Inspection of Emergency Management at the

Oak Ridge Office and the Oak Ridge National Laboratory

October 2005

Office of Independent Oversight
Office of Security and Safety Performance Assurance
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OVERSIGHT

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
BJC	Bechtel Jacobs Company, LLC
CAT	Consequence Assessment Team
CCA	Control Center Assistant
CFR	Code of Federal Regulations
CM	Crisis Manager
DOE	U.S. Department of Energy
EAL	Emergency Action Level
EM	Emergency Manager
EMG	(DOE) Emergency Management Guide
EMP	Emergency Management Procedure
EMT	Emergency Management Team
EPP	Emergency Plan Procedure
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
FD	Fire Department
FWENC	Foster Wheeler Environmental Corporation
HFIR	High Flux Isotope Reactor
IC	Incident Commander
JIC	Joint Information Center
LES	Local Emergency Supervisor
LEM	Local Emergency Manual
LERC	Laboratory Emergency Response Center
LSS	Laboratory Shift Superintendent

(Continued on inside back cover)

1.0 Introduction

The Secretary of Energy's Office of Independent Oversight (formerly the Office of Independent Oversight and Performance Assurance), within the Office of Security and Safety Performance Assurance, conducted an inspection of the emergency management program at the U.S. Department of Energy (DOE) Oak Ridge National Laboratory (ORNL) in September and October 2005. The inspection was performed by the Office of Emergency Management Oversight.

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. The Office of Nuclear Energy, Science and Technology provides programmatic direction for certain ORNL facilities and, in accordance with memoranda of agreement with SC, has responsibilities for certain aspects of operations at ORNL nuclear facilities, such as the High Flux Isotope Reactor (HFIR). Additionally, the Office of Environmental Management (EM) provides program management and direction for environmental cleanup activities at a significant number of ORNL facilities.

Responsibility for operation of ORNL falls under the Oak Ridge Office (ORO). ORO reports directly to SC and is responsible for providing direction and oversight for the emergency management program at both ORNL and East Tennessee Technology Park (ETTP), 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 related areas when requested by the line programs. Within ORO, responsibility for coordination and oversight of site-level activities rests with the cognizant line manager. Consequently, the Assistant Manager for Science is responsible for oversight of the University of Tennessee-Battelle Memorial Institute (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) and Foster Wheeler Environmental Corporation (FWENC) in their roles as event contractors.

Under contract to DOE, ORNL is managed and operated by UT-Battelle. Some facilities located at ORNL are managed and operated by other contractors, such as BJC, FWENC, and Wackenhut Services, Incorporated. The ORNL Emergency Preparedness Department, under the Associate Laboratory Director for Facility 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 and medical emergencies at all ORNL facilities regardless of operating contractor. The operating contractors are responsible for the emergency program within their respective facilities, including the development of hazards surveys and assessments and facility-specific emergency preparedness procedures. The facilities' 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. The Laboratory's six major scientific competencies include neutron science, energy, high-performance computing, complex biological systems, advanced materials, and national security. 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 various commercial organizations. In addition, the site has an extensive environmental management program, conducted by BJC and FWENC, for the cleanup and disposal of legacy wastes from energy research and weapons production. Activities at ORNL involve a variety of radiation and chemical hazards that need to be effectively controlled, and have the potential to cause classifiable emergencies.

This evaluation included an examination of the status of selected critical elements of the emergency management program at ORNL, and included reviews of hazards survey and assessment documents, the ORNL emergency plan, and associated sitewide and facility-specific implementing procedures. The inspection team focused on emergency planning by ORNL through examination of the processes for developing, reviewing, and approving emergency planning hazards surveys, as well as the products themselves. The team also examined the processes for managing program plans and procedures and for ensuring readiness through training, drills, and exercises. In evaluating the area of emergency response, the inspection team conducted limited-scope performance tests with a sample of the site's key emergency response decision-makers to determine their ability to employ the available procedures, data sets, equipment, and skills when responding to postulated emergency conditions. Finally, the team evaluated the site's emergency public information program, including policies and procedures for operation of the Joint Information Center, and examined line management's ability to implement readiness assurance activities.

In the evaluation of emergency management programs, Independent Oversight has placed increasing emphasis on DOE line management oversight in ensuring effective emergency management programs, and has been reviewing the role of DOE organizations in providing direction to contractors and conducting line management oversight of the contractor's activities. In reviewing DOE line management oversight at ORNL, Independent Oversight concentrated on the effectiveness of ORO in managing the various contractors, including such management functions as setting expectations, providing implementation guidance, monitoring and assessing contractor performance, and monitoring and evaluating self-assessments.

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

2.0 Results

2.1 Positive Program Attributes

Since the 1999 Independent Oversight follow-up inspection, the ORNL emergency management program has improved in most areas evaluated. To support the implementation of program improvements, UT-Battelle completed a reorganization of emergency planning leadership in July of 2004 after assuming the lead contractor position for ORNL in 2000. Since completing this reorganization, the ORNL team has accelerated work on many program improvements. The UT-Battelle Laboratory Protection Division managers and staff are knowledgeable of most of the remaining weaknesses and committed to making the necessary improvements. Positive attributes of the emergency management program are discussed below.

UT-Battelle and BJC have incorporated significant improvements in the content of emergency planning hazards assessments (EPHAs) and in the processes that define how hazards surveys and EPHAs are to be developed and maintained. Processes for preparing the hazards surveys, EPHAs, and emergency action levels (EALs) have been developed that incorporate the provisions of DOE Order 151.1B and the *Emergency Management Guide* (EMG), and standardize the content and format of the multiple facility documents. With two exceptions, UT-Battelle and BJC have ensured that all hazardous materials requiring further analysis are assessed in the EPHAs. UT-Battelle, BJC, and FWENC EPHAs are well organized and consistently formatted. They adequately describe facility operations and, with the exception of the FWENC EPHA, appropriately identify facility and site boundaries as well as critical receptors of interest for use in consequence assessment calculations and in development of EALs and the emergency planning zone.

UT-Battelle has made a number of improvements to its readiness assurance program, including implementation of a drill and exercise program that is characterized by numerous strengths. Procedures and processes are in place that, with some exceptions, as discussed in the following section, establish the foundation for a solid program of continuous improvement. Following established procedures, the site has conducted a number of critiques of actual events to identify opportunities for improvement. Furthermore, UT-Battelle has an active drill and exercise program that provides many opportunities for responder practice and serves as a basis for identifying program weaknesses. A notable strength of the drill and exercise program is the readability and usability of the post-exercise reports, which are well organized, present the overall performance by objective, and focus on those objectives that are not met. Drill and exercise performance data is also trended to assist in identification of continuing issues. Finally, to govern management of identified issues, UT-Battelle has implemented a set of procedures and processes that are supported by an effective, computer-based system for tracking corrective actions.

Key emergency response personnel at both the site and facility levels demonstrated effective decision-making in the critical areas of command and control, immediate response, and protection of personnel. With few exceptions**,** crisis managers (CMs) nearly always demonstrated effective command and control through use of available tools and personnel and management of field assets. CMs insisted on the use of checklists and logs by the EOC cadre, and orchestrated concise turnovers from the Laboratory Shift Superintendent (LSS) and effective briefings in the EOC. Incident commanders (ICs) are knowledgeable of their roles and responsibilities and site protocols in implementing the ORNL emergency response. The ICs approached scenes from upwind, stopped at safe distances, and used binoculars to identify hazards and scene conditions, and they promptly provided available information to the LSS. ICs effectively used the Emergency Response Guide to identify hazards by placard numbers, establish isolation zone size, identify downwind protective

action distances, and identify necessary personnel protection equipment in accordance with site protocols.

2.2 Program Weaknesses and Items Requiring Attention

The 1999 follow-up inspection identified significant weaknesses in emergency plan implementing procedures, along with weaknesses in LSS performance, training, and implementation of corrective actions. Independent Oversight performed a corrective action follow-up inspection of ORNL in March of 2002 that indicated some improvements had been made; however, the issues identified in the 1999 inspection continue to impact the performance of the ORNL emergency response organization (ERO). Specific weaknesses are discussed below.

Recurring weaknesses in technical quality and usability of several key ORNL emergency response procedures continue to reduce the effectiveness of key ERO responders. The categorization and classification procedure and EALs do not provide decision-makers with comprehensive, easy to use, objective thresholds to develop emergency classifications. Confusing logic, inconsistencies between the emergency plan and the EAL matrix, and lack of quantitative thresholds for classification contributed to incorrect and inconsistent classification of events during the limited-scope performance tests. Additionally, UT-Battelle has not implemented a methodology that ensures that accurate protective action recommendations (PARs) are issued on a consistent basis. Most EALs do not include predetermined protective actions even though this information has been developed in the EPHAs. Finally, weaknesses in the emergency public information procedures regarding the timeliness and approval of press releases inhibit the ability of responders to meet requirements for timely public communication.

Weaknesses in the assessment and corrective action programs at ORNL prevent the readiness assurance programs from being fully effective in achieving the desired program improvements. SC and ORO have not ensured that the ORNL site emergency management program has been assessed effectively, resulting in recurring weaknesses in both the UT-Battelle and BJC programs. Formal assessments have not fully addressed the appropriate functional elements of emergency management at each of the site's contractors, and the issues tracking system has received only limited use in tracking the corrective actions. Additionally, SC has not provided the oversight and support of the ORNL emergency management program necessary to ensure that the ORO and ORNL programs meet DOE requirements. UT-Battelle has not established a readiness assurance program that consistently identifies and addresses program deficiencies and implements timely corrective actions. For example, some corrective actions required the evaluation of alternative actions, but were closed without opening the follow-on actions that are necessary to implement the actual corrective action. Furthermore, some corrective actions did not sufficiently address the underlying cause of the condition or lead to timely correction of the observed condition. Additionally, BJC has not ensured that appropriately tailored self-assessments of the emergency management program at its ORNL projects have been completed annually.

Several weaknesses in the implementation of training for LSSs and EOC staff diminish the program's effectiveness. Foremost among these is the degree to which the program currently relies on required reading and overview-level training courses. Six of the eight required training activities for EOC staff consist of required reading, including several knowledge areas critical to effective decision-making, such as consequence assessment and protective action decision-making. Similarly, the LSS program has no classroom instruction for or structured practice sessions in the key emergency response areas of event categorization and classification, protective action formulation, and critical decision-making. Furthermore, the topic of EALs, which is a required course for key EOC positions, and the courses for event categorization/classification and protective actions, which are not currently required for any position, are written to the overview level. Other weaknesses include the absence of a formal needs analysis required by the training program procedure, and the lack of structured practice activities for EOC individuals with responsibilities for event categorization/classification and protective action formulation. Finally, although UT-Battelle tracks completion of training and drill/exercise participation, in one instance a key individual assigned to the EOC has not participated in a drill or exercise for at least 21 months.

CMs and LSSs had difficulties in accurately classifying postulated events and providing appropriate PARs to offsite agencies. LSSs were not proficient in performing some emergency tasks and were burdened by a cumbersome notification process that distracted them from being able to manage the event. This resulted in a number of delays in acquiring

response personnel and equipment assets that may have been needed to mitigate event consequences or treat and transport victims. It also resulted in not knowing where assets were deployed and the event conditions at the time Laboratory Emergency Director duties were transferred to the CM. Additionally, implementation of protective actions based on the potential for hazardous material dispersion varied among the Laboratory Emergency Directors. For example, one CM would not issue PARs for a postulated credible bomb threat when EALs and dispersion plume plots indicated potential offsite consequences above protective action criteria because he was awaiting detonation. One CM would not implement a General Emergency as a precautionary measure even after receiving feedback from an EOC cadre member and the Tennessee Emergency Management Agency (TEMA) controller that the condition met the definition of a General Emergency as stated in the ORNL classification procedure. The feedback was based on a potential release if the hostage-taker detonated bombs identified as a credible threat to a hazardous material facility. For the same scenario, one LSS declared a General Emergency only after being urged to by a controller acting as a facility emergency responder. Finally, both a CM and a LSS failed to correctly formulate PARs, and one LSS provided PARs to only some of the offsite authorities.

3.0 Conclusions

The previous Independent Oversight inspection of emergency management at ORNL, conducted in October of 1999, was a follow-up to the 1998 complex-wide inspection. The 1999 inspection found that the content and usage of response procedures and EALs did not adequately support initial decision-making, and that, although some improvement was noted during the 2002 follow-up inspection, weaknesses remained in the ability to issue timely classifications and notifications. This 2005 Independent Oversight inspection determined that ORNL has made progress in the areas of EPHAs, integration of the site emergency plan with site contractors, and establishment of the framework for key emergency management program areas. However, specific critical procedures, training, and tools remain incomplete or are still evolving, resulting in weak ERO performance.

The ORNL emergency management program continues to improve in most areas evaluated. To support the implementation of program improvements, UT-Battelle completed a reorganization of emergency planning leadership in July of 2004 after assuming the lead contractor position for ORNL in 2000. Since completing this reorganization, the ORNL team has accelerated work on program improvements. ORNL has incorporated significant improvements in the content of EPHAs and in the processes that define how hazards surveys and EPHAs are to be developed and maintained. Additionally, enhancement of the ORNL response organization occurred through an increased sense of ownership derived from the move of the EOC from ETTP to ORNL during the period since the last inspection. This move had the added positive effect of requiring the development of plans, procedures, and checklists specific to the facilities and activities at ORNL. The ORNL drill and exercise program is characterized by numerous strengths, including the readability and usability of the post-exercise reports and the identification of response weaknesses, which collectively facilitate program improvement.

Although the ORNL emergency program procedures have improved since the 1999 follow-up inspection, a significant weakness in the technical quality and usability of several key ORNL procedures was highlighted by the limited-scope performance tests. The Independent Oversight inspection team identified several critical flaws in the EALs, including a lack of predetermined protective actions, the absence of quantitative thresholds in symptom-based EALs, and use of confusing logic statements in the EAL tables. This, coupled with weaknesses in both the categorization and classification of EALs and the protective action procedures, resulted in observed performance deficiencies during the limited-scope performance tests, including inconsistent classification of events, and incorrect protective actions and PARs.

Other implementation weaknesses in the ORNL program were noted as well. Cumulative weaknesses in the area of readiness oversight have resulted in recurring issues and program weaknesses. Neither ORO nor SC has ensured that the ORNL site emergency management program has been assessed effectively, which, coupled with implementation weaknesses in the UT-Battelle corrective action process and the UT-Battelle and BJC self-assessment processes, has resulted in a failure to correct several long-standing program weaknesses. Recurring issues, such as weaknesses with the EALs, were identified during this inspection and in prior assessments (both internal and external) and remain uncorrected. Corrective action plans have failed to address all identified technical issues with follow-up assessments requiring additional corrective actions. In addition, several weaknesses in the implementation of training diminish the program's effectiveness. Foremost among these is the degree to which the program currently relies on required reading and overview-level training courses. Furthermore, weaknesses in the emergency public information procedures regarding the timeliness and approval of press releases and the absence of a public education program inhibit the ability of responders to meet requirements for timely public communication. Finally, CMs and LSSs had

difficulty accurately classifying and providing appropriate PARs to offsite agencies.

ORNL has made several substantial improvements since the last Independent Oversight inspection, and UT-Battelle Laboratory Protection Division managers and staff are knowledgeable of most of the remaining weaknesses and committed to making the necessary improvements. Nonetheless, the ratings of this inspection reflect the current status of the program elements that were evaluated. Immediate ORNL line management attention is necessary to ensure that the ERO can develop, approve, and transmit accurate, timely, and consistent protective actions and PARs to offsite agencies. ORO and ORNL line management attention is also needed to strengthen corrective action mechanisms applicable to the emergency management program to better facilitate programmatic improvement and prevent problem recurrence.

4.0 Ratings

This inspection focused on a detailed assessment of eight key emergency management programmatic elements, as well as the performance of selected emergency response decision-makers and support functions. No overall program rating has been assigned. The individual element ratings reflect the status of each ORNL emergency management program element at the time of the inspection. The rating assigned below to the readiness assurance category is specific to those assessment, corrective action, and performance monitoring mechanisms applicable to the emergency management area.

The ratings for the individual program elements evaluated during this inspection are:

Emergency Planning

Hazards Survey and Hazards Assessments ..... EFFECTIVE PERFORMANCE
Program Plans and Procedures ..... SIGNIFICANT WEAKNESS

Emergency Preparedness

Training ..... NEEDS IMPROVEMENT
Drill and Exercise Program ..... EFFECTIVE PERFORMANCE
Emergency Public Information ..... NEEDS IMPROVEMENT

Emergency Response

ORNL Emergency Response ..... NEEDS IMPROVEMENT

Readiness Assurance

DOE Line Program Management ..... NEEDS IMPROVEMENT
ORNL Feedback and Improvement ..... NEEDS IMPROVEMENT

APPENDIX A
SUPPLEMENTAL INFORMATION

A.1 Dates of Review

Scoping Visit	August 30 – September 1, 2005
Limited-Scope Performance Test Planning	September 13 – 15, 2005
Onsite Inspection Visit	September 26 – October 6, 2005
Report Validation and Closeout	October 18 – 19, 2005

A.2 Review Team Composition

A.2.1 Management

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A.2.3 Review Team

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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. UT-Battelle and BJC have not ensured that all hazardous materials identified as requiring further analysis in the hazards surveys are assessed in the EPHAs, as required by DOE Order 151.1B, *Comprehensive Emergency Management System*.	13
2. UT-Battelle has not implemented a categorization and classification procedure and emergency action levels that provide decision-makers with comprehensive, unambiguous, objective thresholds upon which to base emergency classification, as required by the Oak Ridge Reservation Emergency Plan, and DOE Order 151.1B.	15
3. UT-Battelle has not developed protective actions based on EPHA consequences for onsite personnel and the public, as required by the Oak Ridge Reservation Emergency Plan, and DOE Order 151.1B.	16
4. The UT-Battelle training program for ORNL EOC responders and Laboratory Shift Superintendents does not ensure that these individuals are adequately prepared to perform their assigned emergency response functions, as required by DOE Order 151.1B.	22
5. ORO has not demonstrated an effective initial news release process that provides adequate assurance that timely emergency public information will be disseminated during an emergency, as required by DOE Order 151.1B.	25
6. ORO has not developed or documented a public education program that ensures that essential emergency information is provided to the public, before and during emergencies, as required by ORO Order 150, Chapter 1, and DOE Order 151.1B.	26
7. During LSPTs, LSSs as Laboratory Emergency Directors did not manage the emergency response to promote an effective time-urgent response, as required by DOE Order 151.1B.	35
8. ORO has not ensured that the ORNL site emergency management program has been assessed at least once every three years or utilized its issues tracking processes to identify and track important issues to closure, as required by ORO procedures and DOE Order 151.1B.	41
9. SC has not periodically reviewed the ability of the ORO and ORNL site emergency management program to meet the requirements of the DOE emergency management system, as required by DOE Order 151.1B.	42
10. UT-Battelle has not consistently identified and addressed program deficiencies and implemented timely corrective actions, as required by DOE Order 151.1B and DOE Order 414.1C, *Quality Assurance*.	44
11. BJC has not ensured that appropriately tailored self-assessments of the emergency management program at its ORNL projects have been completed annually, as required by BJC procedures and DOE Order 151.1B.	45

APPENDIX C
EMERGENCY PLANNING

C.1 Introduction

Emergency planning consists of identifying hazards, threats, and hazard mitigation mechanisms; developing and preparing emergency plans and procedures; and identifying personnel and resources needed to assure an effective emergency response. Key elements of emergency planning include developing a hazards survey and emergency planning hazards assessment (EPHA) to identify and assess the impact of site- and facility-specific hazards and threats, and establishing an emergency planning zone (EPZ). Based upon the results of these assessments, U.S. Department of Energy (DOE) and Office of Science (SC) sites and facilities must establish an emergency management program that is commensurate with the identified hazards. The emergency management 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 SC emergency response recommendations.

This evaluation included a review of the Oak Ridge National Laboratory (ORNL) hazards surveys and EPHAs (also called emergency management hazards assessments by the site) and their treatment of hazards associated with University of Tennessee–Battelle Memorial Institute, LLC (UT-Battelle), Bechtel Jacobs Company, LLC (BJC), and Foster-Wheeler Environmental Corporation (FWENC) facility operations and transportation activities. The Independent Oversight team also evaluated the ORNL emergency plan, associated implementing procedures, and selected facility emergency plans.

C.2 Status and Results

C.2.1 Hazards Survey and Hazards Assessment

The hazards surveys and EPHAs serve as the foundation of the emergency management program; consequently, their rigor and accuracy are key elements in developing effective emergency response procedures and other elements of the program. The degree to which these documents effectively serve this function is primarily dependent upon the completeness of the institutional processes for developing a hazards survey and EPHA, the effectiveness of the screening process by which hazardous materials are initially identified and evaluated, and the rigor and accuracy of the analyses contained within the EPHA.

The 1999 Office of Independent Oversight and Performance Assurance (now the Office of Independent Oversight) inspection of the ORNL emergency management program determined that an effective program based on hazards surveys and hazards assessments had not been established. This conclusion was based on critical weaknesses that were identified in the hazards survey and hazards assessment development and maintenance process, hazards identification mechanisms, the spectrum of events that was considered, facility boundary definition, and lack of an assessment of transportation activities. This 2005 Independent Oversight inspection found that the quality of analyses and content of ORNL hazards surveys and EPHAs have significantly improved. However, a few omissions and discrepancies exist that detract from the overall effectiveness of the EPHAs.

UT-Battelle and BJC have incorporated significant improvements in the processes that define how hazards surveys and EPHAs are to be developed and maintained and in the content of the EPHAs themselves. Procedures for preparing the hazards surveys, EPHAs, and EALs have been developed that incorporate the provisions of DOE Order 151.1B and the EMG and standardize the content and format of the multiple facility documents. The UT-Battelle, BJC and FWENC EPHAs are well organized and consistently formatted. They adequately describe

facility operations and, with the exception of FWENC, appropriately identify facility and site boundaries, as well as critical receptors of interest, for use in consequence assessment calculations and developing EALs and the EPZ. Facility management is involved in the development, review, and approval process, and the completed hazards surveys and EPHAs are submitted to the ORO for review and comment.

Other positive EPHA improvements that have been incorporated at ORNL include consideration of a complete spectrum of events; use of both average and severe meteorology in calculating the event consequences; and appropriately documented source term quantity and form, analytical assumptions, and results. EPZ determinations have been adequately calculated and documented for the events analyzed in each facility EPHA; however, the ORNL composite EPZ has not been recently updated to reflect individual EPZ determinations. The Emergency Preparedness Department identified that UT-Battelle does not have a DOE-approved composite EPZ based on documentation reflecting current site hazards and analytical methodologies and has a corrective action completion date of June 30, 2006.

An effective hazardous material screening process is based on a thorough identification of the hazardous materials present in the facility, which in turn relies to a great extent on an accurate site inventory of hazardous materials. The procedures for developing hazards assessments accurately define the hazardous material identification and screening processes. The screening process appropriately requires that consequence analyses be performed if hazardous materials exceed the lower of the threshold quantities listed in the Code of Federal Regulations (CFR) or if the National Fire Protection Association (NFPA) hazard ratings are exceeded. Additionally, should a question still exist for retaining a hazardous material for further analysis, a simple worst-case analysis is performed to determine whether the protective action criterion (PAC) is exceeded at 30 meters. Furthermore, the UT-Battelle Emergency Preparedness Department has an initiative underway that will screen each chemical inventoried to an emergency release scenario with a preconceived set of assumptions. This will ensure that concentration levels cannot exceed emergency planning levels from an emergency event involving a release.

Although significantly improved, some omissions and discrepancies were identified that collectively detract from the adequacy and effectiveness of the EPHAs as emergency planning tools. These omissions and discrepancies include:

- Chlorine trifluoride in Building 7503 was identified in the BJC emergency management hazards survey as requiring further analysis. A walkdown of the facility identified that the material did exist in quantities that could result in a classifiable emergency if released. However, chlorine trifluoride was not analyzed in the EPHA for the facility. When this situation was identified during this inspection, adequate compensatory measures were immediately initiated, as required by ORO Order 150, "Comprehensive Emergency Management System," Chapter 1. Until the EPHA for Building 7503 is revised, interim EALs for chlorine trifluoride have been developed and implemented.

- Hydrochloric acid in Building 7925B was identified in the non-nuclear facilities hazards survey for facilities operated by UT-Battelle as requiring further analysis and footnoted that the material would be covered in the Building 7920 emergency management hazards assessment. However, hydrochloric acid was not identified in the EPHA for the facility. The EPHA for Building 7920 is currently going through revision and the hydrochloric acid will be quantitatively analyzed to determine the need for further analysis. However, it should be noted that the revised EPHA for Building 7920 is not completed to date and still requires review.

- The FWENC EPHA for the Transuranic/Alpha Low Level Waste Treatment Project utilizes incorrect facility and site boundary definitions; consequently, three of the identified Site Area Emergencies should have been classified as General Emergencies, and three as Alerts. However, the Transuranic/Alpha Low Level Waste Treatment Project is not currently operational, and this discrepancy does not present a risk at this time. Furthermore, before FWENC begins repackaging contact-handled radioactive waste (facility is scheduled for Operational Readiness Review in late 2005), its EPHA should be revised to comply with DOE Order 151.1B, *Comprehensive Emergency Management System*.

Finding #1: UT-Battelle and BJC have not ensured that all hazardous materials identified as requiring further analysis in the hazards surveys are assessed in the EPHAs, as required by DOE Order 151.1B, *Comprehensive Emergency Management System*.

The 1999 Independent Oversight inspection identified the lack of an assessment of transportation activities as a critical weakness in the emergency management program. Since that inspection, UT-Battelle has developed a transportation hazards survey; however, the survey does not consider facility-to-facility shipments of radiological materials. The survey only considers chemicals that have thresholds published by the CFR, and only those chemicals that exceeded their respective threshold quantities were retained for further analysis. However, the Emergency Preparedness Department identified that the UT-Battelle transportation hazards survey required revision to ensure that all hazardous materials are properly evaluated and screened against current requirements. This effort is in progress, with a corrective action completion date of December 16, 2005. Furthermore, BJC has included transportation scenarios in the EPHAs for their facilities.

Finally, the Independent Oversight team's 2005 evaluation of the EPHAs included a review of the degree to which the EALs incorporate information and analytical results from the EPHAs to appropriately drive classification and protective action decision-making. Line managers are responsible for preparing recommended EALs as part of the EPHA process. Recommended EALs are included in the EPHAs and are for the most part clearly written and well organized. The EPHAs contain such useful features and information as a tabular summary of classifiable events for each facility; hazardous material quantities expressed in commonly used and easy-to-interpret units; distances to critical receptors of interest, including the site boundary; and the point at which the PAC and threshold for early lethality is exceeded. The Emergency Preparedness Department has developed a procedure for preparing EALs and associated protective actions that incorporates DOE guidance using the analytical results contained in the EPHAs. In addition, discretionary EALs have been developed to compensate for unanticipated situations to ensure that timely decisions can be made. Although the EALs have improved since the 1999 Independent Oversight inspection, usability of the EALs was not adequately demonstrated in the limited-scope performance tests conducted by Independent Oversight, as discussed in Appendix E. EAL construction and content are discussed in more detail in Section C.2.2 of this report.

In summary, UT-Battelle and BJC have implemented procedures for preparing the hazards survey, EPHAs, and EALs that are intended to standardize the content and format of the multiple facility documents. They also have significantly improved the content and rigor of their hazards surveys and EPHAs since the 1999 inspection and have included technically accurate information in the EPHAs that provides a basis for preparing emergency classification and protective action decision-making tools. Hazardous material screening criteria is significantly enhanced, such as screening chemical materials according to their respective NFPA hazard rating, with further assessment of other questionable material to determine whether PAC are exceeded at 30 meters. As a result, the required elements to establish the site's emergency management program foundation are in place for current operations. Notwithstanding these improvements, UT-Battelle and BJC have not ensured that all hazardous materials requiring further analysis are assessed in the EPHAs. In addition, FWENC has used incorrect facility and site boundary definitions for the Transuranic/Alpha Low Level Waste Treatment Project, resulting in incorrect emergency classifications for several EPHA scenarios; however, the facility is not currently operational, and FWENC will have to resolve this discrepancy before operations can begin. Furthermore, the composite EPZ is not up to date, and the UT-Battelle transportation hazards survey requires revision; however, the Emergency Preparedness Department has identified these issues and have corrective actions in place to resolve them.

C.2.2 Program Plans and Procedures

The October 1999 Independent Oversight inspection determined that ORNL implementing procedures and EALs did not ensure that emergency categorization, classification, and protective action decisions made in response to an emergency were adequate or communicated to site workers and offsite authorities in a timely manner. This conclusion was based on weaknesses identified in EAL content, expectations for EAL use, definition of the categorization and classification process, personnel accountability procedures, and notification systems and equipment. This 2005 Independent Oversight inspection found that ORNL has made numerous improvements in emergency

management program plans, procedures, and operator aids; however, significant weaknesses in key procedures still exist.

ORO recently completed a comprehensive revision to Volume I of the Oak Ridge Reservation Emergency Plan (ORREP) that continues a concept of operations for UT-Battelle to function as lead contractor for managing the emergency response organization (ERO) during operational emergencies and providing initial response assets. Other ORNL facilities, managed by their respective organizations, fulfill the event contractor role within the facility, including initial response and providing technical support to the UT-Battelle ERO. Nearly all contractors participated in the collaborative effort with ORO to prepare the reservation plan, resulting in a universally accepted response organization. ORREP Volume II clearly defines the roles and responsibilities for ORNL ERO functional positions and establishes a chain of command that transfers initial Laboratory Emergency Director decision-making responsibilities from the Laboratory Shift Superintendent (LSS) to the Crisis Manager (CM) in the Emergency Operations Center (EOC). Since the 1999 inspection, the ORNL response organization has established an EOC independent of East Tennessee Technology Park (ETTP), which has increased the sense of contractor ownership. This move had the added positive effect of requiring the development of plans, procedures, and checklists specific to the facilities and activities on the ORNL.

Additional support from offsite organizations is effectively managed through numerous memoranda of understanding and agreements contained in Volume IV of the ORREP. Security support agreements between ORO and such agencies as the Tennessee state police and local county sheriff offices were last revised and updated in March and April of 2005 and clearly define roles and responsibilities for response actions, communication conduits, and liabilities. Other mutual aid agreements for fire, ambulance, and hazardous material response are annually reviewed and contain the necessary elements to positively affect an integrated response.

One significant effort remains to fully integrate all ORNL contractors that operate hazardous facilities into the UT-Battelle response organization. FWENC manages the Transuranic/Alpha Low Level Waste Treatment Project to repackage contact-handled radioactive waste for shipment to the Waste Isolation Project Plant. This project has not yet started (an Operational Readiness Review is scheduled for late 2005), but hazardous material quantities analyzed in their hazards assessment could generate emergency severities of Site Area and General Emergencies. Of concern is that the FWENC emergency management plan, completed July 2005, establishes an ERO headed by an emergency coordinator performing response decision-making independent of the UT-Battelle ERO, relying on UT-Battelle only for such response assets as fire and medical during an emergency. FWENC has not implemented the supporting structure necessary to manage an integrated, effective emergency response as indicated in the FWENC plan. Additionally, the current FWENC emergency management plan is in conflict with a memorandum of understanding between UT-Battelle and FWENC, dated October 21, 2002, which states that FWENC will "Adhere to the DOE ORO Emergency Plan and coordinate in the event of a Project-related emergency situation." These issues must be addressed prior to resuming operation of the Transuranic/Alpha Low Level Waste Treatment Project.

Provisions of the ORR and ORNL emergency plans for such activities as establishment of incident command, categorization and classification, and protective action decision-making are implemented with a series of sitewide emergency management procedures (EMPs) prepared by the Emergency Preparedness Department of the Laboratory Protection Division. With one exception noted below in the categorization and classification procedure, EMPs clearly define roles and responsibilities to members of the response organization. Detailed checklists are included to aid the responder in performing assigned responsibilities and are reviewed by appropriate procedure "owners" and points of contact annually. For example, comprehensive checklists were developed for each position in the EOC and were utilized by each responder during the performance tests conducted during this evaluation.

Categorization and classification is performed according to an EMP (#0410) that implements the ORNL EAL matrix manual. Although the first issuance of the procedure in February 2005 represents a positive step, errors in this EMP, together with continuing problems with the EALs, impact the ability of the Laboratory Emergency Director to accurately complete emergency classification in an efficient, consistent manner during the time-urgent environment of initial event reporting, decision-making, and notifications. As observed in the LSPTs, EALs selected by the Laboratory Emergency Director were used in categorization and classification decision-making; however, the conclusions were not always consistent

and were sometimes made without gathering available critical data. The Laboratory Emergency Directors also were not consistent in their approach to classifying scenarios that involved the potential dispersion of hazardous materials. These weaknesses are discussed in further detail in Appendix E. For example:

- "Time-urgent" decision-making required by the emergency plan for "rapid recognition of emergency conditions and timely response" is not implemented by EMP #0410. "Time urgent" remains undefined, contributing to some response elements lacking a sense of urgency in their completion.

- The EMP does not direct the Laboratory Emergency Director to utilize facility EALs when possible irrespective of the initiating event (e.g., a credible explosive device) to assure correlation of actual or potential hazardous material barrier damage to event consequences and severity. For example, during LSPTs, the LSSs did not correlate the potential damage to facility systems from a credible bomb threat, which would have resulted in an emergency classification higher than that for the bomb threat alone.

- The generic decision-making definition for Alert is incorrectly stated as PAC exceeded beyond the facility boundary, but should read "hazardous material releases not expected to exceed PACs at the facility boundary."

Although some EALs (e.g., Building 3019A) prepared within recent months exhibit improvement, many EALs do not provide a technically accurate methodology that facilitates timely classification and protective action decision-making for all facilities and activities at ORNL. For example:

- Ambiguous logic statements within the EAL matrix resulted in inconsistent interpretation by the Laboratory Emergency Directors during LSPTs. For example, the EAL matrix involves nested logic statements that incorporate an "and/or" concept for decision-making, such as combination of the operational emergency column and the classification column. Specifically, "Loss of confinement function that cannot be restored concurrent with an OE [operational emergency] condition" should result in an Alert classification, but was misclassified based on an improper evaluation of the "concurrent" statement during the LSPTs.

- EALs are missing applicable thresholds, or are inaccurate. For example, some operational emergencies not further classified are not included; transportation Alert severity EALs are not included in the generic transportation EALs although many isolation zones prescribed by Emergency Response Guidebook 2004 fall between 30 and 100 meters; and transportation EAL TRANS01 "Accident occurs within 100 meters of a facility" is inaccurately listed as a Site Area Emergency (SAE); however, the classification should be dependent on the actual extent of the isolation zone.

- Some EALs are not sufficiently anticipatory as part of the classification process. For example, the "bomb threat" EAL (SEC01) indicates that detonation of the device is required for a General Emergency, which does not address the situation of a credible device that could potentially release hazardous material. This situation was presented during LSPTs, and the Laboratory Emergency Director did not address the predicted consequences that would result in a General Emergency (and corresponding offsite release), which contradicts the definition of General Emergency as stated in the ORNL EAL matrix instructions and DOE Order 151.1B.

- Quantitative thresholds are not always included in EALs to permit objective evaluation even when appropriate indicators, such as area radiation monitors, failed fuel monitors, and building pressure indicators, are available. For example, these indicators are available at HFIR and Building 3019 but not included in the EAL thresholds.

Finding #2: UT-Battelle has not implemented a categorization and classification procedure and emergency action levels that provide decision-makers with comprehensive, unambiguous, objective thresholds upon which to base emergency classification, as required by the Oak Ridge Reservation Emergency Plan, and DOE Order 151.1B.

Significant weaknesses were also noted in the protective action decision-making procedure (EMP

0710), and in the pre-determined actions for each facility or activity included in the EAL matrix manual. Although the first issuance of this procedure in February 2005 represents a positive step, errors in the EMP, together with problems with pre-determined protective actions and protective action recommendations (PARs) in the matrix, adversely affect the LSS's ability to accurately formulate actions that ensure that workers and members of the public are protected. Many of these weaknesses were identified during LSPTs, which are discussed in further detail in Appendix E. Examples of procedural and protective action matrix weaknesses include:

- Pre-determined protective actions and PARs do not always include the distance to the PAC. For example, the Building 3019A General Emergency PAR states, "4. Recommend that off-site [authorities] shelter-in-place … all sectors or areas downwind to the distance of the projected PAC." Distance to the PAC is not included, which requires the Laboratory Emergency Director to evaluate the impact and determine the PAC, which impacts the timeliness of issuing protective actions and may result in inconsistencies in application.

- Some protective actions listed in the EAL set are incorrect. For example, a Building 7900 Site Area Emergency (SAE) protective action requires "Evacuate affected areas to local assembly point." and "Evacuate non-Operations personnel from 7900 building." An SAE should evacuate areas with radiation levels greater than or equal to PACs and shelter at least the Building 7900 *area* since PACs are exceeded beyond 100 meters.

- The ORREP, Volume I, provides logic diagrams for determining protective actions and PARs that are not incorporated in the ORNL Volume II Emergency Plan or the protective action decision-making EMP (ADM-0710). This resulted in observed inconsistencies in protective actions during the LSPTs, such as failure to select the appropriate sectors for protective actions and PARs as observed during LSPTs.

- Activities are listed in the protective action section of the EALs that are not "protective actions" required to mitigate consequences specific to the ongoing event. These additional activities can impact the timeliness of issuing the required protective actions and PARs.

- The ORNL Volume II Emergency Plan prescribes the use of Department of Treasury and Bureau of Alcohol, Tobacco, and Firearms evacuation distances for malevolent acts not involving the potential for hazardous material release. These job aids are used by the incident commander (IC), but were not implemented by the LSS or CM, and are not included in either the ADM-0710 EMP or the protective action section of the EALs. Furthermore, guidance is not provided for correlating these distances to possible affected systems containing hazardous materials where a breach could occur and result in a release of hazardous materials.

Finding #3: UT-Battelle has not developed protective actions based on EPHA consequences for onsite personnel and the public, as required by the Oak Ridge Reservation Emergency Plan, and DOE Order 151.1B.

Line organizations are responsible for developing Local Emergency Manuals (LEMs) for implementation in facilities. The LEM describes responsibilities for Local Emergency Supervisors (LESs), who direct the activities of the Local Emergency Squad, the first responders to any facility emergency. LESs at facilities handling hazardous materials are well qualified subject matter experts who implement emergency response protective actions, including accountability, utilizing job-aids found in LEMs, which contain such pertinent information as facility maps, hazardous material inventories not more than a year old, and emergency points of contact. Manuals are kept current through an annual, in-facility review by an Emergency Preparedness Department representative, along with the LES. Although evacuation and shelter-in-place instructions were well detailed in the LEMs, and mechanisms such as facility alarms and public announcing systems are available to promptly initiate protective actions, "take cover" instructions required by the ORNL Emergency Plan and the protective action EMP (ADM-0710) were not included in the LEM.

Following evacuation, timely positive accountability is performed for secure, high-hazard facilities, such as Buildings 7900 and 3019. However, most laboratory facilities, including facilities using significant quantities of hazardous materials, such as Buildings 7603 and 7615, employ "negative" accountability mechanisms of "sweeping" all spaces during evacuation for absence of workers. This practice may unnecessarily place some Local Emergency Squad evacuees at additional

risk since they may enter spaces with unknown habitability to search for facility occupants.

Equal in importance to protecting facility personnel is providing the LSS with prompt, accurate, facility-specific information in the event of emergency conditions that exceed the facility's response capability. The categorization and classification EMP (0410) requires that "ORNL Staff provide indicator data to the LSS at the onset of an event which include: …" (e.g., actions taken, casualties, protective actions, material at risk, assistance required, IC meet-me information, and status of ventilation). With the exception of Building 7900, this information checklist has not been incorporated into LEMs or other documents or assigned to the LES as a task to perform as quickly as possible after implementing local protective actions. During the Independent Oversight team's interviews using hypothetical emergency scenarios, LESs did not demonstrate awareness of the facility's responsibility to quickly provide the LSS critical event information prescribed by the classification procedure; two LESs assumed the LSS would come to the assembly point with the IC at which time facility status information could be provided to the LSS and IC. A functional checklist from the LES specific to facility emergency information would ensure that the LSS is promptly provided technically accurate information for necessary initial decision-making. Such assignment also fulfills ORREP Volume II requirements to include a technical sector in the incident command system.

To summarize, ORO has recently performed a comprehensive revision to the ORREP, with ORNL likewise completing a revision that generally incorporates provisions of the reservation plan. The move of the EOC to ORNL has positively influenced the development of several new procedures, with comprehensive checklists that effectively support responders' roles. Appropriate agreements with outside response organizations and jurisdictions are in place to ensure that additional response assets are readily available to emergency managers. However, recurring weaknesses in technical quality and usability of several key ORNL procedures continue to reduce the effectiveness of ERO responders. The categorization and classification procedure and EALs do not provide decision-makers with comprehensive, easy to use objective thresholds to develop emergency classifications. Most EALs do not include predetermined protective actions and PARs, even though this information has been developed in the EPHAs. These shortfalls, coupled with confusing logic contained within the EAL matrix, resulted in incorrect and inconsistent classification PARs during the LSPTs.

C.3 Conclusions

Since the 1999 Independent Oversight inspection, ORO and ORNL have improved its emergency planning in a number of key areas. Together, ORO and the site operating contractors prepared and implemented an integrated emergency plan that addresses the functional elements necessary to plan, prepare, and respond to an emergency event. To provide an adequate technical foundation for the program, ORNL contractors developed and implemented procedural direction for the preparation, review, and approval of hazards surveys and hazards assessments, and subsequently implemented these procedures in developing significantly improved hazards surveys and EPHAs for most of their hazardous facilities. In addition, a number of improvements in plans, procedures, and equipment have contributed to the potential for a response organization fully capable of responding to and mitigating emergencies at ORNL, including the establishment of a fully equipped EOC supported by appropriate equipment and implementing procedures and checklists. In spite of these improvements to the ERO and key emergency planning documents, significant weaknesses exist in recently issued emergency classification and protective action procedures and associated tools. Furthermore, readily usable, objective EALs, together with appropriate pre-determined protective actions, have not been accurately derived from EPHAs and other requirements and guidance. As a result of these weaknesses, the procedures do not adequately support decision-makers in their time-urgent responsibilities for event categorization, classification, and protective action formulation, as was observed during the LSPTs conducted as part of this inspection.

C.4 Ratings

A rating of EFFECTIVE PERFORMANCE is assigned to the area of hazards survey and hazards assessments.

A rating of SIGNIFICANT WEAKNESS is assigned to the area of program plans and procedures.

C.5 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 intended to be reviewed and evaluated by the responsible SC and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Oak Ridge Office

- Enhance the hazards surveys and EPHA documents by improving their technical content and ensuring that they reflect stakeholder concerns. Specific actions to consider include:
  - Implement a mechanism for reviewing the hazards surveys and EPHAs that provides appropriate ORO discipline (e.g., safety analysis experts and facility representatives) reviews.
  - Implement a formal comment resolution mechanism between contractor line management and Tennessee Emergency Management Agency (TEMA) that ensures that review comments on EPHAs received from TEMA are adequately resolved.
  - Engage SC in the ORNL hazards survey and EPHA reviews.
- To ensure that ORNL is capable of an effective integrated response, consider including FWENC in the ORR concept of operations prior to FWENC hot operations.

UT-Battelle and Bechtel Jacobs Company

- Enhance the usefulness of hazards survey and assessment development and maintenance processes by incorporating survey activities into and providing additional specificity to the survey and assessment development procedure and documents. Specific actions to consider include:
  - Perform a detailed review of the survey and assessment-related sections of DOE Guide 151.1-1, *Emergency Management Guide*, to identify provisions that should be incorporated into the EPHA development process (e.g., perform qualitative screening of accurate facility inventories and include results in the hazards survey).
  - Procedurally define line management responsibilities at the facility to ensure that integrated safety management implementation mechanisms trigger formal notification to the emergency management staff when quantities of material approach or exceed emergency preparedness planning thresholds (i.e., site-specific, pre-determined threshold screening quantities or radionuclide screening threshold quantities from 10 CFR 30.72).
  - Ensure that changes to the hazardous material screening process are documented in the procedures/instructions, and coordinate changes with the National Nuclear Security Administration Headquarters Office of Emergency Management Implementation (NA-43) to avoid potential rework that may result from a pending revision to DOE Order 151.1 and the associated *Emergency Management Guide*.
  - Develop and include administrative limits on hazardous material inventories in facility use agreements to ensure that bounding inventories analyzed in the hazards assessments are not exceeded.
- Promote EPHA document improvements by reconsidering EPHA revision milestones to ensure that they are established sufficiently in advance of EPHA completion requirements to allow adequate time for completing reviews by facility personnel, resolving comments, and documenting approvals.
- Enhance the EALs to make them a more effective emergency response tool by ensuring that they are technically sound, reflect the most recent analysis, are comprehensive, and are user-friendly. Specific actions to consider include:
  - Ensure that EALs are technically supported by their applicable EPHA and fully reflect the analysis contained therein, including available

information germane to sheltering and evacuation decision-making.

- Develop EALs, recommended by EPHAs, with integrated and fully defined protective actions as EPHA output products.

- Develop a response document or tables derived from the EPHAs' scenario assumptions and resulting consequence analysis results that provide an easy cross-reference from the EALs to the EPHAs for use in the EOC. For example, the response document or tables should clearly link the specific event scenario descriptions, the rollup of the events into EAL statements, and the consequences of the events at various receptor locations.

- Promptly implement changes to EALs and protective action decision-making tools upon approval of EPHA results and conclusions.

- Ensure that all applicable thresholds for operational emergencies not further classified are included in the EAL matrix.

- Evaluate EALs to determine whether they can be enhanced by the addition of symptom-based EALs that include specific instrument set points, such as failed fuel monitoring system or radiation area monitor readings, where possible to facilitate timely classification of events.

- Consider integrating EALs with emergency operating procedures to promptly alert facility operations personnel of classifiable emergencies upon reaching certain plant conditions defined by emergency operating procedures.

- Consider the addition of discretionary EALs to compensate for scenarios outside of those analyzed to ensure that timely classification decisions can be made when only partial event information is known, and correlate event classifications to appropriate predetermined protective actions.

- Consider using performance testing to validate EALs. Ensure that EALs and predetermined protective actions are used by trained decision-makers and can be implemented as written in a manner that will enable users to efficiently accomplish the desired actions in a high-stress, time-urgent environment.

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, media, and U.S. Department of Energy (DOE) employees with accurate and timely information during an emergency event, and in part 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 (formerly the Office of Independent Oversight and Performance Evaluation) evaluated the Oak Ridge Office (ORO) and Oak Ridge National Laboratory (ORNL) training, drill, and exercise programs used to support the ERO at the institutional and facility levels. As part of the programmatic review of the training, drill, and exercise elements, Independent Oversight evaluated the plans and procedures that support these elements and reviewed training and proficiency records for key site emergency responders. Drill and exercise reports were also reviewed for indications that they are being used effectively to both enhance responder proficiency and evaluate the level of the site's response preparedness. The Oversight team also evaluated the effectiveness of EPI plans and applicable processes for an emergency at ORNL.

D.2 Status and Results

D.2.1 Training, Drill, and Exercise Program

As part of the complex-wide review of site emergency management programs, Independent Oversight reviewed the ORNL emergency management training, drill, and exercise program in 1998. That inspection found that ORNL lacked a structured training, drill, and exercise program, and during a follow-up inspection in 1999, it became apparent that progress in implementing actions to improve the training, drill, and exercise area had been slow. In part, this was attributed to efforts on the part of senior management to implement a reservation-wide concept of emergency response and to meet the very near-term goals of the August 1999 ORO Emergency Management Action Plan.

Training Program

The 1998 review at ORNL found that the emergency management training program was not comprehensive, formalized, or current. Few training courses had formal lesson plans, and most training was not adequately documented. In 1999, although progress had been made in addressing those deficiencies, little improvement was evident in the training being provided to emergency response personnel at the Laboratory Shift Superintendent (LSS) level and above to maintain or improve their proficiency. Furthermore, ORNL was developing a program to have a fully trained and qualified ERO in place by a December 1999 deadline, but significant challenges remained for implementing a comprehensive program within the allotted time, particularly in light of the many training material development uncertainties and the impact of the reservation-wide procedure implementation effort on the training workload. This 2005 inspection found that University of Tennessee-Battelle, LLC (UT-Battelle) has defined an appropriate structure for an effective training and qualification program for emergency responders, but that program implementation is incomplete.

Independent Oversight evaluated training programs for the two groups of key UT-Battelle emergency response decision-makers, ORNL emergency operations center (EOC) staff, and LSSs. For EOC responders, ORO and UT-Battelle have implemented a hierarchy of programmatic documents that establishes the foundation for a comprehensive training program. ORO uses Oak Ridge Reservation (ORR) Emergency Plan Procedure (EPP) #103, *ERO Training Program Management*, to convey an appropriate set of program expectations and requirements, such as the use of a systematic approach for training development and implementation, use and conduct of drills and exercises in accordance with guidance contained in DOE's *Emergency Management Guide* (EMG), and requirements for annual refresher training, including participation in an actual event, drill, or exercise. Requirements for UT-Battelle ERO selection and maintenance are contained in ADM-0210, *ERO Administration*, and training program requirements and expectations for UT-Battelle EOC ERO staff are contained in ADM-1210, *Emergency Management Training Program*. ADM-1210, which serves as the training requirements flowdown vehicle from ORO to UT-Battelle, includes a comprehensive set of training program administration roles and responsibilities and a description of the systematic process to be used for developing, delivering, and evaluating the effectiveness of emergency management training. Another positive aspect of the training program is the use by the ORNL training coordinator of a graded approach to demonstrating proficiency prior to being considered qualified. These evaluations appropriately range from responder checklist walkthroughs to a combination of drill/exercise observation plus drill/exercise participation in an "under instruction" role, depending on the position. However, this practice is not a formal program requirement and is not discussed in any procedure or plan.

Individually, these procedures contain some weaknesses in the form of inconsistencies or elements that are not clearly defined. For example, although the need for some sort of demonstration of proficiency prior to adding a newly qualified person to the ERO roster can be inferred from the content of these procedures (and also from ADM-1310, *ORNL Emergency Management Drill and Exercise Program*), neither EPP #103 nor ADM-1210 clearly addresses demonstration of proficiency prior to "qualification." Furthermore, ADM-0210 does not mention a specific frequency for either drill/exercise participation or refresher training, and the ADM-1210 requirement for annual exercise participation does not mention drills or contain any criteria that define the types of events that can be used to credit the annual drill/exercise participation requirement. Nonetheless, when considered collectively, these documents constitute a comprehensive set of requirements for the ORNL emergency management training program.

Although the program structure has been adequately defined, the Independent Oversight team identified several weaknesses in implementation that diminish the program's effectiveness. Foremost among these is the degree to which the program currently relies on required reading and overview-level training courses. Six of the eight required training activities for EOC staff consist of required reading, including several knowledge areas critical to effective decision-making, such as consequence assessment and protective action decision-making. Furthermore, the topic of emergency action levels (EALs), which is a required course for key EOC positions, and the courses for event categorization/classification and protective actions, which are not currently required for any position, are written to the overview level. Other weaknesses include the absence of a formal needs analysis, such as that described in ADM-1210; lack of structured practice activities for EOC individuals with responsibilities for event categorization/classification and protective action formulation; and the fact that the proficiency verifications conducted by the ORNL training coordinator are not documented. Finally, although UT-Battelle tracks completion of training and drill/exercise participation, in one instance it was identified that an individual assigned to the EOC had not participated in a drill or exercise within the past year. In this case, one crisis manager did not participate in any drills or exercises in 2004 or in any of the sequence of major exercises conducted in 2005. UT-Battelle has recognized that the training program is not yet mature and outlined several necessary training program development activities in the 2004 emergency readiness assurance plan. In support of this initiative, the ORNL training coordinator has been tasked with developing substantive improvements to the EOC responder training program and the LSS training and qualification program (discussed below), including a formal needs analysis and extensive training material development or revision, and has recently drafted a project plan. However, the plan has not been reviewed or approved by management, and the project plan assigns all of the development work to the ORNL

training coordinator, who also fills the position of drill/exercise coordinator. It is not clear that resources have been identified and allocated for the successful completion of the project plan.

The Independent Oversight team identified a number of strengths within the LSS training and qualification program. UT-Battelle appropriately uses a combination of training, familiarization, and qualification activities for these individuals. Foremost among these is a lengthy on-the-job training process, involving extensive involvement with LSS office operations where the LSS trainee works with a qualified LSS, gradually performing more functions (including taking the lead during emergency response drills/exercises) until considered competent to stand watch unsupervised as an LSS. In addition, LSS trainees spend time with "complex managers" becoming familiar with ORNL facilities. LSSs must also pass a comprehensive final, written examination that includes an emergency response section that primarily tests usage of the EALs in categorizing and classifying emergency events. Annual refresher training is conducted on a shift basis throughout the year and is designed to update LSSs on site hazards and operations. In 2005, shift training included a scenario-based tabletop discussion of emergency response to a postulated event. Furthermore, three different LSSs filled the LSS role during the three major exercises that comprised the full-participation exercise sequence conducted in 2005.

The emergency preparedness portion of the LSS training and qualification process contains several weaknesses that reduce its effectiveness in preparing LSSs to act as the initial Laboratory Emergency Director. Most important of these is that similar to the EOC training program, there is no classroom instruction for or structured practice sessions in the key emergency response areas of event categorization and classification, protective action formulation, and critical decision-making. Familiarization with the ORNL emergency plan, EAL manual, and emergency response implementing procedures is primarily attained through required reading, supplemented by unstructured mentoring during the on-the-job training phase of training where the LSS trainee spends significant time on-shift with a qualified LSS. Additionally, the on-the-job training phase of LSS training and qualification does not include a "final" performance-based evaluation, nor is there any requirement that the LSS trainee participate in a specified minimum number of drills and/or exercises. Finally, although the LSS office participates in a large number of drills, exercises, and actual events over the course of a year, there is no requirement, as part of requalification, that LSSs participate in a drill/exercise annually, as is required of EOC responders, and their participation in drills/exercises is not tracked in the LSS training matrix. It should be noted that during the course of this inspection, actions were taken to add exercise participation to the LSS training matrix and to require successful completion annually of an LSS tabletop exercise involving an emergency management scenario, better aligning the LLS and other EOC member management expectations for training and performance.

Finding #4: The UT-Battelle training program for ORNL EOC responders and Laboratory Shift Superintendents does not ensure that these individuals are adequately prepared to perform their assigned emergency response functions, as required by DOE Order 151.1B.

To summarize, ORO and UT-Battelle have implemented a hierarchy of programmatic documents that establishes an appropriate foundation for the ORNL emergency management training program. The LSS training and qualification program has several strengths, including an extended LSS trainee period on-shift with a qualified LSS, a comprehensive written final examination, and shift-based refresher training. A few aspects of the procedures related to ERO training require additional clarity or definition, and there are several implementation weaknesses that lessen the effectiveness of the ERO and LSS training programs. These include heavy reliance on required reading, absence of detailed training courses developed specifically to address important emergency response job functions, lack of structured practice activities for event categorization/classification and protective action formulation, and lack of documented evaluations of proficiency in emergency response as a condition for being considered "qualified." UT-Battelle has recognized that the training program is not yet mature and is proceeding to review, approve, and support a project plan that addresses the necessary items.

Drill and Exercise Program

The 1998 Independent Oversight review of ORNL noted several deficiencies in the drill and exercise program, including: lack of formal procedures to provide programmatic controls for drills and exercises, drill and exercise schedules not being tracked, and a lack of

formality in how ORNL applies results from drills and exercises to program improvement. Results of the 1999 follow-up review found that ORNL had made little progress in developing a formal drill and exercise program, and that as structured, the ORNL drill and exercise program was not comprehensive and did not ensure that shortcomings in the ERO could be identified, communicated to management, and effectively corrected. This 2005 inspection found that UT-Battelle has implemented a drill and exercise program that, with few exceptions, is being effectively used to validate the site's overall emergency management approach, provide the necessary opportunities for responders to maintain proficiency, and identify areas requiring improvement.

UT-Battelle establishes requirements and expectations for its emergency management drill and exercise program through ADM-1310, *ORNL Emergency Management Drill and Exercise Program.* Although the procedure applies specifically to drills and exercises sponsored by the ORNL Emergency Preparedness Department, the procedure is also intended to ensure uniformity in the conduct of ORNL drills and exercises sponsored and controlled by other organizations at ORNL. This procedure is a comprehensive set of program elements that includes roles and responsibilities for administering the drill and exercise program; drill/exercise frequency and ERO participation requirements; a comprehensive set of considerations and requirements for planning, developing, and evaluating; and appropriate guidance for exercise package content/format. In general, UT-Battelle's implementation of its drill and exercise program is consistent with this procedure, and consequently, drills and exercises are being effectively planned, appropriately evaluated and documented, and consistently used to identify weaknesses and improvement items for tracking through the UT-Battelle issues management systems.

The ORNL drill and exercise program is characterized by numerous strengths. Foremost among these is the readability and usability of the post-exercise reports, which contain a well-formatted results table that presents the overall performance by objective grading category (e.g., met, met with improvement, weakness) and a summary discussion, by objective, of those objectives that were graded as anything other than met. Many other positive attributes of the drill and exercise program were noted as well:

- The drill and exercise schedule includes an array of both facility-specific and sitewide performance activities ranging from tabletop drills to ORNL-wide shelter-in-place and building evacuation drills to a full-participation exercise, which involves multiple onsite and offsite response entities. For 2005, this provided numerous opportunities for LSSs and ORNL EOC personnel to practice emergency response decision-making skills.

- Exercise objectives are, by procedure, drawn from a bank of exercise objectives, which are appropriately binned by either function (e.g., emergency medical support) or venue (e.g., EOC). Objectives contain evaluation criteria drawn from the EMG and include evaluation checkboxes that address specific objective elements.

- The ORNL drill and exercise coordinator, who also serves as the training coordinator, has developed several tools that further enhance the program. For example, the drill/exercise coordinator develops a timeline worksheet tailored to each exercise for evaluators to use to facilitate the capturing of critical event times and to assist in post-event data-gathering and analysis. Furthermore, for those venues having several evaluators, a "master" evaluator module is developed as part of the exercise evaluation activities to summarize the grading of venue objectives and to facilitate the integration of the individual evaluator results.

- With very few exceptions, individual evaluator worksheets are appropriately used to document exercise results, UT-Battelle weaknesses, deficiencies, improvement items, and commends are being appropriately entered into its issues management systems, and corrective actions are assigned.

- Drill reports developed for facility-level drills at the High Flux Isotope Reactor and at selected Bechtel Jacobs Company, LLC (BJC) facilities at ORNL contain the appropriate elements and level of detail and are also being used to identify and address performance weaknesses and improvement areas.

Notwithstanding these very positive program attributes, the Independent Oversight team identified a few areas where exercise program definition is incomplete or implementation is inconsistent with requirements or best practices across the DOE complex. For example, the criteria used to determine

performance against an objective, based on the results of the supporting checklist items, are not formalized. Additionally, although the 2005 full-participation exercise report indicates that the three "core" objectives were graded as satisfactory, marginal, or unsatisfactory, this process is not discussed in and no supporting criteria are provided by ADM-1310. The linkage between the two marginal core ratings (i.e., EPI process and consequence prediction) and the overall ORNL exercise rating of 99 percent is unclear as well. Furthermore, for several objectives, the evaluation checklist items (i.e., checkboxes) do not adequately support the evaluation criteria or the objective. For example, evaluation criteria associated with an EOC objective related to updating categorization and/or classification actually address protective action decision-making. Another example is that a checkbox that supports an LSS objective for protective action decision-making only asks what protective action recommendation (PAR) was selected without also asking if PARs were applied to the appropriate sector(s). This may have contributed to the some of the weaknesses observed during limited-scope performance tests in specifying a complete set of PARs following postulated releases off site. The use of the same facility for the 2005 full-participation exercise and associated workup exercises reduced the opportunities for other facilities to directly participate in the event and potentially limited the validity and usefulness of the exercises even though different scenarios were used. Finally, the 2004 annual exercise requirement was satisfied by taking credit for an actual event that was not classified and for which the EOC was not activated.

In the drill area, there are a few issues associated with the understanding of drill program requirements by UT-Battelle and BJC facility management and staff. DOE Order 151.1B requires that each facility having an emergency planning hazards assessment participate in at least a facility-level "exercise" annually. The purpose of this requirement is to ensure that all facility staff having an assigned emergency response function have an opportunity to periodically practice. However, some of the facilities within the UT-Battelle non-reactor nuclear facilities division and some BJC facilities are not currently complying with this requirement because the annual building evacuation and shelter-in-place drills address most, but not all, of the local emergency supervisor duties. Contributing to the absence of some required facility-level exercises is the fact that ADM-1310 contains conflicting statements as to whether this is a requirement or recommended action and the fact that the high-hazard facility table in ADM-1310 does not include all of the ORNL facilities that possess emergency planning hazards assessments. Furthermore, BJC does not consider itself bound by ADM-1310 requirements. Instead, BJC facilities at ORNL follow a BJC emergency management program procedure, which does not reference ADM-1310 and which only requires annual evacuation drills for occupied facilities. Other drill program weaknesses include the following:

- Although ADM-1310 permits the annual drill/exercise schedule to include items for which the date has not been determined, approximately 50 percent of the items appearing on the 2005 schedule were marked TBD, nearly all of which are drill related. This impairs overall drill/exercise integration and coordination.

- UT-Battelle has not developed or implemented a mechanism for the drill/exercise coordinator to track drill completion at the facility level.

To summarize, the ORNL drill and exercise program is characterized by numerous strengths that include well-organized and informative post-exercise reports, generally appropriate objectives and evaluation criteria that are consistently applied, and identification and documentation of performance weaknesses and improvement items. The UT-Battelle emergency management drill and exercise program is implemented through a controlling procedure that comprehensively addresses the necessary program elements. A wide variety of drills and exercises is being planned and appropriately evaluated and documented, and weaknesses and improvement items identified during the conduct of drills and exercises are being consistently conveyed into the UT-Battelle issues management systems. However, a few aspects of the process for conducting and evaluating exercises are not well implemented or require additional definition, and the use of the same facility for the full-participation exercise and workup exercises lessens the effectiveness of the exercise program. Finally, the conduct of ORNL facility-level drills does not consistently ensure that all of the site's facility emergency responders are provided periodic opportunities to practice all of their assigned functions. Although these weaknesses will need to be addressed, they do not materially impact the overall effectiveness of exercises and drills in supporting the site's emergency management programmatic goals.

D.2.2 Emergency Public Information

The core of the EPI program is the Joint Information Center (JIC), which serves as the central point for coordination and dissemination of all public information concerning an emergency at any of the ORR installations. Personnel staffing the JIC represent all ORR organizations, including the Y-12 National Security Complex (Y-12), regardless of the event contractor. ORO has overall sitewide responsibility for maintaining the EPI program, including the EPI cadre, JIC, and the procedures necessary to ensure that timely and accurate information is provided to the media and public in the event of an emergency.

The hierarchy of plans addressing EPI is as follows: ORO Order 150, "Comprehensive Emergency Management System," Chapter 1, sets forth DOE Order 151.B, Chapter IX, as the regulatory basis and assigns responsibility for the coordination of EPI activities to the ORO Director of the Public Affairs (Public Affairs Officer). ORR 150B, "Oak Ridge Reservation Emergency Plan," Volume 1, section 10, establishes the EPI program at ORR and provides the framework to ensure timely and accurate information to the media and public in the event of an emergency. ORR 150B, Volume 2, requires that the EPI response organization include participation and responsibilities that begin with the lead (UT-Battelle) and event (BJC) contractor public affair organizations in conjunction with, and at the direction of, the ORO Public Affairs Officer. The ORR EPP #102 establishes the JIC operation process, includes guidance and general policy for the activation, operations, and deactivation of the JIC, and includes JIC cadre position checklists.

When considered collectively, the ORO and ORNL emergency plans and associated EPI program descriptions generally document an appropriate framework for an effective EPI program. Most EPI processes, within the scope of this Independent Oversight inspection, are well conceived and based on the nature and potential severity of an emergency. Plans and procedures/checklists identify key EPI cadre positions and appropriately detail roles and responsibilities. Particularly noteworthy is the JIC and its comprehensive set of checklists. This turnkey facility is of sufficient size and layout, and contains appropriate equipment for facility activation during any emergency at ORR. JIC cadre checklists comprehensively address the identification and resolution of misinformation and rumors in a timely fashion and the establishment of interrelationships among the site and offsite officials.

While the framework and most processes are in place, some sections of the plans do not reflect current ORO practices or appropriate expectations regarding the development and approval of initial and subsequent news releases. Most notably, plans and checklists do not accurately address the timing expectation for issuing the initial press release. ORR Emergency Plan, Volume 1, authored by ORO, requires a pre-approved press release informing the media and public of the situation and the activation of the JIC. Volume 2, authored by UT-Battelle, and its supporting procedure, ADM1010, state that there is a goal of 30 minutes from the time the EOC is operational and further states "The goal for issuing the first press release is within one hour of the EOC being operational." These statements of policy are not consistent with DOE expectations, which call for issuing the initial news/press release within one hour of an event.

Finding #5: ORO has not demonstrated an effective initial news release process that provides adequate assurance that timely emergency public information will be disseminated during an emergency, as required by DOE Order 151.1B.

In addition, supporting plans and checklists provide either conflicting guidance or lack sufficient detail to ensure timely release of subsequent press releases. For example, the ORR emergency plan requires the ORO EOC Manager to approve press releases in one section and the EOC Crisis Manager (CM) and ORNL EOC Emergency Manager (EM) in another, yet the public information ORNL checklist requires the ORNL EOC Public Information Director and the ORO EOC Public Information Advisor to approve all press releases. The BJC checklist requires concurrence from the CM and EM and approval by the Lead Federal Manager. Furthermore, this approval process is confusing, as the words approval, concurrence, and coordination appear to be used interchangeably and lack definition.

This issue of developing and releasing information to the public has been problematic for ORO during past exercises and real events. The May 2005 full field play exercise again identified the timeliness of press releases as a weakness (objective N.4). ORO reviewed, revised, and tested alternative measures and initiated the following new policies and procedures as the corrective action:

- Effective September 23, 2005, the ORO EOC will develop all press releases at the ORO EOC based on information obtained from WebEOC and the initial notification form. The draft release will then be shared with the appropriate contractors, EOC, Headquarters, the JIC, and the Tennessee Emergency Management Agency (TEMA) for a 15-minute factual review, approved by the ORO EOC Manager, and then forwarded to the media or the JIC if activated; this change, however, has not been reflected in contractor EOC checklists.

- Effective October 4, 2005, following notification of an operational emergency, the ORO Duty Officer will notify DOE Headquarters within appropriately specified timeframes, initiate a pre-formatted and pre-approved "press information" statement, and fax it to the media. This procedure, however, does not instruct the Duty Officer to complete this step within one hour of the event. While the intent may be that the Duty Officer will be able to complete this step in a timely manner, awareness of the appropriate time requirement – issued as soon as possible but no later than one hour after categorization/classification – would provide more assurance that during initial time-urgent procedural actions this notification would not be delayed.

The Independent Oversight team noted that this press release development process has gone through many changes in the past and concluded that, while not yet tested, the process could prove a positive step toward correcting this ongoing weakness. Additionally, ORNL identified the need to evaluate the protocols involving the communication of patient information in accordance with the Health Insurance Portability and Accountability Act Of 1996, and made prompt procedural changes to ensure that press releases and news conferences would be in compliance.

ORR EPP #103, "ERO Training Program Management," assigned overall responsibility for ERO EPI and JIC training primarily to the ORO Emergency Management Team Leader, and responsibility to ensure establishment of a comprehensive training program and EPI cadre training completion and qualification tracking to Contracting Officers Representatives. Following issuance of this procedure, ORO and ORNL has attempted to determine who is responsible for each training component and where those training records reside. Currently, ORO and each Contracting Officer Representative have responsibility for their respective EOC EPI cadre training development, completion, and tracking. However, JIC position and orientation training is developed, conducted, and tracked by ORISE (an outside prime contractor of ORO). In an effort to integrate EPI training across the reservation, ORO assumed responsibility to obtain and forward all EPI and JIC training records between and among all contractors. As of this date, no training documents or lesson plans have been shared with ORNL or with Y-12. Additionally, neither ORO nor Y-12 can ensure that the training required for the Y-12 EOC and their JIC personnel has been integrated into the Y-12 emergency management program. Hence, as employees of ORO, ORNL and Y-12 routinely staff the JIC together, regardless of the event site. The absence of an integrated EPI training program does not ensure that this ORO ORNL training program includes all essential programmatic components and that requisite knowledge and skills are being maintained.

Lastly, there has been no information regarding emergency planning distributed to the public since 2003. The ORR plan provides for employee public education through the emergency preparedness website but does not include an adequate public education program to provide methodology for informing the public of DOE/National Nuclear Security Administration emergency plans and protective actions, before and during emergencies, as required by ORO Order 150 and DOE Order151.1B. Recently, ORO requested and received a proposal that includes such appropriate elements as the formation of a "Citizen's Advisory Committee" through the Local Emergency Planning Committee. The Citizen's Advisory Committee would serve as a "sounding board" for ideas, approaches, and education materials, such as brochures, calendars, flyers, telephone book ads, utility bill inserts, and newspaper ads. This proposal is currently under consideration by ORO.

Finding #6: ORO has not developed or documented a public education program that ensures that essential emergency information is provided to the public, before and during emergencies, as required by ORO Order 150, Chapter 1, and DOE Order 151.1B.

The Foster Wheeler Emergency Management Project Plan does not include a methodology or procedures to ensure a coordinated release of timely and accurate EPI as required by their plan and DOE Order 151.1B. The plan was established "...to conform

with DOE requirements [DOE Order 151.1] and with certain policies of the ORNL Plan"; however, the plan stipulates that in the event of an operational emergency, the Corporate Communications Director shall be the contact person for the media and the public but provides no mechanisms for providing timely and accurate information. Additionally, this Corporate Communications Director position resides in New Jersey. The plan also requires the Corporate Communications Director as the sole approver of EPI and provides no coordination or integration with ORO.

To summarize, the EPI program is characterized by several strengths, including an appropriate framework for an effective EPI program; EPI processes that are mostly well conceived and documented; and a JIC with comprehensive supporting philosophies and checklists that have, for the most part, been successfully tested during both exercises and real events. However, while these EPI processes are well conceived and, in most cases, appropriately documented, there are programmatic weaknesses that degrade the site's ability to adequately execute all EPI functions. The most important of these is the lack of appropriate guidance and proceduralized detail for development and dissemination of the initial press release. This has been a recurring problem identified by both ORO and ORNL during past exercises and real events. Planning documents include erroneous and conflicting policy and lack DOE's expectations for the release of public information within one hour of an event. These documents also provide conflicting guidance regarding the approval process for all press releases. Second, but of equal importance, is the absence of an adequate public education program providing essential emergency information to the public concerning the notification process and protective actions. The absence of these two vital public information components reduces assurance that ORO and ORNL will be able to effectively provide the public accurate and timely information before and during an emergency at the ORNL site.

D.3 Conclusions

Since the previous Independent Oversight inspection, ORO and ORNL have made a number of improvements to their emergency preparedness functions. ORO and UT-Battelle have prepared and implemented plans and procedures that establish an appropriate foundation in support of emergency preparedness activities, including procedures governing training and qualification, drills and exercises, and EPI. In particular, the LSS training and qualification program was observed to have several strengths, including a comprehensive written final examination and shift-based refresher training. The training and qualification program is supported by a drill and exercise program that is implemented through a comprehensive procedure and is characterized by numerous strengths. The ORNL drill and exercise coordinator has developed several tools that further enhance the program, including a timeline worksheet tailored to each exercise for evaluators to use to facilitate the capturing of critical event times and to assist in post-event data-gathering and analysis. UT-Battelle plans, conducts, and evaluates a wide variety of drills and exercises, and identified weaknesses and improvement items are consistently entered in the UT-Battelle issues management systems. EPI processes are well conceived, and in most cases, appropriately documented. However, several identified weaknesses detract from the site's emergency preparedness activities. Implementation weaknesses; including heavy reliance on required reading, absence of detailed training courses, and lack of documented evaluations of proficiency, lessen the effectiveness of the ERO and LSS training programs. Additionally, the conduct of ORNL facility-level drills does not consistently ensure that all of the site's facility emergency responders are provided periodic opportunities to practice all of their assigned functions. Finally, lack of appropriate guidance for the initial press release and absence of an adequate public education program detract from the ability of the ERO to communicate event status and PARs to the public. While the overall emergency preparedness function has improved, the weaknesses in the training and qualification program and the EPI program require attention to ensure that the site is adequately prepared to respond to an emergency.

D.4 Ratings

A rating of NEEDS IMPROVEMENT is assigned to the area of training.

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

A rating of NEEDS IMPROVEMENT is assigned to the area of EPI.

D.5 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 intended to be reviewed and evaluated by the responsible Office of Science and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Oak Ridge Office and UT-Battelle

- Consider incorporating requirements for the ORNL contractor emergency responder training, drill, and exercise programs from ORR EPP #103, *ERO Training Program Management*, into LPD-EM-ADM-1210, *Emergency Management Training Program*, and LPD-EM-ADM-1310, *ORNL Emergency Management Drill & Exercise Program*. This will better define the applicability of requirements at ORNL and enhance procedure maintenance by removing redundancy.

Oak Ridge Office

- Consider improving the timeliness of the initial event press releases through the following recommendations.
  - Clarify expectations and policy for the timeliness of the initial press release by specifying in all emergency plans and ERO checklists when initial and subsequent information releases should be released.
  - Train all EMs and CMs on the new press release procedure.
  - Validate the new press release approval process during the next drill and exercise to ensure procedural correctness.
  - Develop EPI objectives with criteria to validate all new EPI and JIC functions during drills and exercises.
- Consider the following to validate the consistency and function of EPI processes within the emergency plans and EPI checklists.
  - Consider conducting a crosswalk of all ERO EOC and JIC checklists to ensure consistent assignments of roles and responsibilities and accurate integration of JIC checklists. Ensure that each checklist has specified mechanisms linking the movement of information, questions, answers, and/or issues to and from all positions involved.
  - Review all EPI and ERO/EOC checklists with the appropriate approval authorities to ensure that responsible parties are aware of implementing expectations.
  - Consider developing a flowchart depicting the development, review, and approval process for all press releases as well as any other EPI that may be released during an emergency to ensure clarity and understanding.
- Strengthen the EPI training program by considering the development and implementation of hands-on EOC and JIC position/task-specific training to replace the present required reading material. Also consider the following recommendations to integrate the EPI training program throughout the reservation.
  - Use the position-specific task lists for ORO and ORNL EPI personnel as the basis for job and training needs analysis. Share this information across the reservation.
  - Develop and share lesson plans with learning objectives and associated training materials as required by the emergency management training plan.
  - Coordinate or integrate the EPI training program components with all the various ORNL emergency management training plans and training tracking systems.
  - Establish a mechanism to ensure that program and procedure changes, lessons learned, and corrective actions are included in initial, periodic, and/or EPI refresher training.
- Improve public awareness of ORNL emergency management concepts and practices by establishing a public education program. In its development,

consider incorporating the following recommendations.

- Work with the EPI training working group and with the EPI working group within the Emergency Management Issues Special Interest Group to coordinate and share outreach tools.

- Coordinate implementing efforts with the local emergency planning coordinator and local EMs.

- Develop and distribute information regarding methods and terminology used to notify the public of an ORNL emergency as well as the emergency management concept of operations and the PARs.

UT-Battelle

- Strengthen the process and procedures for defining and administering the training, drill, and exercise program. Specific actions to consider include:

  - Revise ADM-1210 (and LPD-EM-ADM-0210, as necessary) to clearly address the processes for determining an individual's readiness for placement on the ERO roster and developing and conducting annual refresher training. These processes should include:

    - A requirement that all EOC responders demonstrate proficiency prior to being added to the ERO roster, and a description of the proficiency demonstrations that can be used

    - Requirements regarding the documentation and retention of the proficiency demonstrations

    - Requirements regarding removal of an individual from the ERO roster when annual proficiency requirements are not satisfied

    - Program-level information that describes how the non-drill/exercise component of annual refresher training is developed, delivered, and tracked.

  - Revise ADM-1310 to clarify drill/exercise program requirements regarding the following:

    - The use of evaluator checkboxes in evaluating performance against drill/exercise objectives

    - ORNL facilities that require annual facility-level drills (i.e., clarify "high-hazard")

    - Defining and evaluating exercise performance against exercise "core objectives," and linking these ratings to the overall exercise rating

    - Criteria for using actual events to satisfy annual drill/exercise participation requirements and as a substitute for the requirement for an annual emergency management exercise.

  - Revise the process for scheduling drills/exercises and monitoring completion of the annual drill/exercise participation requirement. The process should facilitate:

    - Reducing the number of anticipated drills or exercises for which no date is assigned

    - Improving the drill/exercise participation database so that drill/exercise completion can be easily tracked and the drill/exercise coordinator automatically informed when the proficiency of any ERO member has lapsed

    - Tracking adherence to the drill/exercise schedule on both a sitewide and facility-level basis.

- Formally review and approve the ORNL Emergency Management Training Development Project Plan. Specific elements to consider include:

  - Prioritize elements and develop specific completion milestones for near- and mid-term activities.

  - Using other sites with multiple facilities and equivalent complexity, benchmark the resources needed to (1) develop and maintain

the necessary training materials and deliver the training, and (2) plan, conduct, evaluate, and report the results of required facility-level and site-level drills and exercises.

- Enhance the design and usefulness of the LSS training and qualification program. Specific actions to consider include:
  - Conduct and evaluate multiple-scenario tabletop performance tests on a shift basis at least annually to improve proficiency. Trend the results of the performance tests to identify systemic weaknesses in response systems, procedures, and EALs.
  - Require satisfactory completion of an emergency response written exam annually instead of biannually. Substitute the use of fill-in-the-blank or short-answer essay questions for the current true/false and multiple-choice questions.
  - Revise LPD-LSS-ADM-0003, *Initial and Requalification for LSSs*, to institutionalize all program requirements regarding the periodicity and nature of LSS training and qualification activities.
- Enhance the design and usefulness of sitewide exercises. Specific actions to consider include:
  - Provide more diversity in the involvement of facility hazards and response personnel by including different facilities within each of the exercises that comprise an annual full-participation exercise cycle.
  - To the maximum extent practicable, ensure that participation by key ORNL decision-makers, especially the CM, is rotated during the full-participation exercise cycle.
- Enhance the quality and usefulness of data collected during drills and exercises. Specific actions to consider include:
  - Review the exercise objectives, evaluation criteria (drawn from the EMG), and the individual evaluation checkboxes to ensure that the criteria and checkboxes consistently and appropriately support the underlying objective.
  - To the extent practicable, develop evaluation criteria that are both specific to the drill or exercise and to the observed venue as opposed to "in accordance with procedure." This will improve the evaluator's ability to determine player and program performance.
  - Remove the "not observed" category from the evaluator checklists or require the evaluator to provide a record to explain this selection to ensure that all evaluation criteria are either evaluated or listed as not applicable.
  - Shortly following each exercise, solicit specific feedback from evaluators regarding the ease-of-use of their evaluation criteria so that future data collection activities can be more effective.

Bechtel Jacobs Company

- Enhance the design and usefulness of facility-level exercises conducted at ORNL. Specific actions to consider include:
  - Revise BJC-EP-3021, *Emergency Management Organization Program Description*, to include the process and mechanism for ensuring that local emergency supervisors are knowledgeable of and experienced in executing those defined response duties that are not addressed by existing building evacuation and shelter-in-place drills.
  - Devise and conduct additional evaluated training and/or drill activities for facility local emergency supervisors, as necessary, to ensure that any enhanced BJC programmatic requirements are satisfied.

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 reentry 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 of two sets of emergency management limited-scope performance tests (LSPTs) and performance-based interviews of personnel that may assume the role of incident commander (IC). The first set of LSPTs evaluated the response of a Laboratory Shift Superintendent (LSS) and a Control Center Assistant (CCA), representing the minimum staffing requirements at the Laboratory Emergency Response Center (LERC), to two simulated events. The second set of LSPTs evaluated two emergency management teams acting in the Oak Ridge National Laboratory (ORNL) emergency operations center (EOC), which is physically separated from the LERC. The EOC teams were composed of an ORNL crisis manager (CM) and a 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. IC interviews, focusing on responses to LSPT scenarios, were conducted with two incident command teams consisting of both a fire department and security commander. Facility emergency supervisors were also interviewed to solicit their emergency response as part of the Independent Oversight procedure review as discussed in Appendix C of this report.

Each set of LSPTs involved the response to two operational emergency scenarios. The first scenario addressed a security event occurring at the High Flux Isotope Reactor (HFIR) that included hostage taking and a bomb threat with the potential to release significant amounts of radioactive material, and the second scenario involved a transportation event with injuries and a release of a hazardous chemical that had offsite consequences. The LSPT scenarios, which were developed by ORNL trusted agents in conjunction with Independent Oversight, were presented to the participants by several trusted agents to ensure scenario validity and delivery of accurate event cues. The trusted agents also played the roles of several unmanned positions, such as ICs and facility emergency directors.

E.2 Status and Results

Since the 1998 Office of Independent Oversight (formerly the Office of Independent Oversight and Performance Assurance) complex-wide emergency management review, ORNL has received two follow-up visits – one in 1999 and one in 2002. The 1998 review found strengths in EOC command and control as well as weaknesses in LSS response, where the primary contributor was a cumbersome notification process. In 1999, Independent Oversight found that ORNL efforts to improve performance had not been effective, largely because training and procedures had not been sufficiently improved. In 2002, Independent Oversight found improvements in procedures and performance, but again, site responders had difficulty with timely offsite notifications. This 2005 inspection found that ICs possessed an expert level of response knowledge and identified several strengths in CM performance and CAT assessment capability. However, due in large part to significant weaknesses in implementing procedures and emergency action levels (EALs) and a notification process that, at the time of the inspection, still did not adequately support LSS communication needs, LSSs and EOC personnel did not demonstrate the ability to consistently and accurately classify events and implement the necessary protective actions and protective action recommendations (PARs).

In the event of an emergency, initial direction and control of the ORNL emergency response organization (ERO) is provided from the LERC. The LERC is continuously staffed by an LSS, who becomes the Laboratory Emergency Director when an operational

emergency is declared, and a CCA. The CCA is required to be in the LERC at all times to respond to incoming calls. The on-scene response is under command and control of an IC who is assigned by the LSS from either the fire or security department, depending on the nature of the event. As the initial Laboratory Emergency Director, the LSS is responsible for determining the initial event categorization and classification and protective actions and PARs, activating the ERO, acquiring assets requested by the IC, and notifying onsite personnel and offsite authorities. The LSS is relieved as the Laboratory Emergency Director by the ORNL CM after the EOC is operational. For a fixed facility, the ORNL response includes a facility emergency supervisor, who is responsible for the immediate response and implementation of personnel accountability procedures at the affected facility. At HFIR, the facility response organization includes an emergency response team led by a local emergency director that relocates to an operations center near HFIR.

E.2.1 Incident Commanders

During interviews, ICs demonstrated that they are knowledgeable of their roles and responsibilities, site protocols in implementing the ORNL emergency response, and methods used in keeping personnel safe. In response to hypothetical situations posed in the interviews, the ICs indicated that they would use appropriately conservative techniques to approach and evaluate the event scenes, and then promptly provide available information to the LSS. The ICs deftly used the Department of Transportation emergency response guidebook to identify hazards using placard numbers, establish the isolation zone size, identify downwind protective action distances, and determine the necessary personnel protection equipment in accordance with site protocols. ICs also identified safe incident command post and staging area locations to facilitate an effective response, and included consideration of meteorological and on-scene conditions, emergency response guidebook or bomb blast zone tables, and their familiarity with the site. ICs understood that additional assets could be obtained through the implementation of the ORNL common response plan and the 16 county mutual aid agreements, and were familiar with the impact of predictive analyses from the CAT on their response. Additionally, the incident command vehicle is adequately equipped with nearly all the information and tools necessary to support an effective response, including pre-fire plans and hazardous material reference documents. However, available map scaling is not conducive to identifying the areas and facilities under protective action and the impacted facilities.

E.2.2 EOC Teams

During the LSPT scenarios, CMs generally demonstrated effective command and control through the use of available tools and personnel and management of field assets. CMs insisted on the use of checklists and logs by the EOC cadre, and orchestrated informative turnovers from the LSS and effective briefings in the EOC. Protocols were followed in meeting EOC staffing requirements and establishing an operational EOC for strategic management of the event. CMs managed the ERO assets well, and verified the status of personnel accountability at the affected facilities. The CMs and the DOE emergency managers reviewed and approved prepared site announcements used for communicating protective actions to personnel on site, and for the security event, controlled site announcements in a manner that would not aggravate the postulated saboteur. Similarly, in the case of the scenario at the HFIR, CMs appropriately deliberated the merits of a remote reactor shutdown in mitigating a potential radiological release with the EOC cadre. CMs appropriately planned for the possibility of a reactor shutdown, but allowed the crisis negotiation team to diffuse the situation first. Other positive attributes observed at the EOC included the use of representatives from the facility and a recovery manager on the EOC cadre. This allowed CMs to promptly obtain information specific to the facility, such as available camera views in the reactor control room and access locations to the reactor where a bomb may be placed, and enabled the recovery manager to start early planning for re-entry with good knowledge of event conditions. Additionally, the EOC noise level has been reduced through use of a recently installed chime and light system to indicate incoming telephone calls. Furthermore, WebEOC was effectively used for information sharing in the EOC during the LSPTs. Personnel using this system were proficient and kept significant events available to users, including consequence assessment dispersion plots, although no control over entry accuracy or appropriateness was observed.

The consequence assessment function was, with some exceptions, also effective. Through the consequence assessment manager, the CATs provided appropriate support to the CMs by providing predictive consequence assessments and planning field monitoring team activities using output from the Computer Assisted Protective Action Recommendation System, the ORNL preferred dispersion modeling program. The consequence assessment manager also performed event categorization and classification verification reviews using the EALs, although the existence of only one EAL set in the EOC was a source of frustration to some EOC cadre members. CAT leaders provided appropriate worst-case and event-based predictive analyses to the consequence assessment managers for approval and subsequent delivery to the CM for decision-making purposes and to the rest of the EOC cadre and offsite authorities for information. The Computer Assisted Protective Action Recommendation System program enabled a timely initial assessment that integrated the effects of the unique topography at ORNL, which sits between two ridges and has a lake and river at its boundary. Modelers provided assessments using an initial worst-case scenario, and later, event-based scenarios as information became available. The predictive assessments provided by the Computer Assisted Protective Action Recommendation System were appropriately considered by CMs for formulating protective actions and PARs, event classification decision-making, and planning of field monitoring team activities. However, the CAT did not always use the most applicable event-based information available, and one modeler demonstrated a lack of proficiency with modeling fire-related dispersion. For example, during the nitric acid release scenario, one CAT had difficulty in providing appropriate program input when a fire engulfed the material. During the same scenario, the other CAT did not model the dispersion with fire because they were unaware of the fire. Furthermore, one CAT assumed a 5500-gallon quantity of nitric acid for use in modeling the dispersion when the actual amount – 1,800 gallons of 60-percent solution – was available from the IC.

In several instances, the EOC teams had difficulty in using response procedures and EALs to accurately classify events. Although the EALs were referred to, the classification conclusions were not always consistent with the EALs and were sometimes made without gathering available critical data. Weaknesses included ineffective use of anticipatory decision-making approaches and plume plots as a basis for classification decisions during events that involved the potential dispersion of hazardous materials. For example, during a postulated bomb threat, one CM did not declare a General Emergency as a precautionary measure, even at the urging of an EOC cadre member and the simulated Tennessee Emergency Management Agency (TEMA) controller. The urging was appropriately based on a potential release if the hostage-taker detonated the bombs, as indicated by a plume plot. The CM declined to implement their recommendation because the EAL being used inappropriately required bomb detonation as a condition for a General Emergency classification. For the same scenario, the other CM upgraded an Alert classification to a Site Area Emergency based on a canine unit's response to a vehicle in the parking lot. This CM considered the dog's response equivalent to discovering a bomb at the facility.

More importantly, the EOC teams experienced difficulty in consistent and accurate protective action decision-making. Protective actions and PARs were usually conservative, were formulated with consideration of meteorological data, were initially based on EALs, and included consideration for the immediate area, the balance of the site, and offsite areas. However, protective actions contained in the applicable EALs provided only general guidance, leaving it to the judgment of the CM and EOC staff to identify the areas in which to apply protective actions and to determine whether evacuation (partial or complete), shelter-in-place, or take cover was most prudent. This resulted in weaknesses and inconsistencies in protective actions among the EOC teams (and, as discussed in section E.2.3 below, among the LSS teams as well), because teams used different tools to support decision-making, and some of these tools lacked specificity or were not the most appropriate. For example:

- Only one EOC team used a bomb blast chart for establishing standoff distances and formulating protective actions, which included a silent evacuation of the entire area. In contrast, the other EOC team used their best judgment in formulating a protective action distance.

- Implementation of protective actions based on the potential for hazardous material dispersion varied among the CMs. For the bomb threat event previously discussed, one CM did not issue PARs for a postulated credible bomb threat, even though

bomb threat credibility had already been established based on written ORNL guidance and EALs, and dispersion plume plots indicated potential offsite consequences above protection action criteria. On the other hand, the same CM did order traffic control on the lake (a public area) based on input regarding an indication by a canine unit of explosives on the hostage-taker's vehicle, without considering that the explosives detection could have been a result of trace residue from transporting the postulated bombs.

- Due to a lack of detailed maps with scales and/or template overlays to represent isolation zones and downwind sectors, CMs had difficulty in identifying areas in which to apply protective actions and PARs.

- One CM did not provide the LSS with PARs when giving orders to make offsite notifications.

Some other response weaknesses were noted as well. One CM did not fully understand the availability and usefulness of the HFIR operations center or the tactical authorities of the IC. For example, in one scenario the CM was surprised when responders entered the HFIR building at the direction of the IC rather than at the direction of EOC staff. Additionally, CMs did not effectively use the 911 Service Team to obtain information from the ICs that is germane to CM decision-making, such as the contents of the hostage-taker's vehicle, before changing event classifications based on unknown, but available, information. Finally, during the HFIR scenario, one CM ordered access control of the lake without notifying offsite authorities.

To summarize, CMs demonstrated effective command and control in the strategic management of the emergency response and considered EOC cadre member advice in their decision-making. CAT dispersion modeling output was initially conservative, subsequently refined to be event-specific, and the CAT provided plume plots to the CM displaying predictive protective action criteria information on three dimensional maps for use in protective action decision-making. However, CMs had difficulty in accurately classifying events, formulating protective actions, and supplying offsite authorities with the necessary information. In large part, weaknesses in implementing procedures and EALs, combined with weaknesses in the training program for EOC positions, contributed to the observed performance weaknesses.

E.2.3 LSS Teams

The LSS teams demonstrated adequate performance in several response areas. The LSSs and CCAs generally worked as a team in executing their responsibilities, and adequate administrative tools are available. The LSSs used the EALs as a basis for most of the classification decisions, and timely notifications to offsite authorities were made for all the postulated emergencies during both initial event classification and subsequent upgrades. However, the same response procedure and EAL weaknesses that hampered the performance of the EOC teams also negatively impacted LSS event classification and protective action decision-making capability. Furthermore, the equipment used during the LSPTs for notification purposes made it necessary to call each offsite entity separately, which allowed for inconsistent information being communicated to offsite agencies and unnecessarily prolonged the notification process. ORNL has subsequently completed an in-progress update of the notification system by implementing a ring-down phone system for use in making offsite notifications. Completion of this modification reduces the number of telephone calls the LSS must complete as part of the notification and promotes transmittal of consistent information by including multiple callers.

As a direct result of the notification process that had to be used, LSSs were not able to effectively manage the emergency events because they became distracted; a contributing factor in one case was that the LSS was not proficient and needed to research methods to execute various tasks. Both LSSs concentrated on making the required offsite notifications and were significantly distracted because the increasing severity included in the scenarios necessitated follow-up notification. One LSS spent a significant amount of time reviewing a bomb threat guidance document, the protective action procedure, and the ORNL common response plan, and looking for a telephone number for the crisis negotiation team. Although it is a good practice to have these references available and used if needed, emergency responder proficiency is best facilitated by execution of these tasks from a checklist. Similarly, the CCAs supporting the LSSs allowed themselves to be distracted when having difficulty with equipment, when multitasking was necessary, or when awaiting LSS orders. Specific event management weaknesses include:

- The LSSs did not gather and record available, critical event data for use in making complete and consistent notifications. For example, available bomb threat checklists and offsite agency notification forms were not used. This resulted in incomplete information-gathering before notifications were initiated and PAR decision-making was completed.

- Neither LSS consistently tracked deployed asset locations or injuries. When it was time to turn over Laboratory Emergency Director responsibilities to the CM, the LSSs could not always describe the current on-scene conditions or the number and nature of injuries. Such information is important for effective coordination of medical response assets and for conducting complete turnovers to the CM.

- One LSS did not obtain the crisis negotiation team when initially requested, despite near-term hostage-taker deadlines, and one LSS did not act upon a demand by the hostage-taker to call him back in 15 minutes.

- One LSS required 17 minutes to classify the event, and it took an additional 11 minutes to activate the EOC.

- When the EOC was activated for an early morning event, the initial LSS order did not route the ERO through the west gate, even though the normally used east gate was closed due to the postulated transportation accident and inbound ERO members from the east side of the site could have been stuck in a traffic jam. However, when the event subsequently escalated to a General Emergency, the LSS recognized the need to route the ERO through the west gate and issued the order to do so.

- One CCA attempted to activate the Public Warning Siren System following an Alert classification, whereas procedures, based on agreements with offsite agencies, restrict the use of the Public Warning Siren System to General Emergency events only unless previously coordinated with offsite agencies.

Finding #7: During LSPTs, LSSs as Laboratory Emergency Directors did not manage the emergency response to promote an effective time-urgent response, as required by DOE Order 151.1B.

In the areas of event classification and protective action formulation, the LSS teams demonstrated the impact of many of the same procedure weaknesses as seen in the EOC teams. Examples of performance inconsistencies and concerns in protective action decision-making include:

- Neither LSS used a bomb blast chart as a basis for protective actions. Instead, the LSSs used their best judgment in formulating protective actions. Additionally, one LSS conducted an announced evacuation of all but essential personnel; the other LSS did not direct any such protective actions.

- One LSS inappropriately continued to use the EAL for unidentified cargo instead of the Emergency Response Guidebook even after the cargo was identified. Although the Emergency Response Guidebook was on the LSS's desk and was used later in the scenario to verify that placard 2031 indicated nitric acid, it was not used to verify the appropriate protective actions and evaluate other information specific to the material.

- The LSSs did not initiate reviews of HFIR EALs for the HFIR event to ensure that the most appropriate event indicators were used for event classification decision-making and to determine whether there were any predetermined protective actions, specific to HFIR, to be implemented.

- Maps were not always used or were not used early in the event to identify areas in need of protective actions and PARs. During one scenario, the LSS did not establish the exact location of a hazardous material release and did not review a complete area map. As a result, the LSS did not recognize that because the isolation zone extended into a public area of the lake, a PAR should have been made to control lake access. Additionally, the LSS did not determine whether there were normally occupied facilities inside the established half-mile isolation zone or whether a nearby guard post was inside the isolation zone. In part, map usage problems are due to a lack of detailed maps with scales and/

or template overlays to represent isolation zones and downwind sectors. ORNL has previously identified a need for a status board with maps in the LERC for this purpose, but installation has not been completed.

- One LSS did not provide PARs when making General Emergency notifications, and one LSS provided PARs to only some of the offsite authorities.

- When PARs were provided for the postulated transportation event, the LSSs should have included sector Y, the sector in which the event occurred, in their notifications to offsite agencies but did not.

The Independent Oversight team observed a number of weaknesses in event classification that were identical to weaknesses previously identified for the EOC teams. Other LSS classification weaknesses include:

- One LSS inappropriately made a Site Area Emergency and then a General Emergency classification because neither the nature of the threat nor the event location and proximity to facilities and the guard post at the site boundary control point were known by the LSS team.

- One LSS knowingly misclassified an Alert condition as a Site Area Emergency because it was thought to be more conservative.

- For one event, one LSS incorrectly indicated that, based on a note in the applicable EAL, it was permissible to downgrade a General Emergency to a Site Area Emergency after Highway 95 was closed for an hour. However, Highway 95 was upwind and several miles away from the event scene, and therefore the note did not apply to the postulated situation. Additionally, the LSS does not have the authority to downgrade an event. It should be noted that as a result of this observation, ORNL management has issued a reminder to Laboratory Emergency Directors that event classification downgrades are not to be made in this manner.

As with EOC team performance, the observed weaknesses on the part of the LSS teams are largely attributable to weaknesses in implementing procedures, EALs, and training. These areas are discussed in more detail in Appendices C and D, respectively.

To summarize, the LSS teams demonstrated their ability to make initial and follow-up notifications in a timely manner, and adequate administrative tools are available for their use. However, LSSs had difficulty in making accurate event classifications, formulating protective actions, and including all of the appropriate information in the notifications to offsite authorities. Contributing to these difficulties are weaknesses in response procedures and EALs, the absence of detailed maps where scaling is easily correlated to distances where protective action criteria is predicted to be exceeded, and training program weaknesses. LSS teams also had difficulties in managing a timely and effective response because the offsite notification system and process required them to direct their attention to those duties, distracting them from dispatching assets needed by the ICs to support the tactical response to postulated scenarios.

E.3 Conclusions

During this inspection, conduct of LSPTs allowed Independent Oversight personnel to observe the performance of two sets of ORNL personnel operating in the LERC and EOC in responding to two postulated emergency events. These observations were supplemented by interviews of fire department and security commanders who may serve as ICs. The results of the IC interviews provided assurance that ICs would provide the necessary protection to nearby workers and responders at the scene, and that they were familiar with site response protocols for interface and communication with the LSS in the LERC. During LSPTs, CMs demonstrated effective command and control techniques, and made good use of the expertise within the EOC cadre in developing and implementing sound strategic responses. In most cases, CMs were well supported by the CAT, whose worst-case and event-specific plume plots were used appropriately for formulating protective actions and planning field monitoring team activities. However, both the CMs and LSSs, acting as Laboratory Emergency Directors, were observed to have difficulties in arriving at accurate event classifications and providing appropriate PARs to offsite agencies. These difficulties resulted primarily from problems implementing the EALs and using the available maps to identify the applicable protection zones, which may be further attributed to weaknesses in the training program, supporting procedures, and the quality of maps and associated tools available for use in the EOC. Furthermore, the LSSs (as Laboratory

Emergency Directors) were not proficient in performing some emergency tasks and were burdened by a cumbersome notification process that distracted them from being able to manage the event. This resulted in a number of delays in acquiring response personnel and equipment that may have been needed to mitigate event consequences or treat and transport victims. It also resulted in the LSSs not knowing where assets were deployed and the event conditions at the time of transfer of Laboratory Emergency Director duties to the CM. Collectively, the weaknesses in the notification process and the procedures to categorize and classify the event and formulate protective actions detract from the ability of the ERO to respond to an event in a fully effective manner.

E.4 Rating

A rating of NEEDS IMPROVEMENT is assigned to the area of emergency response.

E.5 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 intended to be reviewed and evaluated by the responsible Office of Science and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

UT-Battelle and Bechtel Jacobs Company

- When improving the strategic management of emergency events, consider the following actions:
  - Provide the LERC and the EOC a status board that tracks requested assets and their estimated time of arrival and the location of available assets, such as at staging areas, the incident command post, and at the scene. Assign the responsibility of updating the status board to a position in the ERO.
  - Provide the EOC maps suitable to mark on to identify locations of important information, such as the event location, traffic control points, the incident command post, staging areas, assembly and muster stations, and current wind direction. Assign the responsibility of updating the map to a position in the ERO.
  - Develop turnover forms for use in transferring information to oncoming Laboratory Emergency Directors.
  - Drill Laboratory Emergency Directors in a manner that promotes verification of prior orders being completed and questionable WebEOC log entries.
- To improve the effectiveness of activities performed in the LERC, establish task priorities and minimize unnecessary communications. Specific actions to consider include:
  - Establish and drill the CCAs on priorities in executing their tasks.
  - Determine whether the CCA needs additional help with potential emergency task executions during off-normal hours, and enable use of WebEOC at the LERC.
  - Eliminate the practice of preceding event classifications with "operational emergency," since Alerts, Site Area Emergencies, and General Emergencies are already understood to be operational emergencies.
- To improve the timeliness and capability of protective action and protective action decision-making, provide additional tools and training that will give users an easy means to identify areas and features impacted by event consequences. Specific actions to consider include:
  - Provide the LERC, EOC, and ICs with maps that have suitable detail and scaling for use in applying protective action distances and for identifying buildings, guard posts, site boundaries, and other features of interest.
  - Provide template overlays or a similar tool to place on maps that represent isolation zones and downwind protection areas to easily and promptly identify protective action priorities and extent of consequences.

- Drill Laboratory Emergency Directors and consequence assessment personnel to make use of maps early in the event to promptly identify the extent of consequences, and in particular, ensure that PARs for lake control, where the public has access and is unlikely to have radios and televisions immediately available, can be initiated early into the event.

- To improve timeliness in establishing appropriate classifications, protective actions, and information provided to offsite authorities, consider the following recommendations.

  - During drills, encourage LSSs to use the notification form to guide them in gathering initial critical event data and provide them with a record of information that can serve as the basis for subsequent notifications and briefings and promote consistency in the information disseminated.

  - Drill Laboratory Emergency Directors with field responders in a manner that requires Laboratory Emergency Directors to solicit information needed in their emergency response responsibilities, rather than using only field information that field responders decide to provide. When doing so, emphasize the importance of early hazardous material identification and specific location. Furthermore, involve venues, such as the HFIR operations center, so Laboratory Emergency Directors become more familiar with these resources and so local emergency directors are familiar and therefore can anticipate Laboratory Emergency Director needs and responses.

- To improve the timeliness of classification, protective action, and PAR verifications, consider providing additional copies of the EAL in the EOC or provide electronic copies on EOC cadre members' computers.

- Enhance the CAT capability and response by providing a consistent methodology for assessing bomb blast consequences and improve CAT members' proficiency in seldom-performed tasks. Specific actions to consider include:

  - Make bomb blast tables, used by ICs, available in the CAT room and promote their use during training and drills.

  - Drill the CAT with more fire scenarios and include the use of Computer Assisted Protective Action Recommendation System and National Atmospheric Release Advisory Center dispersion modeling programs.

- To enhance the local response at the facilities, provide safer methods to assess event conditions, and improve the process to communicate information from the scene to the Laboratory Emergency Director. Specific items to consider include:

  - Consider alternative mechanisms to "negative accountability" to reduce risk to building "sweepers" for facilities containing significant quantities of hazardous materials.

  - Consider assignment of a building occupant, such as the Local Emergency Supervisor, to perform the role of providing facility status information to the Laboratory Emergency Director and IC during emergencies, and ensure that this role is part of the National Incident Management System incident command system.

  - Clarify to facility personnel that the Laboratory Emergency Directors will not relocate but will remain at the LERC or EOC during classifiable emergencies.

  - Include "take cover" instructions in local emergency manuals.

  - Complete installation of Wide Area Radio System (WARS) base stations and/or transceivers at high-hazard facilities on a priority basis. Provide personnel fulfilling incident reporting functions in high-hazard facilities with adequate communications capability and appropriate training.

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 the Office of Science (SC) line organizations in monitoring program effectiveness; implementing self-assessment programs; and ensuring that timely corrective actions for identified weaknesses are identified, implemented, and appropriately closed. SC 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.

SC has line management responsibility for ORNL, with overall responsibility for programmatic direction, policy guidance, management overview, performance accountability, and funding of landlord activities and infrastructure operations, including emergency management. Operation of the ORNL falls under ORO, which reports directly to SC and is responsible for providing direction and oversight for the emergency management program at the Oak Ridge Reservation (ORR), which includes both ORNL and the East Tennessee Technology Park (ETTP). Within ORO, responsibility for direction and oversight of the contractor's activities rests with the programmatic line manager. Consequently, the Office of the Assistant Manager for Science (AMS) is responsible for oversight of the University of Tennessee-Battelle Memorial Institute (UT-Battelle) in its role as the lead contractor in the ORNL emergency management program; and the Assistant Manager for Environmental Management (AMEM) has oversight responsibility for Bechtel Jacobs Company (BJC) and Foster Wheeler Environmental Corporation (FWENC) in their roles as event contractors.

Additionally, within ORO the Assistant Manager for Security and Emergency Management has responsibility for coordinating and directing the ORR emergency management program. The ORO emergency management team leader exercises day-to-day management responsibility for the program, including the operation of the ORO emergency operations center (EOC) and development of the associated reservation-level procedures.

F.2 Status and Results

F.2.1 DOE Line Program Management

In 1999, an inspection by the Office of Independent Oversight (formerly the Office of Independent Oversight and Performance Assurance) found that the Oak Ridge Operations Office (now ORO) had not established long-term plans for an integrated self-assessment program, with clearly defined organizational roles, responsibilities, and authorities. A follow-up visit in 2002 found that progress had been made in defining self-assessment programs, chiefly through the development of a number of governing procedures, but that key elements of the program had not been implemented. Further, an Independent Oversight inspection of ETTP in May 2003 found that ORO had not conducted the required triennial assessments of the contractor's emergency management program. This 2005 inspection revealed that while governing procedures are in place, and roles and responsibilities for oversight and direction of ORNL are clearly defined, weaknesses in implementation of the oversight program remain.

As discussed in the introduction above, responsibility for direction and oversight of the activities of UT-Battelle rests with AMS. Within this office, oversight is the responsibility of personnel from the Laboratory Support Team, which provides matrix support to the AMS Technical Support and Assessment Division. Laboratory Support Team personnel are regularly engaged in oversight of the ORNL emergency management program through such activities as formal review of pertinent emergency management program planning and preparedness documents; participation in training, drills, and exercises; participation in regular

meetings with laboratory counterparts; and conduct of formal assessments. Responsibility for direction and oversight of the activities of BJC and FWENC at ORNL lies with AMEM, and is exercised primarily through the line project managers for each of the closure projects. AMEM personnel are engaged in oversight of contractor activities at ORNL through formal review of emergency management program planning and preparedness documents, particularly hazards assessments, and through oversight and conduct of readiness activities at BJC and FWENC facilities.

U.S. Department of Energy (DOE) direction and guidance to UT-Battelle concerning emergency management is contained in the governing management and operating contract, as implemented through the standards and requirements identification documents system (S/RIDS). Currently, the S/RIDS for the emergency management subject area contains only the contractor requirements document from DOE Order 151.1B, and does not reference the expectations and guidance contained in the remainder of the order or in the *Emergency Management Guide*. However, a recent amendment to the contract includes ORO Order 150, Chapter 1, which incorporates these documents. DOE direction to UT-Battelle is also expressed through the development and implementation of contract performance incentives. While performance incentives are not included in the current fiscal year's performance measures, performance measures for fiscal year 2006 will include a number of performance measures relating to maintenance and operation of the laboratory, one of which addresses performance in emergency management.

ORO has established a programmatic and procedural framework governing the scheduling, conduct, and follow-up of assessments. The ORO procedure on the emergency management system sets out the roles and responsibilities for management and oversight of the system at the ORR, including responsibilities of the site manager and the contracting officer representatives. Further, the operations assessment program procedure establishes the roles and responsibilities and implementing processes for the site's assessment program. This procedure includes instructions for establishment of three-year and annual assessment plans; conduct of detailed, comprehensive assessments; and follow-up for the resulting corrective actions. Within both the AMS and AMEM offices, the ORO procedure is supported with additional procedures that further delineate the roles, responsibilities, and processes for implementing oversight and assessment activities within these offices.

The current AMS assessment schedules include an annual review of selected elements of the emergency management program in each fiscal year, with the goal of reviewing all the functional elements within a three-year period. In early 2005, AMS personnel conducted a programmatic assessment of the UT-Battelle program. The assessment was thorough, critical, and well-documented, and it resulted in a number of significant findings and observations. The areas examined by the assessors included the technical basis (hazards surveys and assessments), emergency response organization (ERO) training, continuous improvement program, and Laboratory Shift Superintendent program, as well as follow-up for corrective actions associated with the corporate assistance capability review (see discussion under UT-Battelle). The assessment resulted in the identification of six findings and nineteen observations, including the need for improvement in the usability of emergency action level documents, lack of a DOE-approved emergency planning zone, and the need to determine the extent of weaknesses identified in the April emergency preparedness exercise. Notably, some weaknesses in the UT-Battelle program identified during this inspection were previously identified by ORO. Notwithstanding the above, an assessment of all the applicable functional areas in the UT-Battelle emergency management program has not been completed during the last three years.

Following an internal ORO reorganization in the fall of 2004, the available support for emergency management oversight within AMEM was reduced, and the annual assessment of the BJC program was canceled. As a result, AMEM assessments of BJC and FWENC facilities and activities at ORNL during the past two years have primarily been accomplished in conjunction with the evaluation of readiness to start or restart activities. Assessments may consist of observation of the contractor's management assessment and readiness review (for startup of low-risk activities) or the conduct of an independent DOE readiness review or operational readiness review, including emergency preparedness (for high-risk facilities or activities). Review of the reports for several of these activities indicates that the reviews have adequately addressed the contractor's preparation for operation. However, AMEM has not conducted a formal assessment of the functional areas of emergency preparedness applicable to BJC or FWENC facilities and activities at ORNL within the past two years.

The ORO assessment program procedure specifies that tracking and closeout of corrective actions related to issues is the responsibility of the line managers. Tracking of assessments and the resulting issues is adequately supported by the Oak Ridge Issues, Open Items, Nonconformance System (ORION2), which provides a database tool for tracking the findings, observations, and corrective actions resulting from oversight activities. For example, the issues identified in the recent ORO assessment of the ORNL program have been entered into the database, but the database does not contain entries from previous assessments or inspections. Although corrective actions from the March UT-Battelle assessment have recently been submitted to ORO for review, the corrective actions are currently under review and revision and are not included in the database.

Finding #8: ORO has not ensured that the ORNL site emergency management program has been assessed at least once every three years or utilized its issues tracking processes to identify and track important issues to closure, as required by ORO procedures and DOE Order 151.1B.

ORO personnel have been integrated into the ORNL ERO, and during an emergency, are expected to fill four positions in the EOC: emergency manager, 911 services representative, consequence assessment manager, and operations/headquarters liaison. Their actions are primarily governed by four position checklists that provide a ready format to guide and record their actions, and during limited-scope performance tests, DOE personnel were observed implementing the actions specified in the checklists. However, in some instances the DOE checklists do not reflect the roles and responsibilities assigned to DOE personnel in the emergency plan and related implementing procedures and checklists. For example, in one section the ORNL emergency plan indicates that the DOE emergency manager will "approve protective action recommendations issued to TEMA [Tennessee Emergency Management Agency]" during multi-site events, and in another section, the plan indicates that the emergency manager will "concur" with the protective action recommendation. The ORNL crisis manager's checklist indicates that the crisis manager will "recommend off-site protective action recommendations to the DOE emergency manager for approval." Further, the emergency manager's checklist does not indicate that the manager is to "approve" the protective action recommendations. Finally, the ORNL procedures for categorization and classification, protective actions, and notifications make no mention of the roles of DOE personnel.

ORO has developed a procedure and supporting processes for a training program that is designed to ensure that ORO members are capable of performing their ERO duties at both the ORO and the ORNL EOCs. The procedure defines the roles and responsibilities of DOE personnel in developing and conducting the training necessary to achieve and maintain competency. The training program includes both initial and recurring training, as well as provisions for annual participation in drills and exercises. The training program is supported by a training database that can assist in tracking the status of the training of the ERO members. During this fiscal year, ORO has embarked on a formal process, utilizing an established checklist with specific evaluation criteria, of evaluation of the proficiency of the DOE personnel, and approximately half of the DOE ERO members have been evaluated to date. However, the training program does not incorporate a formal qualification process to document a member's experience and qualification for the position or evaluate the member's proficiency prior to placement on the duty roster. Furthermore, while the governing procedure indicates that the systematic approach to training will be used to establish the basis for the training program, the current training program was not developed using this process, and the training program includes only limited training that is ORNL-specific to DOE ERO members' duties at ORNL.

Within SC, the expectation is that oversight of emergency preparedness is the responsibility of ORO, and DOE Headquarters personnel are not routinely involved in providing direction or oversight to the site's emergency management program. Headquarters personnel receive copies of the emergency plans and the emergency readiness assurance plan, but do not typically provide comments or feedback to either ORO or UT-Battelle. Personnel from SC have not conducted evaluations or assessments of the ORO emergency management program. Headquarters participation or observation of exercises is limited to observation of exercises that include an element involving the Headquarters watch office, and there is no evidence to indicate that Headquarters personnel have conducted an evaluation of an ORNL site exercise.

Finding #9: SC has not periodically reviewed the ability of the ORO and ORNL site emergency management program to meet the requirements of the DOE emergency management system, as required by DOE Order 151.1B.

In summary, ORO is engaged in oversight of the ORNL emergency management program through document reviews, startup activities, and routine meetings, and has performed some formal assessments of the ORNL program. Furthermore, ORO has adequate systems and processes, supported by computer tools, for tracking identified issues and actions to closure. However, the formal assessments have not fully addressed the appropriate functional elements of emergency management at each of the site's contractors, and the issues tracking system has received only limited use in tracking the contractors' corrective actions. DOE participation in the ERO is governed by a set of ORNL-prepared procedures and checklists governing their actions; however, the procedures and checklists may not fully reflect the ORO members' integrated roles and responsibilities. Additionally, some weaknesses were observed in the ORO training program. Finally, SC has not provided the oversight and support of the ORNL emergency management program necessary to ensure that the ORO and ORNL program meets DOE requirements.

F.2.2 ORNL Feedback and Improvement

Previously, Independent Oversight inspections of ORNL and ETTP found that weaknesses existed in activities designed to foster long-term improvement in the sites' emergency management programs, including the implementation of an effective self-assessment program. This inspection revealed that significant improvements have been made to the ORNL readiness assurance programs conducted by UT-Battelle and BJC. UT-Battelle managers have taken an active role in providing direction and oversight to the program, and the Emergency Preparedness Department has taken actions to identify opportunities for program improvement. These actions include critique and follow-up corrective actions related to drills, exercises, and, significantly, actual events, as well as review of inspection results from other sites to identify lessons learned. BJC has implemented a self-assessment program commensurate with its role as an event contractor at ORNL. Both companies have implemented issues and corrective action systems that provide excellent support for feedback and improvement activities. However, some weaknesses in the implementation of the readiness assurance programs at both contractors were identified during this inspection.

F.2.2.1 UT-Battelle

The ORNL Emergency Preparedness Department, under the Director for Facilities Operations, is responsible for managing the laboratory's emergency preparedness program, and roles and responsibilities for program administration, including implementation of self-assessment, corrective action, and lessons-learned programs, are delineated in the ORNL emergency plan. Through the development of corporate-level policies and procedures, UT-Battelle has established expectations and implementing procedures to support feedback and improvement activities. Within the performance-based management system, subject area procedures are available to address performance assessment, analysis, issues improvement, feedback, and critiques.

Through the performance-based management system, UT-Battelle has also established a framework for the management of self-assessments. Corporate-level procedures provide instructions for conducting assessments and responding to the results. Within this framework, the Emergency Preparedness Department has developed a procedure that establishes roles and responsibilities for conducting performance assessments of the emergency management program. Each September a performance assessment schedule for the following year is developed and entered into the Assessment and Commitment Tracking System (ACTS). At a minimum, the schedule is to include a requirements management review, compliance assessment (against the functional areas of the emergency management program), a management system maturity evaluation, status of training, and completion of the emergency readiness assurance plan. The procedure also requires that drills and exercises be evaluated, and that weaknesses, deficiencies, and improvement items be identified for correction (see discussion of training, drills, and exercises in Appendix D). While the emphasis on critique and follow-up of drills, exercises, and actual events is commendable, important weaknesses in the self-assessment procedure were noted. First, rather than requiring an examination of an aspect of each of the functional areas of the emergency management program annually, the schedule included in the procedure spreads the evaluation over

a three year period. Second, the procedure does not provide sufficient guidance in some areas to ensure that the assessments produce meaningful results; for example, the procedure does not require the use of standards and criteria, such as those in the *Emergency Management Guide*, for performing the assessments.

As required by the UT-Battelle directives and its internal procedure, the Emergency Preparedness Department has implemented self-assessments of its program. During fiscal year 2004, UT-Battelle conducted six self-assessments and one combined (with ORO) assessment. Two of the assessments, the management system maturity evaluation and the corporate assistance capability review, involved significant time and resources. The management system maturity evaluation was based on a questionnaire and a points rating system, and used both internal and external evaluators, including an ORO participant, to rate the program. This review identified seven items for correction; including completion of the set of implementing procedures, development of a more comprehensive self-assessment, and improvement of drill reports. The corporate assistance capability review was conducted by experienced Battelle (corporate) and DOE ORO personnel at the request of the emergency preparedness program manager. The results of the review indicate that it was both thorough and critical, and it identified three noteworthy practices and six areas for improvement, including hazards surveys, hazards assessments, UT-Battelle and FWENC interface, emergency action levels, and self-assessments. While these two assessments identified conditions that could be the basis for improvements in the program, other assessments were less well structured or did not directly address performance. For example, an annual review of the emergency plan and a review to ensure that the correct revisions of the emergency action levels were available at the required locations were considered self-assessments.

The UT-Battelle performance-based management system provides a solid framework for managing the issues, lessons learned, and actions identified through the readiness assurance processes. The system is supported by the computer-based ACTS, which provides an excellent tool for tracking and closeout of identified conditions (findings, weaknesses, deficiencies, or lessons learned) and the resultant corrective actions. The instructions provide for the assignment of an "assessment owner," who is responsible for managing the results of the assessment from identification of the "conditions" and assignment of the condition and action owners through to closure of the corrective actions. The process is also supported by procedures that address specific areas of implementation, such as analysis of performance assessment results (for repetitive or systemic conditions), extent of condition review, causal analysis, and effectiveness reviews. The Emergency Preparedness Department has made effective use of ACTS to manage the corrective actions resulting from its readiness assurance activities. Responsibility for management of corrective action plans and the associated actions is clearly specified and readily identifiable in the database, which provides a vehicle for both assigning and accepting responsibility. Corrective actions receive the attention of responsible managers, and no overdue items were identified during the inspection. Further, ACTS supports the verification of action closure by providing an effective mechanism for recording the closure evidence, generally as an attachment to the action in the database.

The Emergency Preparedness Department has actively utilized the readiness assurance process to identify issues and improvement opportunities and to track corrective actions. Actions related to self-assessments, drills and exercises, event critiques, and lessons learned from other sites have all been entered into the system. The critique process has been effectively utilized to identify issues and lessons learned that affect the emergency management program and procedures. This effort is supported by corporate procedures that establish a requirement to conduct critiques for reportable occurrences and events under ORNL responsibility and provide implementing instructions for the conduct of critiques. The implementing instructions provide a structured approach to gathering and analyzing event data and developing causal factors and corrective actions. One of the emergency department personnel is a trained critique facilitator, and the department has conducted a number of critiques of actual events, which has led to the identification and assignment of corrective actions. Review of a number of the database records revealed that a significant number of corrective actions have been identified, completed, and closed out. Collectively, these actions have contributed to the overall improvement in the program's processes and procedures. For example,

- Following an operational event at a hazardous material facility, corrective actions resulted in the elimination of the situation management team in favor of direct activation of the EOC for events categorized as operational events not requiring further classification.

- Actions in response to the corporate capability review resulted in improvements to the process for developing hazards surveys, development of a performance indicator to track the completion of the annual hazards assessment reviews, and completion of procedures defining the training, drill, and exercise programs.

- Actions in response to an incorrect protective action recommendation made during an exercise resulted in changes to the associated notification form.

However, the corrective action processes have achieved mixed results in addressing the identified weaknesses. Some actions have been closed without incorporating identified follow-up actions into the corrective action tracking system. For example, some corrective actions required the evaluation of alternative actions, but were closed without opening the follow-on actions that are necessary to implement the chosen alternative. Additionally, some corrective actions did not sufficiently address the underlying cause of the condition or lead to timely correction of the observed condition. For example,

- A number of evaluations have identified weaknesses with the emergency action levels; however, a recent assessment (and observations during this inspection) indicates that difficulties in the use and application of the emergency action levels persist.

- While the corrective action plan for the corporate capability review was effective in addressing the significant issues raised in the report, it did not address all the identified technical issues, and a second review of the technical issues (which was performed as a result of a finding from the March 2005 ORO assessment) has resulted in the identification of additional corrective actions.

- An evaluation of the feasibility of conducting a conference call to perform required notifications was completed and closed without ensuring that the chosen alternative was effectively implemented.

Finding #10: UT-Battelle has not consistently identified and addressed program deficiencies and implemented timely corrective actions, as required by DOE Order 151.1B and DOE Order 414.1C, *Quality Assurance*.

In summary, UT-Battelle has made significant efforts to improve its readiness assurance program. The Emergency Preparedness Department has been actively engaged in the evaluation of operational events, drills and exercises, and Independent Oversight inspections; and follow-up from critiques of actual events and drills and exercises has led to the implementation of program improvements. Processes and procedures governing the scheduling and performance of self-assessments are in place, and to support its readiness assurance efforts, UT-Battelle has implemented an effective system for tracking corrective actions identified with issues and opportunities for improvement. Nevertheless, the self-assessment program does not sufficiently address the program's functional areas, and a number of the implemented corrective actions have not adequately addressed the underlying cause and/or have been closed prematurely.

F.2.2.2 Bechtel Jacobs Company

BJC has procedures in place establishing the roles and responsibilities for its line managers and emergency management personnel. The procedures identify the requirements for BJC projects, as an "event" contractor at ORNL, which include the development of hazards surveys and assessments, emergency action levels, and building and facility emergency plans, as well as providing integrated support to the ORNL ERO. The BJC emergency management program manager is expected to complete an annual management assessment of each project at ORNL. In turn, the project emergency management personnel are expected to complete an annual self-assessment of each of the emergency program's functional elements utilizing criteria that are tailored specifically to the project's facilities and activities.

As part of its closure project evaluations, BJC has implemented the requirement to conduct annual management assessments of the emergency management programs at both the Melton Valley Closure Project and the Balance of Programs Project. A review of the reports of these evaluations reveals that the assessments focused on ensuring that an overall functional emergency management program was in place. The evaluations were based on interviews and document reviews, and resulted in critical, well-documented observations, which included both findings and observations. A finding in the 2004 evaluations identified that the Melton Valley Closure Project had not conducted the required annual self-assessments;

the finding was subsequently closed through the completion of the self-assessments in early 2005.

BJC project emergency management personnel have been involved in support of the BJC project managers in implementation of the readiness assurance program requirements, as well as development of the technical documentation, procedures, and processes. Project emergency management personnel have implemented the self-assessment program through assessments of the local emergency manuals, participation in several targeted facility reviews (in support of readiness activities), conduct of self-assessments, and critique of an actual event at an ORNL facility. Following the corporate project evaluations in 2004, improvements in the implementation of the self-assessment program at ORNL projects were initiated. Project emergency management personnel developed a set of evaluation criteria that are tailored to their responsibilities as event contractors. In early 2005, BJC conducted an independent assessment of the emergency management program at the Melton Valley Closure Project, which appropriately examined the applicable functional elements utilizing specific performance criteria and a combination of observations, interviews, and document reviews. In spite of these improvements, some weaknesses in implementation exist. The Balance of Program Project scheduled self-assessments of its emergency management program elements over the course of the fiscal year, but two of these assessments have been postponed, and a third examined the functional elements at a single facility/activity.

Finding #11: BJC has not ensured that appropriately tailored self-assessments of the emergency management program at its ORNL projects have been completed annually, as required by BJC procedures and DOE Order 151.1B.

Once the readiness assurance process has identified an issue, BJC has an effective system for tracking the issue and its corrective actions to closure. The issues management process includes identification of issues (which may be findings or observations from assessments), review by an issues review board for acceptance into the issues/corrective action tracking system, development of corrective action plans, which may be subject to independent review, and verification of closeout of the actions. A review of a number of issues/corrective action tracking system reports for actions related to assessments, drills and exercises, and readiness reviews indicates that the process is effective in tracking and documenting the actions. However, one weakness in the system was noted during the inspection. In response to an actual ORNL event, BJC personnel conducted a follow-on critique and review of the BJC response, and identified issues, lessons learned, and corrective actions. The identified issues were not accepted for entry into issues/corrective action tracking system, and while the corrective actions were tracked and implemented, the issues and actions may lack the appropriate management awareness and attention. Furthermore, some issues, requiring corrective action by UT-Battelle, have only recently been formally conveyed to UT-Battelle.

In summary, BJC has implemented a readiness assurance program for its projects at the ORNL that is commensurate with its responsibilities. Readiness assurance activities include participation in startup activities for the various projects and facilities, conduct of self-assessments, and follow-up and correction of identified issues. Emergency preparedness personnel are supported by and have effectively utilized the company's corrective action tracking system. BJC emergency preparedness personnel also initiated corrective actions following a critique of BJC's response to an actual event at a UT-Battelle facility. Nonetheless, BJC has not fully implemented its self-assessment program at ORNL with regular, in-depth self-assessments of the functional areas of responsibility at each of its projects.

F.3 Conclusions

The overall readiness assurance program has shown improvement since the previous Independent Oversight visits. ORO personnel have engaged in regular oversight activities at ORNL, including review of hazards surveys and hazards assessment, development and review of program plans and procedures, conduct and observation of startup reviews, and participation in training, drills, and exercises. ORO has developed an acceptable set of procedures governing the roles, responsibilities, and implementation requirements for planning, scheduling, conducting, and following up assessments of the contractor's emergency management program. Additionally, ORO personnel have conducted some effective, formal assessments of UT-Battelle program functional areas. In turn, UT-Battelle and BJC have developed procedures and processes that (with some exceptions) establish the foundation for potentially solid readiness assurance programs. Both companies support their

readiness assurance programs with excellent assessment and issues management tracking systems and procedures. UT-Battelle personnel have actively pursued the identification and correction of improvement items identified through drills, exercises, and actual events, as well as self-assessment, and have been active in identifying lessons learned applicable to their program. BJC personnel have developed a self-assessment program that utilizes standards and criteria that are appropriately tailored to its role as an event contractor and have also pursued corrective actions stemming from issues identified during an actual site event. Notwithstanding the above, weaknesses were identified in the implementation of the assessment programs at ORNL that prevent the readiness assurance programs from being fully effective in achieving the desired program improvements. ORO personnel have not conducted the requisite assessments of the programs at UT-Battelle and BJC over the expected three-year cycle, and have not made sufficient use of their issues tracking system to ensure that important ORNL issues are identified and tracked to closure. Further, UT-Battelle has not implemented a self-assessment program that addresses all the program functional areas annually using established standards and criteria, and BJC has not fully implemented its self-assessment program at each of its projects at ORNL. Additionally, corrective actions taken by UT-Battelle in response to identified weaknesses have not always been implemented in a timely manner or been effective in correcting the underlying program weakness. Finally, SC has not conducted the oversight activities, such as program assessments and exercise evaluations, necessary to ensure the effectiveness of the overall site program.

F.4 Ratings

A rating of NEEDS IMPROVEMENT is assigned to the area of DOE line program management.

A rating of NEEDS IMPROVEMENT is assigned to the area of ORNL feedback and improvement.

F.5 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 intended to be reviewed and evaluated by the responsible SC and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Office of Science

- Consider developing an emergency management program oversight policy statement or program management aid that formally conveys SC expectations regarding the approach to be used in fulfilling the line management oversight responsibilities for ORNL facilities and activities assigned by DOE Order 151.1B.

- In coordination with ORO, consider developing a systematic approach and schedule for conducting emergency management program assessment activities at ORNL.

  – Participate in the review of and comment on the ORO self-assessment, contractor assessment plans, and contractor emergency readiness assurance plan to ensure that the required program assessments are scheduled and completed.

  – Periodically review the results of ORO and contractor assessments to verify that the completed assessments reflect a critical appraisal of the site's performance, including the use of established criteria and standards.

- Consider the following additional actions to improve the readiness assurance activities for the ORNL emergency management program.

  – Conduct site assist visits and/or line management reviews, in coordination with the Office of Emergency Operations or the Office of Independent Oversight, to address program-specific emergency management activities (for example, operation of the Joint Information Center).

  – Review and comment on the ORO and contractor corrective action plans in response to external evaluations, and ensure that corrective actions address the identified issues.

- Incorporate external verification and validation activities, as necessary, to ensure the completion and effectiveness of completed corrective actions resulting from external evaluations.

- Participate periodically in the planning, conduct, performance, and evaluation of the site's full-participation exercises, and ensure that formal external evaluations of the exercises are completed as required.

Oak Ridge Office

- Improve the implementation of the ORO oversight and assessment program at ORNL. Specific activities to consider follow.

  - Develop a detailed, resource-loaded assessment plan for completing the required program assessments for all the ORNL contractors over the three-year cycle.

  - Identify the assessments needed to address each of the emergency management program functional areas over the three-year cycle.

  - Ensure that ORNL contractors perform the required annual program self-assessments and provide the results to ORO.

  - Integrate self-assessments with internal and external assessments and evaluated exercises.

  - Identify the resources needed to complete the assessment plan, and for activities that require outside expertise, identify how that expertise will be obtained.

  - Balance the assessment of documents with performance-based assessments of field implementation of the documents.

  - Include the updated assessment plan in the emergency readiness assurance plan.

- Strengthen the effectiveness of the ORNL feedback and improvement processes by considering the following recommendations.

  - Continue to review and provide comments on the contractors' corrective action plans to ensure that corrective actions address identified issues.

  - Include important issues, without regard to the source, in the ORO issues and action tracking system.

  - Conduct follow-on verification and validation of the contractors' closeout of actions, as part of regular ORO oversight activities.

  - Re-open issues and actions, as necessary, to ensure that the causes underlying the issues and actions are effectively addressed.

- Enhance the ability of the ORO ERO members to contribute to the success of the ORNL emergency response by considering the following.

  - Review the roles and responsibilities of the ORO ERO members and ensure that the emergency plans reflect the desired roles and responsibilities.

  - Ensure that the EOC procedures and checklists reflect the desired roles and responsibilities and appropriately integrate ORO members into the response.

  - Analyze the revised plan and procedures, and identify the ORNL-specific knowledge, skills, and abilities necessary for the ORO members to effectively execute their roles.

  - Incorporate the identified knowledge and skills into the ORO training program.

  - Implement a qualification process that verifies that ORO personnel possess the required knowledge, skills, and abilities prior to being placed on the duty roster.

  - Consider providing Phase I National Incident Management System (NIMS) training to all DOE ORO staff assigned to decision-making ERO positions.

UT-Battelle and Bechtel Jacobs Company

- Improve the effectiveness of the self-assessment program. Specific actives to consider include the following:
  - Include each of the applicable emergency management program functional areas in the annual assessment plan.
  - Include both formal and semi-formal assessments (with scope and depth tailored to strategic improvement plans) in the annual self-assessment program and schedule.
  - Develop procedures and processes that specify the expectations for the conduct of formal and semi-formal assessments.
  - Ensure that self-assessments are conducted using a set of approved standards and criteria and are included in the formal assessment plan or the semi-formal checklist.
  - Emphasize the use of performance-based assessments whenever possible.

UT-Battelle

- Improve the UT-Battelle corrective action processes through consideration of the following specific actions:
  - Improve the determination of the root causes of identified conditions and recurring problems through implementation of procedures and/or training in root cause analysis.
  - Evaluate proposed corrective actions to ensure that completion of the actions will adequately address the underlying causal factors (including appropriate follow-on actions for those items that require initial discussion or evaluation).
  - Periodically review deficiencies and perform a causal analysis of recurring deficiencies to determine what additional actions are necessary to prevent recurrence.
  - Ensure that corrective action plans incorporate specific verification and validation activities and include validation for effectiveness if corrective actions are implemented before action item closure.
  - Verify and validate corrective actions for specific findings as they are completed (rather than waiting until the entire corrective action plan is completed) using independent personnel with working knowledge of emergency preparedness functional areas.
  - When validation activities identify continuing weaknesses, conduct appraisals of the need to either re-open the condition or open a new condition associated with the original condition.
- Consider verification for accuracy and validation for effectiveness of corrective actions prior to closure.

Abbreviations Used in This Report (continued)

LSPT	Limited-Scope Performance Test
NFPA	National Fire Protection Association
OE	Operational Emergency
ORNL	Oak Ridge National Laboratory
ORO	(DOE) Oak Ridge Operations Office
ORR	Oak Ridge Reservation
ORREP	Oak Ridge Reservation Emergency Plan
PA	Protective Action
PAC	Protective Action Criteria
PAR	Protective Action Recommendation
RDF	Radiochemical Development Facility
SAE	Site Area Emergency
SC	Office of Science
S/RIDS	Standards and Requirements Identification Document System
TEMA	Tennessee Emergency Management Agency
UT-Battelle	University of Tennessee – Battelle, LLC
Y-12	Y-12 National Security Complex