy. The CAT, including plume modelers in the ORNL EOC, supports both the incident commander and crisis manager by identifying areas that could be affected by the hazardous material release.

During the 2005 inspection, Independent Oversight personnel observed that incident commanders provided the necessary protection to nearby workers and responders at the scene and were familiar with site response protocols for interface and communication with the LSS. ORNL crisis managers demonstrated effective command and control techniques, made good use of the expertise within the EOC cadre, and, in most cases, were well supported by the CAT. However, the crisis managers and LSSs had difficulty in using the EALs and available maps to develop accurate event classifications and provide appropriate PARs to offsite agencies. In addition, the LSSs were not proficient in performing some emergency tasks and were burdened by a cumbersome notification process that distracted them from managing the event. This 2008 inspection identified several performance improvements, particularly those related to the ORNL EOC crisis managers' and LSSs' abilities to use the EALs to accurately classify the LSPT events, provide protective actions for onsite personnel, and provide offsite PARs. However, the CATs did not demonstrate the ability to effectively generate accurate and timely initial consequence assessments or formulate protective actions based on updated and refined consequence assessment data.

E.2.1 Oak Ridge Operations Center Teams

OROC personnel demonstrated that they are knowledgeable of their roles, responsibilities, and protocols. Overall, OROC personnel effectively performed assigned duties through use of checklists and consistently completed and faxed the initial notification form to the HQ Watch Office, Tennessee Emergency Management Agency, the City of Oak Ridge, and affected counties. Throughout the LSPTs, the OROC duty officer and OROC CAS operator effectively communicated and coordinated tasks. The OROC duty officer received complete and accurate information for the notification form through use of repeat-back practices. In one case, the OROC CAS operator self-identified, through use of a checklist, that an initial notification form had not been faxed and immediately ensured the task was completed. In all cases, OROC personnel issued the initial press release to the media within one hour of event categorization.

A key OROC task is to verbally notify the DOE HQ Watch Office of an emergency event. OROC personnel performed this function in all but one LSPT scenario (when it was not performed for an event reclassification to a General Emergency). However, this omission was mitigated by the DOE operations/HQ liaison in the ORNL EOC who performed this task in a timely manner.

E.2.2 Laboratory Emergency Response Center Teams

Overall, LSSs immediately assumed the LED role upon event initiation, quickly established a response organization, and exercised their authority to implement the ORNL Emergency Plan. LSSs consistently initiated an appropriate response by security and fire emergency resources and dispatched personnel using safe route information. After the ORNL EOC became operational, LSSs formally transferred LED authority to the crisis manager. LSSs demonstrated disciplined use of their initial assessment form, the terrorist bomb threat stand-off chart, and the ORNL bomb threat checklist during the bomb threat scenario. In addition, handwritten logs were maintained by LERC personnel to support post-event analysis and provide a chronology of notifications and communications.

The LERC teams effectively recognized emergency events and consistently and accurately categorized and classified events using appropriate discretionary or facility-specific EALs. LSSs completed initial verbal notifications to OROC, Tennessee Emergency Management Agency, and City of Oak Ridge within 15 minutes of event categorization, as part of the notification process. LSSs used the notification form to record information that they subsequently provided by telephone to the offsite authorities. Although the LSSs performed their emergency response duties using effective teamwork within the LERC, several notification weaknesses were observed. For example:

- Incomplete verbal notification information was provided for the upgrade notifications by one of the LSS teams.
  - For the Site Area Emergency offsite notification, the LSS communicated only three items (i.e., the time of declaration, nature of the event, and that the field monitoring team and joint information center were being activated). The notification form was not used, and, although known, the LSS provided no other information.
  - For the General Emergency offsite notification, the LSS verbal message included only two items (i.e., the time of declaration and the nature of the event) and, importantly, lacked information about PARs. Mitigating this weakness were the direct telephone communications between the ORNL EOC and various offsite entities during which the PARs and affected sectors were identified.
- The ORNL EOC public information director faxed written sitewide announcements to the LSS for broadcast over the public address system; however, during several scenarios, no one in the ORNL EOC called the LERC to inform the LSS or CCA that announcements had been prepared and sent. This resulted in the announcements remaining unnoticed in the fax machine (for up to 30 minutes) and the new information not being provided to ORNL personnel.

To summarize, LERC teams effectively demonstrated their ability to recognize operational emergencies, implement the ORNL Emergency Plan, dispatch appropriate response units, and activate the ERO. Event classifications were consistently accurate, and initial verbal notifications were timely and accurate. A few notification weaknesses were observed, almost exclusively related to the performance of event classification upgrades, but because of redundant communication mechanisms in the ORNL EOC, these notification problems did not materially impact the overall response effectiveness. The upgrade notification weaknesses are likely due to the absence of clear roles and responsibilities for implementation of the notification process, as described in Section C.2.2 and addressed by the associated finding.

E.2.3 Emergency Operations Center Teams

Overall, the crisis managers and DOE emergency managers demonstrated effective command and control, decision-making, and leadership within the ORNL EOC. Crisis managers and DOE emergency managers were familiar with EOC operations and their assigned roles and responsibilities. Crisis managers conducted formal and comprehensive LSS-to-crisis manager LED turnovers and informed ERO personnel of the transfer of LED responsibilities. Crisis managers generally articulated strategies, priorities, and direction to the EOC cadre and were sensitive to the protection of workers, the public, and the environment (e.g., accountability, protective actions and PARs, drainage of releases to waterways). Lastly, periodic situational briefings ensured the involvement of the DOE emergency manager and appropriate ORNL EOC cadre in key decision-making processes (e.g., EAL verification, bomb detonation timeline, relationship of EOC location to plume location, meteorological conditions, etc.).

With one exception, ORNL EOC personnel effectively recognized emergency events and used EALs to consistently categorize and classify the events. ORNL EOC personnel formulated appropriate protective actions for onsite personnel and the nearby public and implemented them through the onsite and offsite notification processes. DOE 911 Services personnel, located in the ORNL EOC, proactively assessed evacuation routes for personnel at assembly points and established conservative roadblocks to ensure the safety and health of site personnel and the public. Bechtel Jacobs Company, LLC (BJC) and EnergX TN, LLC (EnergX) facility representatives reported to the ORNL EOC and provided the necessary technical support pertinent to their respective facilities. EOC personnel used their position-specific checklists to support decision-making tasks and maintained event logs to support post-event analysis and provide a chronology of tasks performed. The OROC, LERC, and ORNL EOC personnel effectively exchanged information, and the DOE operations/HQ liaison provided timely information to external organizations in the form of updated situation reports.

The inspection team observed a few response inconsistencies and communication difficulties during ORNL EOC activities. During one bomb threat scenario, the LSS used a bomb standoff chart to determine an isolation zone of 300 feet to protect personnel against the bomb blast effects. The ORNL EOC used the Emergency Response Guidebook for a large spill of nitric acid to determine an isolation zone of 500 feet to protect against the potential chemical dispersion. In addition, although the bomb standoff chart recommends an 1800-foot take-cover radius for the bomb threat, this was only communicated by one LSS team to the ORNL EOC and was not mentioned or discussed by the other LSS/EOC team. However, this inconsistency was mitigated because the LSS had evacuated personnel within the 300-foot isolation zone and sheltered in place all nonessential site personnel. In addition, EOC personnel had difficulty using one EAL because of unclear wording regarding the applicability of the EAL to facilities other than the building number specifically referred to in the EAL. One of the crisis managers obtained additional information from the EnergX facility representative and upgraded the event to a General Emergency. The other crisis manager initially upgraded the event to a Site Area Emergency (rather than the expected General Emergency) because of the EAL requirement that a determination first be made as to the size of the fire, but no such information was available. The crisis manager did not realize for several minutes that this information had already been reported from the scene because the 911 Services personnel, who had input a WebEOC message updating the status of the fire to a "large fire," did not immediately report the status of the fire verbally to the crisis manager or any other EOC staff. The crisis manager then upgraded the event to a General Emergency, but did not ensure that the entire EOC cadre was aware of the upgrade. The ORNL EOC consequence assessment manager was unaware of the classification upgrade to General Emergency until 17 minutes after the upgrade, when it was announced to the EOC cadre during a situational briefing.

The ORNL EOC public information directors and ORO EOC emergency public information (EPI) writer were knowledgeable of their procedures and responsibilities and were able to execute tasks effectively. ERO activities supported effective collection and dissemination of information for site workers and the public, and crisis managers and DOE emergency managers promptly reviewed and concurred with (or appropriately altered) site public address announcements and news releases to ensure their accuracy and completeness before their dissemination. The ORNL EOC public information director developed timely and accurate public address announcements and news releases that were reviewed within the 15-minute deadline. When participating, the EPI writer aggressively pursued information on the timing and classification of the events and developed timely news releases, public advisories, and site broadcast e-mails. However, an inaccurate time was entered for the upgraded classification to General Emergency, and the public address advisories were not consistently given to the duty officer in the OROC for distribution.

To summarize, ORNL EOC crisis managers and DOE emergency managers demonstrated appropriate concern for identifying hazards and the safety of site workers and responders. The ORNL EOC cadre was familiar

with their assigned roles and responsibilities for EOC operations, implemented appropriate protective actions to protect onsite personnel and the nearby public, and ensured that notifications were issued to site workers and offsite authorities. ORNL EOC public information directors and ORO EOC EPI writers were effective in providing timely public address announcements and news releases. However, inconsistent initial isolation zone determinations between the LSS and ORNL EOC during one scenario and communication difficulties on both days pertaining to the fire scenario were observed. These issues did not substantially impact the overall effectiveness of the ORNL EOC teams.

E.2.4 Consequence Assessment Team

The CAT, which works in a separate room in the ORNL EOC, is staffed with a good mix of expertise – modeler, meteorologist, environmental, radiological safety, and industrial hygiene subject matter experts. CAT personnel were generally knowledgeable of their required tasks, including the need to support such other key activities as event classification and protective action decision-making. Consequence assessment managers in the main EOC room led the CAT and provided consequence assessment briefings to the crisis manager. The CAT has many resources available to them, such as emergency planning hazards assessments (EPHAs), dispersion models, meteorological data, and chemical handbooks, for performing their function. However, CAT modeler conclusions between the two sets of LSPT scenarios were significantly different and were not accurate or timely. Modelers experienced difficulty in performing an event-based consequence assessment and did not demonstrate the ability to effectively formulate protective actions based on updated and refined consequence assessment data.

Numerous weaknesses were identified during the conduct of the LSPTs in performing the consequence assessment function. For example:

- The Computer Assisted Protective Action Recommendation System (CAPARS) is the primary modeling software used by the CAT modelers, but CAPARS does not contain an explosive release algorithm. As a work-around, the modelers produced a plume plot projection utilizing a one-minute fire release for the bomb threat event in order to obtain a plume plot projection. The plume plot projections resulted in much greater protective action distances than indicated by the EPHA (which is not based on CAPARS) and the EAL (greater than three miles versus 150 feet).

- One CAT modeler incorrectly used sodium hydroxide rather than nitric acid in the dispersion model program.

- A method to quickly and accurately calculate a source term is not available. During the bomb threat event, one CAT modeler performed a hand calculation to convert gallons of nitric acid to grams of nitric acid and obtained a result that was in error by a factor of ten. The other CAT modeler performed a hand calculation, that was then checked, but the checks did not identify errors in the equation and value for specific gravity, which also resulted in an error by a factor of ten. Also, the method used by both CAT modelers assumed a nitric acid concentration of 100%, rather than the 63% given to them by the consequence assessment managers.

- Weaknesses in dispersion modeling proficiency were distinctly evident and adversely affected the ability of the two teams in formulating protective actions based on updated and refined consequence assessment data. Modelers were unsure about what source terms and release durations should be input into the dispersion models to obtain a plume plot and did not achieve their checklist requirement to develop a plume plot within ten minutes after arriving in the EOC.

- The archived predetermined consequence analysis scenario files in CAPARS, as well as the source term reference manual in the CAT room, are out of date. The BJC and EnergX EPHAs were revised and issued in 2008, but the archived scenario files used for performing timely initial consequence assessments are dated 2004 and 2005 for the respective facilities.

In addition, the CAT modelers were not consistently familiar with EPHAs and source term determinations documented in the EPHAs. One modeler did not know where to find the consequence analysis assumptions in the relevant EPHA. The other modeler had a general understanding of EPHA layout and content; this modeler obtained source term determinations for the fire scenario and obtained consequence assessment projections comparable to the EPHA, but did not refer to the EPHA during the bomb threat scenario. The consequence analysis assumptions used by the CAT modelers for the bomb threat scenario were dissimilar to those used in the EPHA (i.e., concentration of nitric acid, damage ratio, release fractions, etc.). Therefore, the consequence assessment projections obtained during the bomb threat scenario by both modelers (warranting a Site Area Emergency) were not comparable to those in the EPHA and EAL, which indicated that the highest classification would be an Alert.

Finding #6: During limited-scope performance tests, ORNL consequence assessment teams did not consistently produce accurate and timely initial assessments and did not provide consequence assessment projections that ensured appropriate protective action decision-making, as required by DOE Order 151.1C.

To summarize, the CATs are staffed with the appropriate areas of expertise and have many references and tools available to support their consequence assessment function. However, the CAT modelers did not demonstrate proficiency in developing plume plots and providing event classification and PARs that would provide for timely and accurate results. Furthermore, performance by the CAT modelers resulted in significantly different source terms and consequence assessment results than those contained in the EPHAs.

E.3 Rating

A rating of EFFECTIVE PERFORMANCE is assigned to the Oak Ridge operations center teams.

A rating of EFFECTIVE PERFORMANCE is assigned to Laboratory emergency response center team decision-making.

A rating of EFFECTIVE PERFORMANCE is assigned to ORNL EOC team decision-making.

A rating of NEEDS IMPROVEMENT is assigned to consequence assessment team decision-making.

E.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

UT-Battelle

- Consider emphasizing the use of WebEOC and event status boards during drills and exercises to strengthen the use of available information systems.
- Strengthen notifications and communications with offsite organizations. Specific actions to consider include:
  - Improve the efficiency of LSS personnel in completing the upgraded notification form by verifying that the notification form is limited to critical and other more urgent information.
  - Document verbal information communicated during the upgraded notification process to ensure repeatability and information transfer.
  - Implement a warning device on the fax machines to indicate when a fax is received.
- To enhance the operational awareness of response activities, consider keeping a map displayed and updated in the EOC and LERC with the following information.
  - Isolation zone and protective action zone distances
  - Locations of staging areas, traffic control points, and command post
  - Buildings evacuated and evacuee relocation facilities.
- To enhance the consequence assessment output products and the timeliness of their availability, consider the following:
  - Provide a spreadsheet for converting gallons to grams that incorporates hazardous material specific data (i.e., curies/gram, density of material, etc.) and train and drill consequence assessment personnel on its use.
  - During exercises and drills, emphasize the use of information contained in the EPHA for use in calculating event consequences.

APPENDIX F
Readiness Assurance

F.1 Introduction

Emergency management program administration includes elements of readiness assurance, as well as performance of some planning and response functions. Readiness assurance activities ensure that emergency management program plans, procedures, and resources of the Oak Ridge Office (ORO) and Oak Ridge National Laboratory (ORNL) will facilitate an effective response to an emergency at the site. Readiness assurance activities include implementation of a coordinated schedule of program evaluations, appraisals, and assessments. Key elements of the readiness assurance program include the active involvement of Office of Science (SC) line organizations in monitoring program effectiveness, implementing self-assessment programs, and ensuring timely corrective actions are taken for identified weaknesses. U.S. Department of Energy (DOE) field elements also have direct responsibility for performing some emergency response activities, including oversight of the site's emergency response and activities related to the release of emergency public information to site workers and the public.

This inspection examined the processes by which ORO provides guidance and direction to and maintains operational awareness of the ORNL emergency management program. The inspection included reviews of ORO emergency management program assessment processes and University of Tennessee-Battelle, LLC (UT-Battelle), Bechtel Jacobs Company, LLC (BJC), and Isotek Systems, LLC (Isotek) emergency management self-assessment and issues management processes.

F.2 Status and Results

F.2.1 DOE Line Program Management

In 2005, Independent Oversight found that ORO was engaged in oversight of the ORNL emergency management program and had adequate systems and processes for tracking identified issues and actions to closure. However, formal assessments did not fully address the appropriate functional elements of emergency management at each of the site contractors' facilities, and the issues tracking system received only limited use in tracking the contractors' corrective actions. This 2008 inspection found that ORO has improved its oversight of the emergency management programs at ORNL. For example, ORO personnel have scheduled and conducted several assessments of contractor programs, identified issues requiring follow-up and correction, and actively engaged in the follow-up of the issues identified during the previous inspection. Nevertheless, an area of continued weakness involving oversight of the ORNL event contractor programs was identified.

ORO has developed an adequate framework for executing its responsibilities to provide oversight and direction to ORNL as the cognizant field element office. The Oak Ridge Reservation Emergency Plan assigns responsibility for ORNL program administration and oversight of UT-Battelle to the Assistant Manager for Science (AMS), who also heads the ORNL Site Office. The Assistant Manager for Environmental Management (AMEM) is responsible for oversight of the ORNL event contractors: BJC, Isotek, and EnergX. Additionally, within the Office of the Assistant Manager for Security and Emergency Management, the

emergency management team leader is responsible for overall ORO program management and operation of the ORO emergency operations center (EOC). The ORO administrative manual includes chapters that address roles and responsibilities of the assistant managers, although the AMS and AMEM sections do not contain detailed entries for emergency management oversight. In addition, ORO has developed an internal order governing emergency management that addresses roles and responsibilities for approval of documents and oversight of contractors; however, it is out of date, and a draft to replace it is currently being reviewed as part of the approval process.

With few exceptions, ORO provides adequate direction and oversight to the Laboratory's emergency management program and has established effective communication mechanisms with the contractor's emergency management organizations. Nearly daily contact is maintained between AMS personnel and UT-Battelle managers through attendance at the Facility and Operations Directorate morning meetings (an informal meeting to discuss items of current interest). Also, DOE personnel and contractor managers meet regularly in several different forums to discuss emergency management items. AMS utilizes the performance evaluation process, which includes semi-annual reviews of performance, to encourage improvements in the ORNL emergency management program. ORO personnel have reviewed and/or approved such key site emergency management documents as emergency readiness assurance plans and the emergency planning zone. ORO personnel also reviewed and AMEM approved a number of hazard surveys and emergency planning hazards assessments (EPHAs) developed by its contractors, and others are currently under review. Nonetheless, although AMS and ORO personnel reviewed the UT-Battelle hazard surveys and some EPHAs, AMS has not approved these documents.

The ORNL Site Office has established and adequately implemented assessments of the ORNL emergency management program under UT-Battelle. To supplement the ORO procedures, the site office developed internal procedures that address oversight, formal assessments, self-assessments, and corrective action development and follow-up. Annual assessments of the Laboratory program performed in fiscal years 2005 to 2007 adequately address the program functional elements, and assessment reports indicate the reviews were thorough and identified a number of important issues. Also, beginning in spring 2007 and continuing until its completion earlier this year, ORO conducted a detailed, well-documented effectiveness review for the corrective actions stemming from the 2005 Independent Oversight inspection. A programmatic assessment of some of the Laboratory's emergency management functional elements was scheduled for this year; however, it has not yet been performed. Currently, AMS plans an assessment of two of the 15 functional elements, the planning and conduct of the recently completed annual exercise and the UT-Battelle self-assessment program, during the remainder of the fiscal year.

The Office of the AMEM also has developed a supplemental procedure that adequately addresses scheduling of assessments and provides sufficient direction for managing their performance. ORO personnel from the emergency management team and AMEM have conducted some assessments of the contractors' programs. For example, in 2007, ORO completed an assessment of all the elements of the BJC emergency management program at the East Tennessee Technology Park, including the corporate hazard survey and EPHA processes. In addition, AMEM included emergency management as a topical area in operational readiness reviews conducted at two ORNL facilities, including the Transuranic Waste Processing Center. Nevertheless, as identified in the 2005 inspection, AMEM has not completed full assessments of the event contractors' emergency management programs at ORNL, including, for example, reviews of the contractor self-assessment programs.

Finding #7: ORO has not conducted full assessments of the contractor emergency management and self-assessment programs for environmental projects at ORNL, as required by DOE Order 151.1C.

When issues are identified by ORO personnel, they are prioritized according to their appraised risk and significance as either findings (priority 1 & 2 issues) or observations (priority 3). ORO personnel appropriately enter the prioritized issues into the ORO computer-supported issue tracking system, and contractor organizations enter the issues into the applicable corrective action tracking systems. Findings from AMS assessments are entered and tracked to closure in the UT-Battelle corrective action tracking system, and, although observations do not require contractor action or response, UT-Battelle routinely addresses the observations with corrective or follow-up actions. Similarly, BJC personnel have analyzed issues identified by AMEM, and corrective actions have been assigned, tracked, and completed. Completed actions are routinely verified by ORO personnel prior to final closure.

In addition to a contractor assessment program and evaluation of the Federal role during exercises, ORO has implemented an internal self-assessment program, and the emergency management team completed self-assessments of the overall ORO emergency management program in 2007 and 2008. The self-assessment reports provide evidence of mostly thorough reviews of the site program, particularly with respect to the flowdown of requirements and roles and responsibilities. For example, the 2007 self-assessment identified a deficiency in completing required oversight activities at the ORNL environmental activities under AMEM. Recently AMEM personnel informally reviewed implementation of its emergency management oversight responsibilities as part of the transfer of responsibility from one division to another. Further, some self-assessment activities involving the operation of the ORO EOC have been completed. However, ORO personnel have not included annual self-assessments of DOE emergency response functions within the ORNL EOC.

In response to the last Independent Oversight inspection, ORO, UT-Battelle, and BJC developed a comprehensive corrective action plan and, as noted in this and previous sections, adequately implemented the actions to address the identified findings. All the actions in the corrective action plan have been completed, and evidence of completion is readily available. Both UT-Battelle and BJC completed effectiveness reviews for the individual findings, including demonstrations of performance when applicable. In 2007, ORO completed effectiveness reviews for those findings with completed actions and, in two cases, identified the need for additional actions. Subsequently, UT-Battelle and BJC completed all the initial and/or additional actions, and ORO performed and documented an appropriate overall effectiveness review. Though the site's corrective actions were completed and substantially effective; as noted above, the Office of the AMEM has not implemented a comprehensive assessment program for its projects at ORNL.

Although the corrective actions and closure process were mostly thorough, one finding from the 2005 inspection, which identified that SC was not conducting periodic assessments of the ORO and ORNL emergency management programs, was closed without implementing an effective corrective action. Subsequently, through the Office of Science Management System, SC established a framework for executing its oversight responsibilities, both at Headquarters and the sites. Under the Deputy Director for Field Operations, the Environment, Safety and Health Division of the Office of Science (SC-31.1) provides oversight of the ORO and ORNL emergency management programs through review of the emergency readiness assurance plans and participation in site drills and exercises. SC-31.1 recently visited ORNL to observe the annual full site exercise and has recently developed procedures to standardize emergency operations at their ten site offices. The corrective action for the finding committed to developing an oversight program

for the ORO and contractor programs that would ensure review of the programs every three years. This finding was closed by SC-31, and found to be satisfactory during the effectiveness review, after developing an integrated assessment schedule that included an assessment of ORO for fiscal year 2008. However, this assessment was not performed.

Finding #8: SC has not implemented effective corrective actions to ensure that periodic evaluations of the ORO and ORNL emergency management program are performed, as required by DOE Order 414.1C, *Quality Assurance*, and DOE Order 151.1C.

ORO has developed and implemented a generally comprehensive training program for the ORO EOC members and Federal members of the joint information center (JIC) and ORNL EOC. The ORO training program includes all Federal and contractor ORO EOC members, the four Federal ORNL EOC positions, and the two Federal JIC positions, along with a contractor JIC facility manager position. Training provided to the ORO emergency response organization (ERO) cadre contains an appropriate mixture of instructor-led training courses, self-study, required reading, and web-based Federal Emergency Management Agency courses. In addition, ORO provides annual refresher training to the ORO ERO through required reading and includes a questionnaire that is completed and returned to demonstrate understanding of the material. ORO tracks the training status of the ORO ERO members through a computer database that is checked manually to ensure that all ORO ERO personnel are current in their training requirements. ORO participates in a sufficient number of drills and exercises annually to ensure that all ORO ERO members can maintain proficiency for their assigned response duties. However, some minor weaknesses were identified in the training program procedure and implementation. Although personnel demonstrate proficiency before being placed on the ERO cadre roster, the ERO training program procedure does not clearly state that requirement. In addition, the training database lists the initial date that required reading of the applicable sections of the ORO Emergency Plan was completed rather than when subsequent revisions were read or discussed in annual refresher training. Further, due to only one qualified member on the ORO EOC roster for the Science Operations Advisor position, current practice is for a person qualified as an ORNL DOE Emergency Manager to fill this position if necessary. However, this practice is not documented in ORO procedures or on the ORO ERO roster.

To summarize, ORO oversight of the emergency management programs at ORNL is mostly effective, and its direction and oversight of the Laboratory's response to the previous inspection promoted adequate responses to most of the findings. The Office of the AMS provides direction to UT-Battelle through frequent interactions, utilizes the performance evaluation program appropriately, and conducts the required oversight assessments of the UT-Battelle program. In addition, Office of the AMEM personnel evaluated some aspects of the event contractor programs under its responsibility at ORNL. Moreover, ORO has also implemented a comprehensive Federal training program for the ORO EOC and selected JIC positions, and proficiency is demonstrated before new members are added to the cadre. Although direction and oversight of the Laboratory program by AMS has improved since the previous inspection, a few areas of weakness or that need additional improvement remain. For example, as identified during the 2005 Independent Oversight inspection, AMEM personnel have not conducted complete assessments of the event contractor programs at the Laboratory, as required. In addition, some planning documents have not been reviewed and approved in a timely manner, and ORO self-assessments have not addressed DOE implementation of its roles and responsibilities during an emergency response at ORNL. Further, some minor weaknesses were noted in the clarity of the proficiency requirement in the ORO training program procedure and the undocumented practice of allowing some substitutions in the ORO EOC. Finally, SC has not conducted a periodic review of the site program, which is a specific requirement of DOE Order 151.1C and is also a repeat weakness from the previous Independent Oversight inspection. Nonetheless, on balance, DOE line management, particularly within the Office of the AMS, is effectively performing its program oversight and response functions.

F.2.2 Contractor Feedback and Improvement

The 2005 Independent Oversight inspection reported that, with some exceptions, UT-Battelle and BJC had established the foundation for a potentially solid readiness assurance programs, and both programs were supported by excellent assessment and issues management tracking processes. However, the inspection also noted that UT-Battelle and BJC had not fully implemented their self-assessment programs. Additionally, corrective actions taken by UT-Battelle had not always been implemented in a timely manner or been effective in correcting the underlying weaknesses. This 2008 inspection found that both UT-Battelle and BJC have implemented comprehensive readiness assurance programs, including appropriately designed and executed self-assessments and effective systems for tracking and implementing corrective actions.

Collectively, UT-Battelle, BJC, and Isotek have established comprehensive processes for performing the required emergency management program feedback and improvement activities. The ORNL Emergency Plan establishes the roles and responsibilities for the readiness assurance program conducted by UT-Battelle, and the BJC emergency management program description includes roles and responsibilities for the conduct of its self-assessment program as an event contractor. All three organizations have institutional procedures that govern the conduct of management (self) assessments. Further, UT-Battelle has a specific procedure that addresses the conduct of self-assessments for the emergency management program, and BJC has an assessment approach and a tailored set of criteria that are appropriate for its role as an event contractor at ORNL.

In accordance with its procedures, UT-Battelle has implemented a self-assessment program that appropriately addresses all of the emergency management program elements. The assessment program procedure includes a schedule that incorporates each of the program elements and sub-elements on a rotating basis (beginning in December 2007) and establishes performance goals and criteria from the DOE Emergency Management Guide for each of the program element assessments. The assessment procedure also includes an additional performance goal and supporting criteria for local emergency squads and local emergency manuals, which are checked each year. Areas to be included in the annual schedule of assessments are entered into the Assessment and Commitment Tracking System (ACTS), including assessments of all program elements, a management system maturity evaluation, checks on the status of the training and drill/exercise programs, and development of the emergency readiness assurance plan. The program also includes a semi-annual review of issues to identify trends and recurring issues, as well as management reviews of actual events. Assessments of each of the program elements, along with other scheduled assessments, have been satisfactorily completed over the last two years with a number of issues and improvement items identified.

UT-Battelle has implemented an effective process for follow-up of issues identified during assessments and exercises; these actions have led to continued program improvements. Issues identified by internal and external assessments are entered into ACTS, which provides an effective tool for tracking the actions and closure documentation as well as the effectiveness reviews. Nearly all actions appropriately address the underlying issue(s) and are tracked to closure; evidence of completed actions is included in the database. UT-Battelle also proactively reviews the results of Independent Oversight emergency management inspections at other sites, identifies opportunities to apply lessons learned to their program, and assigns suitable action items. Corrective actions are also entered into ACTS for issues/items identified during sitewide drills and exercises. The UT-Battelle computer-supported system is a particularly strong tool that facilitates tracking actions to closure and archiving the supporting closure evidence.

As an ORNL event contractor, BJC has implemented an appropriate self-assessment program for the emergency management program elements applicable to the BJC projects at ORNL. Assessments of the projects' emergency management programs are included in an internal BJC schedule, which, for example,

identifies the scope, schedule, and responsible individuals. In some cases, BJC has effectively combined self-assessments with drill and exercise evaluations. Assessments are implemented according to schedule, and, although a few evaluations lack discussion of some of the assessors' activities, most of the assessments are thorough and well documented. Although one element of the assessments, hazard surveys and EPHAs, was overlooked until recently, self-assessments have addressed nearly all the functional elements in the tailored criteria and identified items/issues requiring program changes and improvements.

BJC has implemented a suitable program to manage issues and corrective actions for its emergency management feedback and improvement program. The issues management program is based on the BJC corporate program; identified issues are entered into the tracking system, responsible individuals assigned, and corrective actions determined and implemented. Issues management is adequately supported by a computer-based management system, and corrective actions are tracked to completion and adequately documented in the management system. Many of the issues identified during the self-assessments are corrected and closed during the assessment.

As an event contractor, Isotek has an adequate program for implementing assessments and completing corrective actions for identified issues. Through a management assessment procedure, Isotek established an appropriate program for the scheduling, conduct, and follow-up of self-assessments. An assessment of the emergency management program was scheduled and performed this fiscal year using a reasonable set of requirements for an event contractor. The assessment identified issues with the facility's technical bases, local emergency manuals, and employee training. Issues were entered into the condition reporting system, and corrective actions were identified and either completed or appropriately tracked.

To summarize, UT-Battelle has implemented an effective feedback and improvement program to support its role as the lead contractor for the emergency management program at ORNL. A comprehensive set of assessments is scheduled and conducted on an annual basis. Issues identified through assessments and exercises are appropriately assigned corrective actions, which are tracked to completion and documented in the corrective action tracking system. BJC has instituted an assessment program that uses an appropriately tailored set of criterion for its role as an event contractor at the Laboratory. With one minor exception, the assessments have been performed and documented as scheduled and corrective actions identified and implemented. In addition, an Isotek self-assessment identified several important programmatic weaknesses that are currently being addressed. Overall, the feedback and improvement programs have improved since the previous inspection and have contributed to overall improvements in the emergency management program.

F.3 Rating

A rating of EFFECTIVE PERFORMANCE is assigned to the area of DOE line program management.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of contractor feedback and improvement.

F.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Office of Science

- To improve the oversight of ORO and ORNL emergency management programs, consider the following actions:
  - Using a team of independent emergency management subject matter experts (such as personnel from the Headquarters and Chicago offices), conduct a periodic review of the site program.
  - Participate in the preparation and conduct of one of the site's emergency exercises and provide written feedback on the performance of ORO and ORNL.
  - Conduct independent reviews of the effectiveness of corrective actions developed by ORO for findings identified in this 2008 Independent Oversight report.
  - Perform independent reviews of key technical planning documents provided to SC by ORO, and provide comments to ORO and ORNL.

Oak Ridge Office

- Consider performing an analysis directed towards identifying the challenges of a timely review and approval of hazards surveys and EPHAs and that assesses the need for additional capabilities through such mechanisms as training additional personnel or obtaining outside support.
- To enhance oversight activities and to ensure that up-to-date knowledge of the status of the ORNL emergency management program is maintained, consider the following specific actions:
  - Perform assessments of some of the programmatic elements in each fiscal year.
  - Review the contractors' readiness assurance programs annually.
  - Tailor assessments of the event contractors to fit their roles and responsibilities.
- Consider expanding the ORO self-assessment program to fully evaluate the readiness of Federal staff in the ORNL EOC to perform as an integral element of the ORNL EOC team.
- Enhance the effectiveness of the ORO ERO training program by considering the following actions:
  - Clarify the requirements in the ORO ERO training program procedure to indicate that ERO members are added to the monthly duty roster upon completion of training and an initial demonstration of proficiency.

- Record the date in the ORO ERO training database when required reading was completed for subsequent revisions to plans or checklists, or when changes to required reading documents were discussed in annual refresher training.

- Document the practice of allowing an ORNL DOE emergency manager to fill in for the ORO EOC Science Operations Advisor, and include the appropriately qualified personnel on the ERO roster.