

# Summary Report

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Inspection of  
Environment, Safety, and Health Management  
and Emergency Management  
at the

Oak Ridge Operations  
Office

and

East Tennessee  
Technology Park



May 2003

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Office of Independent Oversight and Performance Assurance  
Office of the Secretary of Energy

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## Abbreviations Used in This Report

AMEM	OR Assistant Manager for Environmental Management
BJC	Bechtel Jacobs Company
CFR	Code of Federal Regulations
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EAL	Emergency Action Level
EM	DOE Office of Environmental Management
EMHA	Emergency Management Hazards Assessment
EOC	Emergency Operations Center
ERO	Emergency Response Organization
ES&H	Environment, Safety, and Health
ETTP	East Tennessee Technology Park
ISM	Integrated Safety Management
OA	Office of Independent Oversight and Performance Assurance
OR	Oak Ridge Operations Office
OSHA	Occupational Safety and Health Administration
PSS	Park Shift Superintendent
USQ	Unreviewed Safety Question

# OVERSIGHT

## Introduction

The Secretary of Energy's Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health (ES&H) and emergency management programs at the U.S. Department of Energy (DOE) East Tennessee Technology Park (ETTP) site in April and May 2003. The inspection was performed as a joint effort by the OA Office of Environment, Safety and Health Evaluations and the Office of Emergency Management Oversight.

### Background

At DOE Headquarters, the DOE Office of Science is the landlord for the Oak Ridge Reservation. The Office of Environmental Management (EM) has primary line management responsibility for the closure project at ETTP. As such, EM has overall Headquarters responsibility for programmatic direction, funding of activities, ES&H, and emergency management at the site. At the site level, line management responsibility for ETTP operations and safety falls under the Manager of the Oak Ridge Operations Office (OR). Within OR, the Office of the Assistant Manager for Environmental Management (AMEM) is responsible for ETTP. The ETTP site is managed and operated by the Bechtel Jacobs Company LLC (BJC). BJC has a management and integration contract with DOE, and uses subcontractors to perform most work activities. BNFL PLC performs decontamination and decommissioning (D&D) activities under a separate contract with DOE, managed through the OR Assets Utilization organization.

The ETTP site is located on the DOE-owned Oak Ridge Reservation in eastern Tennessee about 12 miles from downtown Oak Ridge, Tennessee, and about 20 miles from Knoxville, Tennessee. ETTP's historical mission involved enrichment of uranium using the gaseous diffusion process. The various activities associated with the enrichment process involved large quantities of radioactive materials, generated various radioactive and hazardous wastes, and resulted in contamination of operational facilities. Enrichment operations were discontinued in 1987.



Aerial View of East Tennessee Technology Park

The current missions of the ETTP site include managing radioactive wastes, maintaining facilities pending their disposition, characterizing hazardous materials and conditions, D&D of facilities, and environmental cleanup and restoration for the eventual site transition to public use. In addition, ETTP currently leases selected facilities to private sector companies as part of its site reindustrialization effort. ETTP activities involve various potential hazards that need to be effectively controlled, including exposure to external radiation, radiological contamination, hazardous chemicals, and various physical hazards associated with facility operations (e.g., machine operations, high-voltage electrical equipment, hoisting and rigging heavy loads, and noise).

Throughout the inspection, OA reviewed the role of EM and OR in providing direction to contractors and conducting line management oversight of contractor activities. OA is placing more emphasis on the review of contractor self-assessments and EM and OR line management oversight in ensuring effective ES&H and emergency management programs. In reviewing line management oversight, OA focused on the effectiveness of OR in overseeing ETTP contractors, including such management functions as setting expectations, providing implementation guidance, monitoring and assessing contractor performance, and monitoring and evaluating contractor self-assessments. OA also focuses on the effectiveness of contractor self-assessment programs; DOE orders require contractors to establish self-assessment programs that review all aspects of ES&H and emergency management performance.

## ES&H Review Scope

The purpose of the ES&H portion of this inspection was to assess the effectiveness of selected aspects of ES&H management as implemented by ETTP under the direction of OR. The ES&H portion of the inspection was organized to evaluate four related aspects of the integrated safety management (ISM) program: (1) OR and ETTP contractor implementation of selected ISM guiding principles, including efforts to address the new 10 CFR 830, Subpart B, safety basis requirements for DOE nuclear facilities; (2) OR and ETTP contractor feedback and continuous improvement systems; (3) BJC implementation of the core functions of safety management for various work activities; and (4) BNFL implementation of the core functions of safety management for the Three-Building D&D project.

The OA inspection team used a selective sampling approach to determine the effectiveness of OR and ETTP in implementing DOE ES&H requirements. The approach involved examining selected institutional programs that support the ISM program and implementation of requirements at selected ETTP organizations and facilities. Specific work activities that were reviewed included decontamination, decommissioning, equipment removal, demolition of surplus facilities, construction, maintenance, and waste management. OA focused on implementation of selected safety requirements during these work activities, including subcontractor work control processes, flowdown of ES&H requirements to subcontractors, medical program requirements, asbestos requirements, radiological work planning and permits, control of air contaminants (e.g., nickel and radiological), noise abatement, injury and illness record keeping, hoisting and rigging requirements, and radiological controls.

## Emergency Management Review Scope

In addition to the OA review of OR's emergency management oversight and operational awareness activities, the inspection team conducted tabletop performance tests with a sample of the site's key decision-makers to evaluate their ability to employ available tools and skills when responding to postulated emergency conditions.

## Organization of the Report

Section 2 provides an overall discussion of the results of the review of the ETTP ES&H and emergency management programs, including positive aspects and weaknesses. Section 3 provides OA's conclusions regarding the overall effectiveness of OR and ETTP contractor implementation of ES&H and emergency management programs. Section 4 presents the ratings assigned during this review. Appendix A provides supplemental information, including team composition. Appendix B identifies specific findings that require corrective action and follow-up.

More detailed information on the inspection results is contained in two separate volumes of the report, which were provided to OR management and are available to other DOE sites on request. Volume I provides more detailed information on the results of the review of ETTP ES&H programs, and Volume II provides more detailed information on the results of the review of the ETTP emergency management program.

## 2.1 Positive Attributes

### Environment, Safety, and Health

Although a number of implementation deficiencies were observed, the work control systems provide an effective framework for identifying, analyzing, and controlling hazards. Most work observed by OA was performed with a high regard for safety. As discussed below, some aspects of EM, OR, BJC, and BNFL ES&H programs are particularly effective.

**EM has provided significant management attention and resources to ensure effective implementation of 10 CFR 830, Subpart B, by BJC at ETTP and other BJC-managed facilities.** EM established a Safety Basis Special Project Team in early calendar year 2003 to support development, review, and approval of the documented safety analyses (DSAs) required by 10 CFR 830, Subpart B. The Project Team was staffed with 22 members from EM, OR, and other EM sites, selected for their qualifications and performance on similar tasks. Support provided to BJC by the Safety Basis Special Project Team was instrumental in meeting the regulatory due date for submitting the DSAs. The revised DSAs are a significant improvement over the previous ETTP authorization bases.



Hazardous Material Abatement in K-25

**OR and BJC have worked together effectively to strengthen the site-specific ES&H requirements.** The DOE/BJC contract, which applies to facilities and activities at ETTP and two other DOE sites, contains a comprehensive set of ES&H requirements covering the broad scope of work and range of hazards associated with work at these three sites. These requirements have been tailored to each site, consistent with DOE policy and guidance, through a Work Smart Standards process and a standards and requirements identification process. In recent months, BJC has taken a number of steps to improve contractual requirements and ensure that requirements flow down to the working level. Subject matter experts have reassessed the adequacy of contractual requirements, resulting in the appropriate addition of some new requirements. ES&H subject matter experts have also made several changes in implementing procedures to ensure that contractual requirements flow down through company procedures and subcontracts. An external review of the requirements management program was performed to assess the effectiveness of these steps, resulting in further improvements. The OR and BJC efforts have resulted in significant improvements in the BJC Work Smart Standards, standards and requirements identification documents, and implementing procedures. The current requirements set is appropriate for the hazards at the site, and there is reasonable assurance that these requirements have been incorporated into BJC implementing documents. However, processes for updating the requirements need to be established, and processes for ensuring that requirements are incorporated into subcontractor and lower-tier subcontractor implementing documents need to be improved.

**BNFL has established a good safety record, demonstrated a strong management commitment to improving worker safety, and actively involved the Knoxville Building and Construction Trades labor organization in the BNFL safety program.** The BNFL safety record, as measured by rates of recordable injuries and illnesses and lost workday cases, is better than the

general industry safety record for companies performing similar D&D-type work. Recently, BNFL's safety performance was recognized by the National Safety Council, and BNFL was awarded a second Certificate of Merit for having achieved one million hours of work without a lost-time injury. The National Safety Council also awarded BNFL the Excellence Achievement Award, for having attained a lost-workday case rate less than one half the national average rate for similar industries as defined by the Bureau of Labor Statistics. BNFL management commitment to improving worker safety has contributed to the good safety record. The BNFL Joint Labor/Management Safety Committee has been effective in encouraging an open exchange of safety issues between BNFL management and labor. The Knoxville Building and Construction Trades organization has been active in promoting workers' safe behavior. The BNFL Safety Committee and subcommittees have also been proactive in identifying and resolving safety concerns, and in promoting a safety-conscious approach within the workforce. BNFL management has also demonstrated commitment to safety by devoting resources to hazard controls that improve the overall working environment. For example, to control potential exposure hazards from airborne contaminants, BNFL has provided its workers with state-of-the-art respirators, even though BNFL could have met the requirements by using measures that were less expensive, and less comfortable for the workers. BNFL has also established or improved a number of facility engineering controls, resulting in improved safety and working conditions. For example, to minimize the use of temporary electrical grounding connections and avoid electrical shock hazards, BNFL installed ground fault circuit interrupter receptacles throughout Buildings K-29 and K-31. In response to a behavioral-based evaluation conducted by the BNFL Safety Committee, BNFL also replaced the central lighting in Buildings K-29, K-31, and K-33 to reduce the need for portable lighting.

**Safety has been appropriately integrated into the BJC procurement process.** As a management and integration contractor, BJC uses subcontractors to perform most work activities, including the potentially hazardous work. Therefore, BJC has taken effective steps to ensure that ES&H is appropriately considered in the procurement of services to work at ETTP. Bidders on BJC subcontracts are prequalified based upon their past safety performance. ES&H subject matter representatives are involved throughout the procurement process, from development of requests



Material Removal Activities in K-25

for proposals to development of final contracts. Safety requirements to be included in subcontracts are updated and tailored for specific subcontracts by ES&H subject matter experts. The BJC requirements management process ensures that changes to ES&H requirements in the DOE/BJC contract are incorporated into BJC subcontracts when applicable. However, implementation of requirements by subcontractors and lower-tier subcontractors needs improvement.

## Emergency Management

OR, BJC, and BNFL have established an appropriate framework for an effective ETTP emergency management program, and several aspects of the program have been effectively implemented. Positive attributes of the emergency management program are discussed below.

**Top-level requirements and policies for an effective ETTP emergency management program are in place.** The Oak Ridge Reservation Emergency Plan and associated ETTP Annex contain the appropriate emergency planning elements and clearly defined programmatic roles and responsibilities. BJC and BNFL have developed comprehensive, facility-specific emergency response plans to address local responses to both sitewide and facility-specific events. OR has also established implementing procedures and standards to further define minimum requirements and provide guidance for site-specific implementing procedures and programs.

**The ETTP exercise and drill programs are well defined, documented, and executed.** BJC has conducted frequent, well-designed exercises that use challenging scenarios involving many onsite and offsite responders. Exercise objectives and evaluation criteria



Simulated Hazardous Material Decontamination

are developed through a planning group that includes representation from all responding organizations. BJC and BNFL also conduct frequent drills, and these drills are being used to improve performance. Both exercises and drills are critiqued and thoroughly documented. BJC and BNFL formally track identified program and performance weaknesses, and assign, track, and verify completion of corrective actions. Although the conduct of drills is considered a strength, the drills do not test all of the necessary response actions, and no effective mechanism has been established to enforce the requirement for emergency response organization (ERO) members to participate in a drill annually.

**Training programs for on-scene and field-deployed responders are effective.** These responders include the ETTP fire department, facility building wardens and first response teams, and field monitoring teams. Training programs for these responders often lead to certifications and licenses from the Tennessee Emergency Management Agency, the Tennessee Department of Health, and the Red Cross, among other organizations. These programs are complemented by site-specific emergency response training, typically including performance evaluations, that provides a sound basis for qualification. Building occupant emergency response training is comprehensive, conducted periodically, and well documented, and it adequately prepares building wardens for assigned duties.

**Park shift superintendent (PSS) and emergency operations center (EOC) teams were proficient in performing many initial response**

**functions during tabletop performance tests.** The PSSs promptly and accurately categorized and classified all of the postulated events presented to them and demonstrated effective command and control in the PSS office. The PSSs quickly assessed the need to call out common response and mutual aid support and activate the EOC. The EOC teams were proactive in evaluating event conditions and reviewing onsite protective actions, and responders worked well as a team. They appropriately balanced potential security threats with responses to hazardous material releases. Plume modelers were very knowledgeable and were able to promptly develop dispersion plots to support the EOC response. DOE emergency managers coordinated well with the Crisis Manager in the EOC and provided appropriate oversight of the contractor led response. Despite these positive attributes, the PSS and EOC responders were unable to implement the immediate follow-on actions of formulating protective action recommendations and communicating those recommendations to offsite authorities. These performance weaknesses were largely attributable to program, procedure, and training weaknesses.



Removal of Material in Pipe Housing Area

## 2.2 Program Weaknesses

### Environment, Safety, and Health

Although the framework for the ETTP ISM program is in place, weaknesses were identified in some important aspects of ISM systems, work control processes, implementation of requirements, and feedback and improvement systems.

**Weaknesses in important aspects of OR/AMEM, BJC, and BNFL feedback and**

**improvement processes are hindering further improvements in the implementation of ISM at ETTP.** Although all three organizations perform numerous assessments and have some effective processes, all three organizations have weaknesses in various aspects of assessments, issues management, lessons-learned programs, and other feedback mechanisms. OR/AMEM has not established an effective process that evaluates safety trends and assigns and prioritizes appropriate oversight activities into an annual oversight plan. In addition, OR does not yet have sufficient Facility Representative coverage of D&D efforts and does not have a lessons-learned program. BJC feedback and improvement processes have not ensured that its subcontractors establish and implement ISM programs and feedback and improvement processes such as assessments, issues management, lessons learned, and employee concerns programs. Further, BJC has not ensured that all injuries and operational events are properly documented and evaluated for causes and preventive actions. BNFL processes have not ensured that all operational incidents, deficient conditions, and performance errors are fully and effectively evaluated or documented. Because of these deficiencies, management had not identified and corrected a number of ES&H process and performance problems in ETTP facilities.

**The unreviewed safety question (USQ) process has weaknesses that could lead to potential non-compliance with 10 CFR 830, Subpart B.** BJC and BNFL did not correctly incorporate significant elements of 10 CFR 830, Subpart B, requirements into their USQ procedures. Some of the identified weaknesses resulted in part because of inconsistencies and ambiguities in the DOE USQ Guide. As a result, changes in facilities or procedures, or discovery of conditions potentially outside the safety basis, could result in undetected USQs. Deficiencies in the USQ procedures have contributed to deficiencies in implementing the USQ processes. For example, nine of ten recent BNFL procedure changes were improperly screened. Additionally, an identified potential inadequacy in the safety basis for the Three-Building D&D project was not evaluated through the USQ process or reported through the Occurrence Reporting and Processing System (ORPS). EM and OR did not perform adequate reviews to ensure that the deficiencies in the BJC and BNFL USQ procedures were identified and corrected.

**BNFL's implementation of ISM has deficiencies in hazard control implementation and procedural adherence.** Although most aspects are

effective, BNFL hazard control processes were not always effectively implemented. BNFL has extensively sampled metal fumes; however, BNFL has not sufficiently sampled and analyzed the potential hazards from ozone and nitrogen oxides resulting from plasma arc cutting to determine the potential for worker exposure to these hazards. BNFL has not ensured that all floor openings have coverings that completely cover the opening, are adequately secured in place, and are labeled in accordance with Occupational Safety and Health Administration (OSHA) requirements. BNFL has not sufficiently implemented requirements for fixed and removable radiological contamination surveys. In addition, BNFL and subcontractor personnel did not rigorously implement some aspects of BNFL procedures and safety requirements, indicating a need for improvement in procedural adherence and conduct of operations.

**BJC and its subcontractors have not been fully effective in implementing ISM core function elements, such as procedural adherence, hazard controls, medical requirements, and waste management requirements.** BJC and subcontractor work control processes do not ensure that all appropriate hazard controls are identified and implemented for known hazards, thus increasing the potential for worker exposure to those hazards. Workers did not follow all hazard controls outlined in BJC subcontractor activity hazard assessments or other control mechanisms in the areas of lockout/tagout, radiation protection, and industrial hygiene. Continued storage of hazardous lithium compounds under the poor environmental conditions in the K-25 building has resulted in container degradation. In addition, BJC has not established adequate measures to ensure that subcontractors fully implement DOE medical and waste management requirements. Some subcontractor documents and practices do not fully meet applicable ES&H requirements.

**BNFL and BJC have not established sufficient processes for updating contractual requirements as regulations change.** BNFL has not established effective processes for ensuring that its Work Smart Standards are consistent with regulations, including OSHA construction and general industry requirements, and industry consensus standards. In addition, BNFL processes do not ensure that ES&H requirements in Work Smart Standards are incorporated into policies, procedures, and subcontracts. While the baseline set of Work Smart Standards is complete, BJC has not established a systematic process to ensure that Work Smart Standards and implementing procedures will



remain current with respect to regulatory requirements and consensus standards.

## Emergency Management

Although the programmatic framework for the ETTP emergency management program has been appropriately established, several fundamental elements of the program have not been adequately developed and implemented to ensure that responders have the necessary tools and are adequately prepared to respond effectively to an event involving a substantial release of hazardous material. Concerns were also identified regarding the effectiveness of OR and BJC feedback and improvement programs.

**Emergency management hazards assessments (EMHAs) are not all current and accurate.** BJC has been working to upgrade their EMHAs to be consistent with DOE and OR standards, and recently revised EMHAs are significantly improved over previous versions. However, both the older and the revised EMHAs still contain basic weaknesses. Several EMHAs, for both BJC and BNFL facilities, are not based on an accurate quantity or form of material at risk. Some EMHAs also contain numerous other technical errors that have resulted in analyses that either significantly over- or under-estimate the consequences of potential hazardous material releases.

**Emergency plan implementing procedures, emergency action levels (EALs), and response checklists do not support timely or accurate event categorization/classification, offsite notifications, and protective action formulation.** Implementing procedures and checklists do not clearly and accurately describe key processes, such as offsite notifications and protective action decision-making, and management expectations for the use of these documents are not clearly defined. For example, protective actions and protective action recommendations associated with the EALs do not contain the necessary specificity regarding downwind distances and affected geographic sectors to ensure adequate protection of workers, site tenants, and the public from the consequences of a hazardous material release. Additionally, there are many significant discrepancies between the results of the EMHAs and the information contained in the EAL tables used by the PSS and ERO in responding to an emergency.



Medical Treatment of a Simulated Injured Victim

**OR and BJC training programs do not ensure that PSS and EOC responders are proficient in performing critical emergency response tasks.** Site-specific training for these positions consists almost exclusively of self-study of procedures, with no assessment of responders' competence before they are assigned to the duty roster. The procedure weaknesses identified above further limit the effectiveness of training for these positions because the training relies upon self-study using these procedures. In the case of OR, required written exams for ERO personnel have not been graded, and one OR staff member was assigned to the ERO roster without completing any ERO-specific training. Annual refresher training has been provided only once in recent years.

**OR oversight has not been effective in identifying and correcting weaknesses in the ETTP emergency management program.** OR has not conducted programmatic assessments of ETTP emergency management elements as required by DOE Order 151.1A and internal procedures. OR technical document reviews, such as those of EMHAs, have, for the most part, not been timely. Additionally, OR has not ensured that ETTP contractors take prompt compensatory actions for situations where EMHA results identify consequences beyond those indicated in existing planning and response documents.

### Environment, Safety, and Health

The ISM program at ETTP has significantly improved from three years ago, when ISM deficiencies identified through internal and external reviews of ETTP prompted OR to rescind approval for the OR and BJC ISM programs. Since then, BJC has revamped its ISM program and has devoted significant attention to the establishment and implementation of ES&H roles and responsibilities. Similarly, BNFL has devoted attention and resources to improving its ISM program. The results of this OA inspection indicate that work remains to address a number of deficiencies in ISM processes and implementation of those processes. However, the results of this inspection also indicate that ETTP has made significant progress in the past three years in addressing systemic deficiencies.

EM, OR, and contractor management are supportive of safety and understand and accept their line management responsibility. BJC and BNFL have developed generally adequate ISM program documents that define appropriate policies and practices. Their respective contracts identify an appropriate set of requirements. In most cases, requirements have been incorporated into adequate processes and procedures, and most ES&H requirements are adequately communicated and understood by ETTP managers and workers. Despite recent efforts to improve their respective Work Smart Standards, neither contractor has established effective mechanisms to ensure that changes in existing requirements, or new regulations, are adequately identified, evaluated, and incorporated into their contracts. Weaknesses in ensuring that subcontractors meet identified requirements further reduce assurance that requirements are effectively implemented. Improvements are needed in BJC and BNFL processes for updating contractual requirements to ensure continuing effectiveness.

Under the leadership of EM, the DSAs for ETTP have been completed in accordance with the 10 CFR 830, Subpart B, schedule milestones. The new DSAs are a significant improvement over

the previous generation of fragmented authorization basis documents. However, the BJC and BNFL USQ processes need improvement to ensure that the 10 CFR 830, Subpart B, requirements are correctly reflected and effectively implemented, and to prevent operations or activities outside the authorized safety envelope.

Many aspects of work that the OA team observed at ETTP were performed with a high regard for safety. With a few exceptions, the work activities were well defined and the potential hazards were effectively identified and analyzed. In most cases, effective hazard controls were in place and effectively implemented. However, weaknesses were identified in the implementation of a number of hazard controls and procedures, and ES&H requirements were not always rigorously implemented at the working level.

Some aspects of OR/AMEM, BJC, and BNFL feedback and improvement programs are established and effective. Many assessments and inspections are performed, and many corrective actions are taken to address assessment findings. However, process and performance weaknesses in certain aspects of assessments, issues management, and lessons learned need to be addressed to ensure timely identification and resolution of ES&H deficiencies and continuous improvement.

Overall, the ISM programs at ETTP have improved. However, a number of weaknesses in ES&H processes and programs warrant management attention, with particular attention to feedback and improvement processes, implementation of worker safety controls, procedural adherence, and USQ programs.

### Emergency Management

OR, BJC, and BNFL have established institutional-level policies, plans, and procedures that provide a solid framework for implementing an effective emergency management program. Plans and procedures clearly define the roles and responsibilities of these organizations and the common implementing requirements and guidance

that are necessary to achieve a well integrated and comprehensive program. The overall concept of ETTP emergency operations is commensurate with the identified and analyzed site hazards, and is facilitated by the round-the-clock presence of the PSS, who serves as the initial site emergency director. On-scene and field-deployed responders are highly trained and prepared to perform their localized response duties. These include the fire department staff responsible for incident command for non-security-related events, emergency medical support, and hazardous materials response; field monitoring teams; and building wardens.

Despite this good overall programmatic framework, OR and BJC have not fully implemented the ETTP emergency management program in accordance with that framework. For example, BJC has expended significant effort to revise its EMHAs to be consistent with DOE, OR, and BJC standards and expectations, and the updated assessments represent a significant improvement. However, the current assessments still exhibit several fundamental weaknesses. For example, the BJC EMHAs are not always based on the appropriate quantity or form of material at risk. Additionally, when EMHAs completed in January 2003 concluded that the consequences of the analyzed accidents could be much more severe than previously analyzed, BJC did not promptly implement compensatory measures to ensure that emergency responders were aware of, and capable of responding to, these events. With regard to BNFL, the EMHAs have been reviewed annually as required by DOE Order 151.1A and Oak Ridge Reservation standards. However, none of these reviews detected that the toxicological effects of uranium-bearing compounds, which are more significant than the radiological effects for the scenarios that were analyzed, had not been assessed. In addition, for both BJC and BNFL accident scenarios, there are significant technical discrepancies between the hazards assessment results and the corresponding EALs that are used by the PSS and EOC team to execute their response to an emergency.

Most importantly, BJC has not established adequate mechanisms for implementing the critical, time-urgent response actions of formulating and communicating recommended public protective actions to offsite authorities to minimize the consequences of a potential hazardous material release from ETTP. For example, BJC has not established definitive predetermined protective actions linked to EALs that can be promptly identified and communicated by the PSS. Although the Oak Ridge Reservation Emergency Plan and publicly available web sites depict predefined geographic

sectors to facilitate accurate communication of protective actions, neither the PSS nor EOC responders have been given the information needed to correlate these sectors with the release consequences specified in the EMHAs. In addition, the current emergency notification process, which requires sequential calling of multiple recipients and was performed by responders using informal notes, does not ensure that the most critical emergency information is relayed consistently and accurately to offsite authorities. Since the PSS and ERO training programs are based on procedures that do not adequately identify how to implement these response actions, the PSS and ERO training and drill programs cannot compensate for these programmatic weaknesses. For example, although the BJC drill and exercise program is well conceived, documented, and administered, it does not critically evaluate the ability of PSS and EOC responders to formulate protective actions and communicate them promptly and accurately. Therefore, the program has not been effective in identifying the weaknesses identified in this report.

The consequences of these program weaknesses were clearly evident during the tabletop performance tests administered by OA during this evaluation. The PSSs and EOC teams were effective in their initial actions to summon mutual aid, activate the ERO, categorize and classify the postulated emergencies, and activate automated site and public warning systems as defined by their procedures and checklists. However, they were unable to promptly and accurately formulate and communicate protective actions as a direct result of the systematic weaknesses identified above. While some of the weaknesses identified in this report have been generally recognized by the BJC emergency management staff, these weaknesses have not been documented or fully evaluated to ensure that appropriate corrective actions are defined and implemented. Further, BJC has not conducted the required emergency management program assessments to ensure that the program has been fully implemented and is being maintained in accordance with DOE and company requirements and expectations.

OR needs to significantly increase its participation in and monitoring of OR site emergency management programs to ensure that site contractors have implemented fully effective programs in accordance with DOE and OR expectations. OR has not conducted the site-level program assessments that are required by DOE Order 151.1A, ORO Order 150, and the Oak Ridge Reservation Emergency Plan. OR also has not ensured that contractor plans, procedures, and EMHAs are reviewed and updated annually, and many

documents submitted to OR have not received a timely review. As a result, OR was not aware of existing BJC hazards assessment results that could have a significant impact on the size of the ETTP emergency planning zone and, consequently, the overall Oak Ridge Reservation emergency planning zone. OR also did not ensure that the contractor implemented prompt compensatory measures when revised EMHAs

identified significant increases in the potential consequences of a hazardous materials release from two ETTP facilities. Increased OR and BJC management attention is necessary to ensure that ETTP is adequately prepared to respond to an emergency or incident regardless of its magnitude, and to establish a robust capability to self-identify and correct program weaknesses.

## 4.0 Ratings

The ratings reflect the current status of the reviewed elements of the ETTP ISM and emergency management programs.

### **Safety Management System Ratings**

Guiding Principle #2 – Clear Roles and Responsibilities ..... EFFECTIVE PERFORMANCE  
Guiding Principle #5 – Identification of Standards and Requirements ..... NEEDS IMPROVEMENT

### **Feedback and Improvement**

Core Function #5 – Feedback and Continuous Improvement ..... NEEDS IMPROVEMENT

### **BJC Implementation of Core Functions for Selected Work Activities**

Core Function #1 – Define the Scope of Work ..... EFFECTIVE PERFORMANCE  
Core Function #2 – Analyze the Hazards ..... EFFECTIVE PERFORMANCE  
Core Function #3 – Develop and Implement Hazard Controls ..... NEEDS IMPROVEMENT  
Core Function #4 – Perform Work Within Controls ..... NEEDS IMPROVEMENT

### **BNFL Implementation of Core Functions for Selected Work Activities**

Core Function #1 – Define the Scope of Work ..... EFFECTIVE PERFORMANCE  
Core Function #2 – Analyze the Hazards ..... EFFECTIVE PERFORMANCE  
Core Function #3 – Develop and Implement Hazard Controls ..... NEEDS IMPROVEMENT  
Core Function #4 – Perform Work Within Controls ..... NEEDS IMPROVEMENT

### **Emergency Planning**

Hazards Surveys and Hazards Assessments ..... NEEDS IMPROVEMENT  
Program Plans and Procedures ..... SIGNIFICANT WEAKNESS

### **Emergency Preparedness**

Training and Drills ..... NEEDS IMPROVEMENT  
Emergency Exercises ..... EFFECTIVE PERFORMANCE

### **Emergency Response**

ETTP Emergency Response Decision-Making ..... NEEDS IMPROVEMENT

### **Readiness Assurance**

DOE Assessments and Performance Monitoring ..... SIGNIFICANT WEAKNESS  
Contractor Assessments and Issues Management ..... NEEDS IMPROVEMENT

# APPENDIX A

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## SUPPLEMENTAL INFORMATION

### A.1 Dates of Review

Scoping Visit	February 25 - 27, 2003
Onsite Inspection Visit	April 28 - May 9, 2003
Report Validation and Closeout	May 20 - 22, 2003

### A.2 Review Team Composition

#### A.2.1 Management

Glenn Podonsky, Director, Office of Independent Oversight and Performance Assurance  
Michael Kilpatrick, Deputy Director, Office of Independent Oversight and Performance Assurance  
Patricia Worthington, Director, Office of Environment, Safety and Health Evaluations  
Thomas Staker, Deputy Director, Office of Environment, Safety and Health Evaluations  
Charles Lewis, Director, Office of Emergency Management Oversight  
Kathy McCarty, Deputy Director, Office of Emergency Management Oversight (Team Leader)

#### A.2.2 Quality Review Board

Michael Kilpatrick	Patricia Worthington
Charles Lewis	Thomas Staker
Dean Hickman	Robert Nelson

#### A.2.3 Review Team

Kathy McCarty, Deputy Director, Office of Emergency Management Oversight (Team Leader)

##### **ES&H**

Bradley Davy, ES&H Lead  
Vic Crawford  
Marvin Mielke  
William Miller  
Ching San Huang  
Robert Compton  
Albert Gibson  
Mark Good  
Joe Lischinsky  
Jim Lockridge  
Don Prevatte  
Ed Stafford  
Mario Vigliani

##### **Emergency Management**

Jeff Robertson, Emergency Management Lead  
Jim O'Brien  
Steve Simonson  
Mike Lloyd  
Tom Rogers  
Dave Schultz

#### A.2.4 Administrative Support

Lee Roginski  
Tom Davis  
Tom Mazour

## APPENDIX B

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### SITE-SPECIFIC FINDINGS

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

ES&H FINDING STATEMENTS
1. EM and OR review and approval of BJC and BNFL USQ procedures did not ensure that all facility and procedure changes and discovered conditions would be adequately evaluated, analyzed, and approved as required by 10 CFR 830, Subpart B, creating the potential for an undetected USQ.
2. BJC has not established a systematic process for ensuring that Work Smart Standards and implementing procedures are kept current with external regulatory requirements and consensus standards.
3. BJC has not established adequate measures to ensure that subcontractors fully implement DOE medical and waste management requirements, and subcontractor documents and practices do not always meet applicable ES&H requirements.
4. Weaknesses in the BJC USQ procedure could lead to an undetected USQ and potential non-compliance with 10 CFR 830, Subpart B.
5. BNFL has not established effective processes for ensuring that Work Smart Standards are consistent with regulations, including OSHA construction and general industry requirements, and industry consensus standards or for ensuring that ES&H requirements in Work Smart Standards are incorporated into policies, procedures, and subcontracts.
6. Weaknesses in the BNFL USQ procedure could lead to an undetected USQ and potential non-compliance with 10 CFR 830, Subpart B.
7. OR/AMEM has not established an effective process for evaluating safety trends and prioritizing oversight activities into an annual oversight plan that ensures an adequate evaluation of contractor ES&H performance and promotes continuous ES&H improvement. In addition, the oversight processes documentation is not current, Facility Representative coverage of D&D efforts is insufficient, issues management processes are not fully utilized, and no lessons-learned program has been established.
8. BJC feedback and improvement programs have not ensured that BJC and its subcontractors effectively implement ISM. Weaknesses were evident in assessments, issues management, lessons learned, and employee concerns programs.
9. BJC has not ensured that all injuries and operational events are properly documented and evaluated for causes and preventive actions.
10. Some operational incidents, deficient conditions, and performance errors have not been fully and effectively evaluated or documented by BNFL to establish causal factors and effective recurrence controls, or to determine reportability.

**Table B-1. Site-Specific Findings Requiring Corrective Action Plans (continued)**

<b>ES&amp;H FINDING STATEMENTS</b>
11. BJC and subcontractor work control processes do not ensure that all appropriate hazard controls are identified and implemented for known hazards, resulting in an increased potential for worker exposure to those hazards.
12. Workers did not follow all hazard controls outlined in BJC subcontractor activity hazard assessments or other control mechanisms in the areas of lockout/tagout, radiation protection, and industrial hygiene.
13. Continued storage of hazardous lithium compounds under the poor environmental conditions in the K-25 building has resulted in container degradation and an increased risk to workers and the environment.
14. BNFL has not sufficiently sampled and analyzed the potential hazards from ozone and nitrogen oxides resulting from plasma arc cutting to determine the potential for worker exposure to these hazards.
15. BNFL has not ensured that all floor openings have coverings that completely cover the opening, are adequately secured in place, and are labeled in accordance with OSHA requirements; personnel, tools, or equipment could, therefore, fall into or through the openings.
16. BNFL has not sufficiently implemented requirements for fixed and removable radiological contamination surveys to document specific radiological conditions and changes in radiological conditions during work, establish the technical basis for controls, and convey information on specific radiological hazards to workers as part of the radiation work permit process.
17. BNFL and subcontractor personnel did not rigorously implement some aspects of BNFL procedures and safety requirements.



**Table B-1. Site-Specific Findings Requiring Corrective Action Plans (continued)**

<b>EMERGENCY MANAGEMENT FINDING STATEMENTS</b>	
1.	BJC EMHAs do not always consider the correct hazardous material at risk for potential release to ensure that the consequences of emergency events are computed correctly as required by Oak Ridge Reservation Standard #500, <i>Emergency Management Program Hazards Assessment Process</i> , and DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
2.	BNFL has not assessed the toxicological consequences of potential releases of uranium-bearing compounds from facilities under their cognizance, and has not documented results in EMHAs as required by Oak Ridge Reservation Standard #500, <i>Emergency Management Program Hazards Assessment Process</i> , and DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
3.	BNFL emergency action levels do not support timely and accurate event categorization/classification or protective action formulation for affected populations, as required by DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
4.	BJC does not promptly translate EMHA conclusions into EALs, as required by DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
5.	BJC emergency plan implementing procedures, response checklists, and emergency action levels do not support timely and accurate event categorization/classification, offsite notifications, or protective action formulation for affected populations, as required by DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
6.	The BJC training and drill program does not ensure that ERO members are proficient in some key tasks, such as formulating protective actions and protective action recommendations and conducting offsite notifications, and has not implemented all elements required by Oak Ridge Reservation Standard #503, <i>ERO Training Program Management Plan</i> , and DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
7.	The OR training and drill program does not ensure that OR ERO members are proficient and have completed the training and drill requirements specified in Oak Ridge Reservation Standard #503, <i>ERO Training Program Management Plan</i> , and DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
8.	OR has not conducted triennial assessments of ETPP contractor emergency management programs as required by DOE Order 151.1A and ORO Order 150, <i>Comprehensive Emergency Management System</i> , or annual assessments required by the Oak Ridge Reservation Emergency Plan.
9.	OR has not implemented an appropriate overall Oak Ridge Reservation emergency planning zone to assure adequate emergency planning for potential emergency events as required by Oak Ridge Reservation Standard #500, <i>Emergency Management Program Hazards Assessment Process</i> , and ORO Order 150, <i>Comprehensive Emergency Management System</i> .
10.	BJC self-assessments are not rigorous enough to consistently identify programmatic weaknesses in the ETPP emergency management program, and program elements are not assessed annually, as required by DOE Order 151.1A and ORO Order 150, <i>Comprehensive Emergency Management System</i> .

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