# Inspection of Emergency Management at the

# Office of Secure Transportation

March 2007



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

OVERSIGHT

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## Abbreviations Used in This Report

| | |
|---|---|
| ARG | Accident Response Group |
| CCIC | Convoy Commander in Charge |
| DOE | U.S. Department of Energy |
| EAL | Emergency Action Level |
| EM | Emergency Manager |
| EMB | Emergency Management Branch |
| EOC | Emergency Operations Center |
| EPHA | Emergency Planning Hazards Assessment |
| ERDO | Emergency Response Duty Officer |
| ERG | Emergency Response Guide |
| ERO | Emergency Response Organization |
| ES&H | Environment, Safety, and Health |
| IC | Incident Commander |
| ICS | Incident Command System |
| ICP | Incident Command Post |
| LSPT | Limited Scope Performance Test |
| NARAC | National Atmospheric Release Advisory Center |
| NNSA | National Nuclear Security Administration |
| OMO | Office of Mission Operations |
| OST | Office of Secure Transportation |
| PAR | Protective Action Recommendation |
| RAP | Radiological Assistance Program |
| TECC | Transportation and Emergency Control Center |
| TPP | Training Program Plan |

# 1.0 Introduction

The Secretary of Energy's Office of Independent Oversight, within the Office of Health, Safety and Security, conducted an inspection of the emergency management program at the Office of Secure Transportation (OST) in January and February 2007. The inspection was performed by the Office of Emergency Management Oversight.

Headquartered in Albuquerque, New Mexico, the Assistant Deputy Administrator for OST reports directly to the National Nuclear Security Administration (NNSA) Deputy Administrator for Defense Programs. The facilities and assets of OST are government owned and operated, unlike most NNSA sites, which are contractor operated. As such, OST has primary responsibility for the development and implementation of the emergency management program, a role typically performed by a contractor organization. OST directs and/or supports emergency response actions within the area under its control and at the scene of the emergency. OST assets consist of fixed facilities and transportation assets. The OST fixed facilities are tenants and are located on sites throughout the country administered by other host organizations. Transportation assets are used for ground convoy and air operations.

The primary mission of the OST is to transport nuclear weapons, nuclear weapons components, and special nuclear materials from U.S. Department of Energy (DOE) sites to shippers and receivers across the contiguous United States. The secure transportation system incorporates multiple levels of safeguards and security to guarantee that shipments are accomplished in a safe and secure manner. Although OST is authorized to operate shipments by highway or air, most shipments are carried out by highway using a convoy of tractor-trailer combination trucks accompanied by escort vehicles. The trailers used for these shipments are specially constructed to be highly resistant to damage from crashes and fires and to incorporate special features to deny intruders entry. OST Federal agents conduct the shipments, and all shipments are monitored by OST personnel in the Transportation and Emergency Control Center (TECC) located within the NNSA Service Center complex on the Kirtland Air Force Base.

This evaluation examined the status of selected elements of the emergency management program at OST, and included reviews of hazards survey and assessment documents, emergency plans, and associated transportation and facility-specific implementing procedures. In evaluating the area of emergency response, the inspection team conducted limited-scope performance tests (LSPTs) with a sample of 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 line management's ability to implement readiness assurance activities.

Section 2 of this report provides an overall discussion of the results of the OST emergency management program elements that were evaluated. Section 3 provides Independent Oversight's conclusions regarding the overall effectiveness of OST 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 summarizes the findings that require corrective action and follow-up. Appendices C through F detail the results of the reviews of individual emergency management program elements.

# 2.0 Results

## 2.1 Positive Program Attributes

OST continues to make progress in implementing an emergency management program that meets Departmental expectations and promotes effective response to transportation events. Positive attributes of the emergency management program are discussed below.

- **The emergency responders are supported by an appropriately detailed and well-organized set of procedures, checklists, and protective action recommendation cards (PAR cards) to respond to an emergency.** The Federal Agent Standard Operating Procedure provides instructions and guidance to the Federal agents in responding to an emergency and implementing incident command for such emergencies as radioactive material releases, general emergencies, and trailer accidents. Easy-to-use PAR cards contain general instructions and decision flowcharts for determining protective actions based on the cargo and observed conditions. TECC response actions are clearly defined by information sheets and checklists and are available to support the range of anticipated emergencies. Checklists that have been prepared for each of the emergency operations center (EOC) positions provide an acceptable set of instructions to guide the actions of EOC cadre members.

- **During LSPTs the incident commanders, TECC supervisors, and EOC team demonstrated their knowledge of the emergency response organization (ERO) roles and responsibilities and OST protocols in implementing the emergency response.** The OST incident command teams demonstrated the ability to implement an effective incident command system with external response organizations, lead the field response, and request additional response resources. The TECC provided timely initial notifications and protective action recommendations to other Federal agencies and to state, tribal, and local governments. The EOC team demonstrated familiarity with EOC operations and equipment and most of their assigned responsibilities.

- **OST has implemented an active program of evaluated drills and exercises.** Exercises are rotated through a variety of facilities and are used to evaluate all program elements over a multi-year period. Exercises are used to validate policies and procedures and to identify programmatic gaps and shortfalls. The drills and exercises are well designed, planned, evaluated, and documented, and they are characterized by thorough packages and well-documented after-action reports. Although they are effectively designed and conducted to support the training program, as discussed in Section 2.2, ERO members do not consistently participate annually in drills or exercises.

- **The training program for Federal agents and TECC personnel is defined by a comprehensive training program plan, and its implementation is effectively managed.** The training program plan and OST's Office of Mission Operations training practices include provisions for instructor training, formal lesson plans, task-specific training, classroom and hands-on training, evaluation of knowledge and skills, and annual refresher training and drill participation. All Federal agents and TECC personnel have completed initial training requirements and are current in annual training, task-specific training, and drills. Training for the EOC cadre is provided under a separate program that is not formally defined.

## 2.2 Program Weaknesses and Items Requiring Attention

Despite progress since the 2004 Independent Oversight inspection of emergency management, additional work remains to address DOE/NNSA requirements, particularly in the areas of hazards assessments and consequence assessments. Specific weaknesses are discussed below.

- **The OST emergency planning hazards assessment (EPHA) does not contain analyses for all hazardous materials transported and does not describe the protective action recommendation development process for use in the development of PAR cards.** The EPHA analyzes consequences only for equivalent weapons-grade plutonium mixtures and tritium; however, additional hazardous materials are transported by ground shipments, such as plutonium (Pu)-238; uranium (U)-238; U-235; and beryllium. Although these hazardous materials and others are included in the Defense Programs Transportation Risk Assessment, referenced by the transportation hazards survey, they are not analyzed in the EPHA. Additionally, most PAR cards in the set contain protective action distances that are non-conservative or have no technical basis in the EPHA analyses, and OST does not have a documented process in place to support the development, review, and approval of the PAR cards.

- **During LSPTs, consequence assessment activities did not ensure that protective action recommendations and EOC decision-making were appropriate for the hazards, and as a result, responders were placed at risk.** Environment, safety, and health advisors demonstrated the ability to obtain plume plots using the source term, event location, and actual meteorological conditions; however, data input errors and miscommunications resulted in plume plots that were not representative of the hazards or event scene conditions. Significant discrepancies between protective action recommendations in PAR cards and National Atmospheric Release Advisory Center (NARAC) plume plots were not adequately evaluated or reconciled. Similarly, when the direction of the plume plot differed from observed and recorded wind direction it was not questioned. Since the EPHA was not available in the EOC, plume plots were developed without the benefit of release fractions and airborne release fractions used in that document. Further inaccuracies were introduced in consequence assessments when the type of event was modeled as a mechanical release instead of a fire or explosion, as postulated by the scenario.

- **The training and drill programs for the EOC cadre do not ensure that all members participate in a drill or exercise annually, receive refresher training, and receive task-specific training.** Approximately one-third of EOC cadre members on the duty roster did not participate in either a drill or exercise in 2006, and over one-half did not complete the annual refresher training. Additionally, training for the EOC cadre does not include task-specific training to ensure the development and maintenance of emergency response capabilities, such as for consequence assessment. Finally, EOC cadre members do not receive training on procedure changes and lessons learned.

- **Additional work is needed in several areas to fully address weaknesses identified during the 2004 Independent Oversight inspection and to ensure that corrective actions for weaknesses identified in exercises are developed, completed, and validated for effectiveness.** Some corrective actions taken in response to previous inspection findings were not effective in resolving all of the underlying issues. Specifically, OST has not maintained the transportation emergency plan to describe the current concepts of emergency operations; they have not implemented a document control system for the plan's implementation procedures; and they have not implemented a training plan, although one has been drafted. Additionally, although a comprehensive corrective action process has been established, OST has not consistently resolved identified weaknesses to prevent recurrence and does not address weaknesses identified during exercises.

# 3.0 Conclusions

The results of the February 2004 Independent Oversight inspection of emergency management at OST included the observation of an emergency exercise and reviews of selected emergency management program elements. The 2004 inspection found that many elements of the emergency management program were effectively implemented, but significant weaknesses were noted in event scene command and control, and performance weaknesses had origins in procedural and training program deficiencies. Additionally, the evaluation of the EPHA found that it did not appropriately review and analyze all hazardous materials. This 2007 inspection found that, in general, OST efforts have been effective in addressing weaknesses in field response; however, some corrective actions were either ineffective or did not fully address elements of the program, particularly those that affect the EOC cadre.

OST has established an emergency management program made up of two components. The first component, associated directly with transportation activities, is implemented by OST's Office of Mission Operations and includes Federal agents, who accompany and protect the shipments, and the TECC staff, who track shipment locations and perform many of the initial emergency response functions. This part of the emergency management program is largely characterized by clearly documented program requirements, up-to-date response procedures and tools, and formal, effective training. The second component of the emergency management program is implemented by OST's Emergency Management Branch (EMB) and primarily addresses emergency management program administration and functions performed by the EOC cadre. This part of the emergency management program is less well defined and executed. EMB has initiated steps to better define program elements, and several key program documents are either undergoing revision or are in some stage of review and approval. For the most part, the draft documents adequately address the applicable program elements, and some aspects of the draft programs have been implemented; however, the programs' requirements have not been fully implemented.

OST continues to improve the emergency management program and some strengths were noted. In response to the February 2004 Independent Oversight inspection report, the EPHA was revised to justify exempting a transportation accident involving a nuclear yield and to include information necessary for categorization/classification decision-making by host sites. OST emergency response continues to be supported by an adequate set of plans, procedures, and checklists. A well-defined training program in emergency management tasks is established for Federal agents and TECC personnel, and an active drill and exercise program provides the ERO challenging opportunities to develop and maintain proficiency. During LSPTs, field teams and TECC teams demonstrated the ability to implement an effective emergency response, and EOC teams concurrently developed mitigation and recovery strategies and coordinated well with offsite agencies. Additionally, OST has established a comprehensive self-assessment program.

Nevertheless, some program weaknesses and performance inconsistencies were noted. The most significant weakness is that the EPHA does not provide the technical bases for protective action distances recommended to host sites and offsite agencies through the use of PAR cards. Although the Defense Programs Transportation Risk Assessment, referenced in the hazards survey, identifies ground transportation shipments of Pu-238, U-238, U-235, and beryllium, these hazardous materials are not analyzed in the EPHA. While the EPHA has been enhanced since 2004, the revised EPHA does not ensure that all transported hazardous materials are adequately assessed, and as a result the recommendations for protective action distances provided in the PAR cards are not based on technical analyses. The LSPTs demonstrated that improvements are needed in the performance of consequence assessment activities. Plume plots were generated that were not representative of the hazards or event scene conditions, and significant differences between protective action distances on plume plots and those provided on PAR cards were not evaluated

or justified. Additionally, simulated responders were put at risk because the properties of the hazardous material were not clearly understood. Weaknesses in communication and record keeping practices also negatively impacted some response efforts.

Other weaknesses include: the emergency plans for ground and aviation transportation have not been updated as required; important procedures and checklists in use by emergency planners and responders are not included in a document control system; and corrective actions for exercises are not adequately identified and tracked to ensure that identified weaknesses are corrected. Additionally, the training program for the EOC cadre does not include task-specific training and does not ensure that all members receive refresher training and participate in a drill or exercise annually. As a result, many of the EOC cadre members did not receive refresher training in 2006 or participate in a drill or exercise, and therefore were not made aware of procedure updates or process changes.

Overall, OST has been successful in addressing program weaknesses in field response activities at the event scene and facilitating an increased level of emergency preparedness for a significant transportation event involving the release of hazardous material. However, line management attention is necessary to ensure that all transported hazardous materials are appropriately analyzed in the EPHA and that results of those analyses are used to provide the technical basis for protective actions and protective action recommendations.

# 4.0 Ratings

This inspection focused on a detailed assessment of six key emergency management programmatic elements, including the performance of selected emergency response decision-makers and support functions. The individual element ratings reflect the status of each OST 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 Surveys and Hazards Assessment ..... SIGNIFICANT WEAKNESS
Program Plans and Procedures ..... EFFECTIVE PERFORMANCE

**Emergency Preparedness**

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

**Emergency Response**

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

**Readiness Assurance**

Feedback and Improvement ..... NEEDS IMPROVEMENT

# APPENDIX A
# SUPPLEMENTAL INFORMATION

## A.1 Dates of Review

| | |
|---|---|
| Limited Scope Performance Test Planning | December 5 – 6, 2006 |
| Planning Visit | January 9 – 11, 2007 |
| Onsite Inspection Visit | January 22 – 31, 2007 |
| Report Validation and Closeout | February 20 – 21, 2007 |

## A.2 Review Team Composition

### A.2.1 Management

Glenn S. Podonsky, Chief, Office of Health, Safety and Security
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Bradley A. Peterson, Director, Office of Independent Oversight
Steven C. Simonson, Acting Director, Office of Emergency Management Oversight

### A.2.2 Quality Review Board

Michael A. Kilpatrick
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### A.2.3 Review Team

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John Bolling
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Brian Robinson
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### A.2.4 Administrative Support

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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. OST has not ensured that all hazardous materials are identified and adequately assessed in the EPHA, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 13 |
| 2. OST has not implemented a process to ensure that PAR cards are technically accurate based on EPHA consequence results and ensure protection of OST personnel, emergency responders, and the public, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 13 |
| 3. OST has not maintained current emergency plans to describe the provisions for response to an operational emergency, and has not established a document control system to ensure that a full set of up-to-date, approved procedures implement the plan, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 16 |
| 4. OST training and drill programs do not ensure that all EOC cadre members are trained in their ERO tasks, receive annual refresher training on lessons learned and changes to plans and procedures, or demonstrate their proficiency, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 21 |
| 5. During LSPTs, consequence assessors did not always formulate protective actions and protective action recommendations commensurate with the hazards to provide for the safety of responders and the public, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 26 |
| 6. During LSPTs, communication weaknesses hampered an effective response, and record keeping practices did not support the development of accurate historical records of event activities for use during the event or subsequent event reconstruction, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 26 |
| 7. OST has not ensured that prior corrective actions were effective in resolving the identified weaknesses and preventing recurrence of the same or similar weaknesses, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*, and DOE Order 414.1C, *Quality Assurance*. | 30 |
| 8. OST has not implemented a corrective action process for weaknesses observed during exercises to ensure that identified weaknesses are corrected, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. | 30 |

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# 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 hazards survey and emergency planning hazards assessment (EPHA) documents to identify and assess the impact of specific hazards and threats. Based upon the results of these assessments, National Nuclear Security Administration sites, facilities, and transportation shipments must establish an emergency management program that is commensurate with the identified hazards. The emergency plan defines and conveys the management philosophy, organizational structure, administrative controls, decision-making authorities, and resources necessary to maintain the 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 emergency response recommendations.

This evaluation included a review of the Office of Secure Transportation (OST) hazards surveys and EPHA and their treatment of hazards associated with transportation and facility operations. The Independent Oversight team also evaluated the OST emergency plans and associated implementing procedures.

## C.2 Status and Results

### C.2.1 Hazards Surveys and Hazards Assessment

The hazards surveys and EPHA 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 February 2004 Independent Oversight inspection reported that OST had made continued progress in preparing the hazards surveys and EPHA and that the EPHA contained evaluations for most of the hazardous materials and analyses for most accident scenarios. However, some hazardous materials were improperly screened in the development of the hazards surveys, and the EPHA did not contain potential accident consequences for all transported materials. In addition, OST had not adequately addressed all of the emergency events that may affect shipments. This 2007 inspection found that although OST has resolved some of the issues identified in the 2004 inspection, significant weaknesses remain in performance of hazardous material identification and development of consequence analyses. Furthermore, the protective action recommendation cards (PAR cards), which are the response tools used to identify initial protective action distances, have no documented technical basis and are not consistent with the consequence analysis data contained in the EPHA.

OST developed six hazards surveys that cover the five fixed facilities and transportation activities under their cognizance. The hazards surveys generally meet Departmental expectations regarding level of detail: they identify the emergency conditions associated with each facility; describe the potential health, safety, and environmental impacts; and screen the hazardous materials to determine whether further analyses are required in an EPHA. However, five of the six hazards surveys are a year or more overdue for the triennial review and update required by DOE Order 151.1C, *Comprehensive Emergency Management System*, and changes that may have occurred in hazardous material inventories have not been documented or incorporated.

Independent Oversight performed a walkdown of the Aviation Program fixed facility in Albuquerque, New Mexico, to verify the accuracy of the *Aviation Program Fixed Site Hazards Survey*. During the

walkdown, discrepancies were identified between the hazardous materials listed in the hazards survey and the hazardous materials present. Specifically, the hazards survey does not identify methyl ethyl ketone and identifies only 1 gallon of toluene, but there are 55 gallons of each of these materials stored at the facility. Although these materials would screen out per the screening criteria in DOE Order 151.1C, the order requires all hazardous materials be identified and screened to indicate whether the need exists for further analyses in an EPHA. No materials were found that would require EPHA analyses.

The OST Emergency Management Branch (EMB) has maintained an EPHA that generally meets the intent of DOE Order 151.1C for the events and hazardous materials analyzed. The EPHA describes the OST ground and air transportation activities and provides in-depth characterization of the hazardous materials retained for analysis. To address issues identified in the February 2004 Independent Oversight inspection report, the EPHA was revised to include consequences of events at 30 meters in the consequence tables, providing potential host sites the information necessary for categorization/classification decision-making through their emergency management program. The EPHA revision also documents an assessment justifying the exemption of a transportation accident involving a nuclear yield as an initiating event. Additionally, OST EMB has recently developed a draft process for preparing their EPHA. Although not yet implemented, this procedure provides a reference that generally reflects the DOE *Emergency Management Guide*, provides a good basis for preparing the EPHA, and identifies roles and responsibilities for EPHA review and approval.

Although the EPHA has been enhanced since the 2004 Independent Oversight inspection, it does not ensure that all transported hazardous materials are adequately assessed and does not consider a spectrum of events. These issues were also identified as a finding in the February 2004 inspection report. Consequence analyses have been performed for equivalent weapons-grade plutonium mixtures and tritium in the EPHA; however, other transported hazardous materials have been identified that require further analysis. The *Defense Programs Transportation Risk Assessment*, which OST references in the transportation hazards survey, identifies several types of ground transportation shipments that contain hazardous materials, such as plutonium-238, uranium-238, uranium-235, beryllium, and various chemicals used in the trailer deterrent systems, that have not been included in the EPHA for analysis. The draft *Transportation Safety Analysis Report* identifies the same hazardous materials as well as others that have not been included in the EPHA. The DOE *Emergency Management Guide* recommends that the hazard and accident analyses results from the safety analysis reports/documented safety analyses be used in developing the EPHA to the extent practicable to ensure consistency of the emergency technical planning basis with the facility authorization basis. Use of this information can both enhance the quality of the EPHA and greatly reduce the effort required for its preparation.

Additionally, although consequence analyses have been developed for a range of weapons-grade plutonium mixtures and tritium quantities, the EPHA does not include an adequate spectrum of accident events. The consequence analyses in the EPHA only consider 100 percent releases of material from containment, which are considered lower-probability, higher-consequence releases. Higher-probability, lower-consequence releases have not been analyzed because release mechanisms from the shipping containers and transport vehicles have not been considered. For example, the EPHA does not identify directly or by reference the following:

- The physical containment barriers and the inherent strength of their design and construction
- All potential initiating events
- The physical properties of the materials (e.g., liquid, powder, solid)
- All the release conditions required to release the material from the barriers.

Even though the containment barriers are rigorous and robust, they have not been factored into the consequence analysis results. Consequently, the resources of local emergency response organizations (EROs) may not be efficiently utilized due to exaggerated consequences of the overly conservative protective action recommendations. For example, under the current conservative analyses, the potential exists for recommending protective actions out to distances of greater than 100 kilometers (km). Additionally, consequence analyses were not re-analyzed to verify the accuracy of the original HotSpot data when the EPHA was revised in calendar year 2002. Using the latest version of HotSpot, Independent Oversight performed spot check analyses that indicated that the

consequence analysis results have changed (some less conservative, some more conservative) due to improvements to the modeling software.

**Finding #1: OST has not ensured that all hazardous materials are identified and adequately assessed in the EPHA, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

The consequence analysis results obtained from the spectrum of potential emergencies identified in the EPHA are used to develop emergency action levels (EALs). The EALs must include protective actions corresponding to each consequence analysis, per DOE Order 151.1C. For OST shipments, EALs are represented by a set of PAR cards. The applicable PAR cards are selected during the planning and preparation for transportation shipments and are used to support emergency response in the event of an incident or accident. The PAR cards have been developed so that timely initial protective actions can occur and focus on populations nearest the scene and therefore at greatest risk. The EPHA partially describes the derivation of the PAR card set and, for example, documents the justification of the initial maximum protective action distance of no more than 16 km (with a clarifying statement that "protective actions may ultimately be warranted many kilometers from the point of release"). Determination of adequate protective action recommendations during an emergency event is therefore dependent on the consequence assessment performed by the environment, safety, and health (ES&H) advisor in the emergency operations center (EOC). Nevertheless, a number of the protective action distances and recommended protective actions in the PAR cards have inaccurate or undocumented technical bases, and consequence analysis results from the EPHA were not used to identify an accurate set of protective action recommendations appropriate to both the shipment and the event/condition. As a result, a number of weaknesses in the PAR cards were noted. For example,

- The Bravo PAR card recommends "shelter in place" out to 800 meters for a fire or explosion involving the trailer. However, the EPHA references the use of the guide for explosives (Guide 112 from the 2004 Emergency Response Guidebook), which recommends "evacuation" out to 800 meters in all directions.
- No technical basis is documented for the initial 400 meter or 800 meter shelter-in-place or evacuation distances for each of the PAR cards. The consequence analyses indicate that the protective action guide of 1 rem is exceeded to distances greater than 800 meters for the majority of the release scenarios associated with the PAR cards.
- There is no technical basis or discussion to justify the determinations of whether to shelter-in-place or evacuate the public and nonessential emergency response personnel.

Contributing to these weaknesses is the absence of an OST procedure to describe the development of the PAR cards or require that the technical basis be documented.

**Finding #2: OST has not implemented a process to ensure that PAR cards are technically accurate based on EPHA consequence results and ensure protection of OST personnel, emergency responders, and the public, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

In summary, OST has developed hazards surveys and an EPHA that generally meet DOE's expectations regarding level of detail for the events and hazardous materials analyzed. OST EMB has also developed a draft procedure for preparing the EPHA to help ensure that the EPHA is reflective of the DOE *Emergency Management Guide*. However, OST EMB has not assessed all transported hazardous materials in the EPHA, even though these materials are identified and analyzed in OST safety basis documents, and has not considered higher-probability, lower-consequence release events in the EPHA. Additionally, OST EMB has not documented the technical basis for the PAR cards and does not have a process or procedure to describe the development of the PAR cards. Although the PAR cards are often less conservative than the EPHA analyses, the EPHA is very conservative in that no credit is taken for release barriers. The impact of these significant EPHA weaknesses and the discrepancies in the PAR cards is that emergency responders are not provided with tools to enable them to provide appropriate protective action recommendations to host sites and local agencies responding to an emergency event involving an OST shipment.

## C.2.2 Program Plans and Procedures

The previous Independent Oversight inspection found that overall, OST had developed adequate plans and procedures to support the response to emergencies, but that EOC and convoy standard operating procedures were not current and, in some cases, lacked the specificity necessary to support an effective emergency response. This inspection found that some improvements have been made in the areas with identified weaknesses, and OST emergency response continues to be supported by an adequate set of plans, procedures, and checklists. However, the OST and aviation transportation emergency plans have not been maintained up to date, and a number of important response procedures and checklists are not included in an effective document control system.

The concepts for managing an OST response to an emergency are described in an OST emergency management plan and in an aviation transportation emergency management plan that is supplemented by a mishap response plan. Both of the emergency plans address the elements of the emergency management program and contain detailed descriptions of OST operations and facilities, the ERO, and roles and responsibilities of ERO members. The plans are generally adequate in addressing command and control as well as important emergency response functions, such as categorization, protective actions, notifications, and consequence assessment.

However, the plans have not undergone annual reviews and updates. A revision to the OST emergency plan is in progress, and the aviation plans will be revised in the near future as a new contractor is integrated into flight operations. Nevertheless, the currently approved emergency plans do not fully reflect the present organization and approach to emergency response. For example, the plans refer to organizational groups (emergency management team), a location (situation room), and positions (crisis manager) that are no longer used. Additionally, one action in the OST emergency plan for the incident commander (IC) to ensure that field data is collected is no longer expected and instruments are not available to support this activity, and the plan refers to the use of a joint information center in Albuquerque even though interviews indicated that this would not be the case. Further, there are some conflicts and inconsistencies in the plans, for example:

- The aviation plan indicates that event categorization is determined by the "crisis manager with assistance of the aviation duty officer," but the OST emergency plan indicates that categorization is performed by the Transportation and Emergency Control Center (TECC).

- The mishap response plan indicates that flight dispatch will fax information on hazardous materials to first responders, but the OST emergency plan assigns this responsibility to TECC personnel.

- The aviation plan does not specify responsibility for categorization and protective action recommendations in the event of a plane crash and indicates that the Federal Aviation Administration will provide the protective actions to first responders; the OST plan assigns protective action recommendation notifications to TECC personnel.

Finally, neither of the emergency plans thoroughly addresses aviation accidents at airfields, such as during taxi, landing, and takeoff, where the PAR card will not be readily available from the plane's occupants. For example, following an aircraft accident during landing or takeoff from a civilian airfield, where the first responders will likely be from the airport fire department (i.e., when the response time will be short compared to the time to relay PAR cards through the several communication nodes involved), the plans do not address the preplanning to ensure that first responders are provided with information regarding the hazardous materials and recommended protective actions in a timely manner.

Although emergency plans are not current in all respects, procedures and checklists are generally up-to-date and effective. In the event of an emergency, an on-scene Federal agent, typically the Convoy Commander in Charge or the OST courier on an aircraft, will become the IC. The TECC becomes the focal point for notifications and communications, providing support to the IC, as well as the emergency response duty officer and aviation duty officer. If the event warrants, the EOC is activated. Each of these three locations is supported by a set of procedures and checklists that implements roles and responsibilities and guides the actions of the ERO.

At the scene, the IC's response to the emergency is supported by an appropriate, well-organized procedure, checklists, and PAR card set. The *Federal Agent Standard Operating Procedure* has been improved since the previous inspection and provides adequate

instructions and guidance to the Federal agents in responding to the emergency and implementing incident command for such emergencies as radioactive material releases, general emergencies, and trailer accidents. The procedure includes both post-attack/accident and emergency management checklists, which are included in a notebook with the PAR card set. Together, the manifest, PAR card set, and checklists adequately support the IC in providing protective action recommendations (Emergency Response Guide numbers and selected PAR card) to the first responders and addressing personnel protection, such as establishing contamination control (including an entry control point) for releases. For example, the PAR cards contain a set of general instructions and decision flowcharts to direct the IC to the correct card based on the cargo manifest and observed conditions. Nevertheless, as observed in the limited-scope performance tests (see Appendix E), some specific tools, such as control point logs to support contamination control, have not been developed.

In the TECC, response to incidents/accidents continues to be supported by a procedure and a comprehensive set of information sheets and checklists, which are included in an appropriate document control system. The emergency section of the TECC operating procedure refers the operators to the specific information and/or checklist binder for instruction for all incidents. Detailed information sheets and checklists are available to support the range of anticipated emergencies, including convoy incident/accident (cargo not involved), vehicle accident with hazardous material release or trailer breach, attack on convoy, and aircraft incident/accident. Checklists generally contain appropriate actions, including determination of categorization, identification of the selected PAR card, and implementation of appropriate notifications. Facsimile sheets for each of the PAR cards have been pre-staged to enhance the timely dissemination and readability of the protective action information.

EOC responders are supported by procedures and processes for activating the EOC and a set of checklists guiding response functions. The emergency situation book provides an acceptable process for determining whether to activate the EOC and instructions for initiating the subsequent ERO recall and EOC activation. EOC checklists, which have been recently updated and prepared for each of the EOC positions, provide a suitable set of instructions to guide the actions of the ERO cadre members. However, some EOC procedures do not reflect the current EOC organization or operations. For example, although several procedures governing the EOC (*EOC Operations Plan, EOC Concept of Operations, EOC Operating Procedure, and Emergency Response Duty Officer*) contain instructions that are useful in understanding and initiating EOC operations, these procedures have not been updated to reflect the current EOC operating concept and organization. In addition, no checklist includes steps specifying that changes to the protective action recommendations are to be reviewed and approved prior to being communicated to affected organizations.

Although OST emergency response is supported by a generally satisfactory set of procedures and/or checklists, the change control and document control processes still do not ensure that the most recent procedures, checklists, and operator aids are reviewed, approved, and issued for use by mission planners and ERO personnel. For example:

- The flowchart that is utilized to determine the applicable protective action recommendation for each shipment, and thus the PAR card to be given to responders and emergency contacts, contains information that has not been formally reviewed and approved, and the charts themselves are uncontrolled.

- The PAR card set, instructions, and checklists in the notebook, which are primary response tools for the IC, are not formally reviewed or included in a document control or operator aids program.

- The emergency situation book has not been reviewed, approved, and controlled, and the categorization matrix used in this procedure is copied from a draft (unapproved) emergency management plan.

- Protective action recommendation facsimile sheets in use in the TECC, which include completion and distribution instructions for TECC personnel and instructions for the recipients, do not show evidence of review and approval and do not contain instructions for classification review prior to transmittal.

- EOC notebooks contain procedures and operator aids that are unnumbered and have not been formally reviewed and approved.

- EOC checklists have not undergone a formal review and approval process, and are not included in a formal document control system.

As a result, the Independent Oversight inspection team members observed the use of several flowcharts with different dates, and in one case, additional instructions for determining the correct PAR card for the shipment manifest. In addition, a number of checklists that had been superseded were available and used during the limited-scope performance tests; however, this did not significantly contribute to any performance weaknesses.

**Finding #3: OST has not maintained current emergency plans to describe the provisions for response to an operational emergency, and has not established a document control system to ensure that a full set of up-to-date, approved procedures implement the plan, as required by DOE Order 151.1C, *Comprehensive Emergency Management System.***

In summary, the concepts and approaches that generally address both ground and aviation transportation emergencies are adequately addressed in the applicable emergency plans. OST emergency response at the incident scene is satisfactorily supported by a procedure and implemented through a notebook containing appropriate operator aids and PAR cards. TECC and EOC response are also adequately supported, primarily by a set of checklists and operator aids for ERO personnel at each location. Nonetheless, the emergency management administrative program has not ensured that the emergency plans have been updated as required, resulting in some inconsistencies among the emergency response documents and practices. Additionally, the administrative program has not ensured that important procedures and checklists in use by emergency planners and responders have been included in an appropriate document control system or operator aids program.

## C.3 Conclusions

Since the previous Independent Oversight inspection, OST has improved emergency planning documents and addressed some identified weaknesses. The OST hazards surveys and EPHA generally meet expectations regarding level of detail, and the EPHA has been revised to provide support for classification decisions for events at host sites and to justify the exemption of analysis for an event with a nuclear yield. The ground and aviation emergency plans provide a satisfactory description of the overall approach to emergency response and are adequately supported by procedures and implementing checklists, including an upgraded incident command procedure. Emergency responders are also assisted by a comprehensive set of checklists and operator aids, including PAR cards. Nevertheless, several important emergency planning documents have not been appropriately revised and updated. The OST emergency plans have not been updated as required to address changes in response practices and implementing checklists, and document control practices have not ensured that important procedures, checklists, and operator aids in use by OST personnel are appropriately reviewed and approved. However, the EPHA weaknesses are the most significant because they impact the validity of protective action recommendations. The EPHA does not assess all hazardous materials transported by OST, although these materials are identified in related OST safety analysis documents. In addition, the EPHA does not consider higher-probability, lower-consequence potential release events, and no credit is taken for release barriers. OST has not documented the technical basis for the PAR cards, and the PAR cards are often less conservative than the EPHA analyses. The cumulative effect of these significant EPHA weaknesses and the discrepancies in the PAR cards is that the OST ICs do not have the tools necessary to provide appropriate protective action recommendations to host sites and local agencies responding to an emergency event involving an OST shipment.

## C.4 Ratings

A rating of SIGNIFICANT WEAKNESS is assigned to the area of hazards surveys and hazards assessment.

A rating of EFFECTIVE PERFORMANCE 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 Federal line managers and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

- Enhance the usefulness of the draft OST/EMB-PROCESS-001, Rev 1, *Emergency Planning Hazard Assessment Process*, by providing additional specificity to the procedure. Specific actions to consider include:
  - Update the process document to reflect the new requirements contained in DOE Order 151.1C.
  - Perform a detailed review of the hazards survey and assessments related sections of DOE's Emergency Management Guide (G 151.1-1) against the process document to identify missing recommended attributes and then update the process document accordingly.
  - Require that hazards surveys document the hazardous material database inventories used in the screening process.
- Enhance the quality, accuracy, and usefulness of the hazards surveys and EPHA. Specific actions to consider include:
  - Establish a mechanism that ensures that a review of the hazards surveys and EPHA is conducted prior to initiating any new activities.
  - Document all hazardous materials undergoing the screening process in the hazards surveys or the EPHA to provide a record of all materials evaluated.
  - Review the EPHA, *Defense Programs Transportation Risk Assessment*, and *Transportation Safety Analysis Report* hazardous material inventories to ensure that they are consistent or that inconsistencies are appropriate and documented accordingly.
  - Perform consequence analyses contained in the EPHA using the National Atmospheric Release Advisory Capability (NARAC) software to minimize potential confusion caused by differences between the HotSpot software results currently used during planning and the NARAC results obtained during response activities.
- Consider developing and implementing a process document for the development of PAR cards that ensures the following:
  - The technical basis for each card is justified by the analysis contained in the EPHA.
  - All hazardous materials involved in an emergency event are considered in the protective action distance recommendations.
  - The logic diagram used to select each PAR card is linked to the event type used in the analysis for the specified protective action recommendation.
- Strengthen the planning process for OST emergency response by considering the following specific actions:
  - Update each of the emergency management plans to ensure that they address the current concepts, organizations, locations, interfaces, and processes for emergency response.
  - Compare each of the emergency management and response plans and supporting implementation procedures to ensure consistency among the roles, responsibilities, and actions.
  - Review the potential emergency events, particularly aviation events at airfields, and verify that the emergency plans, memoranda of understanding, and implementing procedures effectively address the range of anticipated events, such as handling, taxi, take-off, and landing incidents.
- Further improve the ability of ICs to implement contamination control through consideration of the following actions:
  - Develop a checklist governing the basic actions and supporting log sheets (to record vehicles and personnel entering and leaving the potentially contaminated area) to enhance

implementation of the entry control point functions.

- Review the equipment needed to support establishment of an entry control point, such as clipboards, stanchions, and rope, and include the equipment with the convoy, when possible.

- Strengthen the procedure development, review, revision, and document control processes to support and enhance the performance of mission planners and ERO responders. Specific actions to consider include:

  - Develop a detailed governing procedure for procedures, checklists, and related documents to ensure that these documents are prepared, reviewed, approved, and controlled using a formal, structured process.

  - Ensure that critical processes, such as PAR card selection during mission planning, are addressed by appropriately detailed procedures, and ensure that supporting calculations for these procedures are reviewed and approved as safety-related calculations.

  - Implement a routine review and revision cycle for program documents to ensure that they are current.

  - Establish a controlled set of documents (procedures and checklists) that have unique identifiers to facilitate verification that the current version of a document is being used.

  - Establish an operator aids program (for example, see DOE STD-1043-93, *Guide to Good Practices for Operator Aid Postings*) for the operator aids used by OST emergency responders.

  - Periodically audit all response notebooks and binders to verify that response notebooks include only current copies of response procedures, checklists, and forms.

# 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. 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.

The Office of Independent Oversight team evaluated the training, drill, and exercise program used to support the Office of Secure Transportation (OST) ERO. As part of the programmatic review of the training, drill, and exercise elements, the Independent Oversight team evaluated the plans and procedures that support these elements and reviewed training and proficiency records for key emergency responders. Drill and exercise reports were also reviewed for indications that they are being used effectively to enhance responder proficiency and evaluate the level of the OST's response preparedness.

## D.2 Status and Results

The 2004 Independent Oversight inspection reported that the OST training program was adequately detailed for Federal agents and Transportation and Emergency Control Center (TECC) staff and was in transition for the ERO cadre. However, the emergency operations center (EOC) cadre and Federal agents were not receiving sufficient training in key areas, such as task-specific training for their positions, and the EOC cadre training needs were not effectively managed to ensure that all training requirements were met. Since that inspection, OST has improved the task-specific training for Federal agents. Additionally, this 2007 inspection found that a strong program of drills and exercises is in place to provide hands-on opportunities for ERO members to perform emergency functions under a variety of conditions and locations. However, the ERO training program documents have not been finalized, and annual refresher training and task-specific training for EOC cadre members are still not fully implemented.

### D.2.1 Training

Two distinct organizations within OST provide emergency management training to the ERO: the Office of Mission Operations (OMO) and the Emergency Management Branch (EMB). OMO has responsibility for training the Federal agents and the TECC staff, while the EMB provides training to the EOC cadre members. These organizations implement training using separate training plans and different methodologies.

#### Federal Agents and TECC Staff

OMO has a well-defined Training Program Plan (TPP) that provides an adequate framework for developing training material and establishes a comprehensive set of program requirements. Specifically, the TPP stipulates that training topics are identified using job task analysis methodologies and prescribes detailed methods for lesson plan development and maintenance requirements using an established instructional system development process. Furthermore, the TPP prescribes refresher training on an annual basis and requires the inclusion of lessons learned. Other positive attributes of the TPP include expectations for performance evaluations to ensure student mastery of the required knowledge and skills, and stipulation of the use of qualified instructors who are subject matter experts and have completed a basic instructor training course. Finally, the TPP requires annual participation in a drill or exercise to maintain skills and duty roster eligibility.

OMO is effectively implementing the TPP. Training requirements have been identified for all Federal agents and TECC staff positions; lesson plans have been developed; instructors are qualified; and all personnel on the emergency duty roster have successfully completed their designated curriculum, with sufficient depth to provide position relief.

Furthermore, all Federal agents and TECC personnel are current in annual refresher training and annual drill participation requirements. Annual refresher training also appropriately includes lessons learned. Personnel training requirements are effectively managed using the OST qualification training system, a computerized tracking system. This system provides the training status of OMO personnel for position qualification and automatically alerts appropriate personnel, through an email-based system, when periodic training or drill participation is coming due or is deficient. The qualification training system also supports maintenance of the OMO duty roster and is well supported by training records on file.

### Emergency Operations Center Cadre

The EMB is responsible for EOC cadre training, which is implemented by a designated EMB training coordinator. The EOC cadre training practices incorporate many positive program attributes. Specifically, EMB provides training in many relevant topics for initial and periodic training for all EOC cadre positions using a variety of training settings, such as self-study, web-based courses, instructional classroom courses, and drills. Successful completion of course material for initial and periodic training is demonstrated by written tests and evaluated drills. Training on plan and procedure changes is provided through evaluated drills or the annual exercise. Additionally, course material is presented by qualified instructors who are subject matter experts and have completed a basic instructor training course.

Notwithstanding the above, the following weaknesses were observed:

- The training curriculum does not identify training specific to EOC positions, such as consequence assessment.
- The EOC module for web-based training material is out of date. Specifically, the training does not provide accurate information regarding the EOC cadre positions.
- Classroom training lesson plans are not developed.
- Approximately one-half of the personnel on the EOC duty roster did not complete the annual refresher training in 2006.

Contributing to these weaknesses is the absence of an approved training plan for the EOC cadre to formally establish program requirements for annual refresher training that includes lessons learned topics; the process and frequency for review and approval of training materials; periodic drill and exercise participation requirements; and the method for tracking and reporting the status of the EOC cadre members' training. Currently, EMB has a draft TPP, but its content is incomplete, and no expectations are established for its approval date.

## D.2.2 Drills and Exercises

EMB-evaluated drill and exercise packages are similar in design, incorporating many positive attributes, such as scenario narratives, objective evaluation criteria, and prepared injects. Some objectives are designed to validate policies and procedures and identify gaps and shortfalls in emergency responses. Immediately following evaluated drills and exercises, critiques are held by participants to discuss and identify program strengths and weaknesses. The results are well documented in after-action reports that also contain recommendations for improving observed weaknesses. Although both the drill and exercise programs effectively identify weaknesses, EMB does not ensure that corrective actions are implemented, as discussed further in Appendix F of this report.

The OST exercise program has been very active. It evaluates all program elements over a five-year period and rotates exercises among various facilities and commands. For example, over the past 18 months, EMB has conducted exercises at the Nevada Test Site, Y-12, Fort McCoy, and the Agent Operations Central Command. Additionally, responders external to the OST are invited to participate in exercises at least once every three years.

EMB drills are designed to train, test, and maintain operational emergency response skills. EMB relies on the drill program as the means for periodic refresher training and training on changes to plans and procedures. Three drills were conducted in 2006; however, approximately one-third of EOC cadre members on the duty roster did not participate in either a drill or exercise in 2006. As a result, non-participating EOC cadre members did not receive training on changes to plans and procedures, receive refresher training, or practice infrequently used skills. The failure of OST to ensure that all ERO members participate annually in a drill or exercise is attributed to the weaknesses in the training program discussed above; specifically,

training and drill participation requirements and the method used to track the status of individual's training requirements are not formally established in a training plan or effectively implemented.

**Finding #4: OST training and drill programs do not ensure that all EOC cadre members are trained in their ERO tasks, receive annual refresher training on lessons learned and changes to plans and procedures, or demonstrate their proficiency, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

## D.3 Conclusions

OST has made some improvements in their training, drill, and exercise programs while maintaining many program strengths observed during the last Independent Oversight review. The training program for preparing Federal agents and TECC staff continues to be a mature, robust program and has improved the performance of Federal agents in their incident command position functions as observed during limited-scope performance tests. Federal agents and TECC training program requirements are comprehensive and well documented, providing all essential elements attributed to an effective initial and annual refresher training and drill program. Additionally, OST has improved its exercise program by expanding the exercises conducted at host sites and at a variety of OST facilities to test all emergency program elements over a five-year period. Likewise, evaluated drills conducted by EMB are well designed and documented. Nevertheless, a number of weaknesses previously identified by Independent Oversight still exist in the training program for the EOC cadre. There has been no progress in the development of course material for position-specific training of the EOC cadre, and there remains no assurance that all EOC cadre members will receive annual refresher training or regularly participate in a drill or exercise. Additional observed weaknesses include a web-based EOC cadre training course in use that is out of date, and an effective method for correcting weaknesses observed during drills and exercises is not in use. Contributing to these weaknesses is the absence of established program requirements and the absence of an effective tracking method for identifying EOC cadre members due for periodic training and drill participation.

## D.4 Ratings

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

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

## 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 Federal line managers and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

- Formalize existing training practice and establish clear EOC cadre training requirements by completing and implementing a training plan. Specific attributes to consider in providing an adequate framework for the training plan include:
  - Establish a systematic method for identifying all knowledge and skills needed for each EOC cadre position, then select the proper training setting and develop course material.
  - Establish requirements for the contents of lesson plans and a process for their development, review, and approval.
  - Establish a training material maintenance program, through periodic reviews and updates as necessary, that will ensure that up-to-date material is used for training.
  - Establish expectations for remedial training when students have not demonstrated mastery of course material.
  - Establish requirements to attend an annual refresher that provides periodic training for seldom used skills, lessons learned from the previous year, and changes to plans and procedures.

  - Establish a mechanism to review changes to plans and procedures to ensure they do not warrant more immediate training than the scheduled annual refresher. Consider the use of an email-based required reading program that can record and track training completion.

  - Establish a required frequency for drill participation to maintain proficiency and duty roster eligibility.

- Formalize existing EMB drill and exercise practices for the EOC cadre by completing and implementing the drafted drill and exercise plan.

- To support management of the EOC duty roster, enable determination of in-progress training status, and identify EOC cadre members in need of specific periodic training or drill activities, consider using an electronic tracking system that provides early warnings to cadre members and appropriate managers to allow time to schedule and attend training sessions or to notify appropriate personnel when training deficiencies exist.

# 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 made during limited-scope performance tests (LSPTs) of response activities of two field teams performing on-scene emergency responses, two Transportation and Emergency Control Center (TECC) teams, and two Emergency Operation Center (EOC) teams. The field teams were led by the convoy commander, who typically serves as the incident commander (IC). The field teams also included two other Federal agents who filled positions in the incident command system (ICS). The TECC and EOC teams were fully staffed shifts led by an Office of Secure Transportation (OST) emergency manager (EM) and supported by a staff that executes such important functions as event categorization, formulation of protective action recommendations, onsite and offsite notifications, consequence assessments, and press releases.

Two sets of two LSPTs were conducted on successive days. The first LSPT in the set involved a combined TECC, EOC, and field response team. The second LSPT involved the same staffing except the field team, which did not survive the simulated incident. The EOC teams consisted of an EM, six other duty officers, and selected EOC support staff, including public affairs advisors.

Two operational emergency scenarios were developed for the LSPTs: a ground transportation event initiated by a malevolent act that resulted in the postulated release of plutonium oxide and personnel injuries; and an aviation event involving an aircraft crash that resulted in the postulated release of tritium. The LSPT scenarios, which were developed by Independent Oversight in conjunction with OST trusted agents, were presented to the participants by the OST trusted agents to ensure scenario validity and delivery of accurate event cues. The trusted agents also played the roles of several positions that were not otherwise staffed.

## E.2 Status and Results

In the event of an emergency involving a ground convoy, the Convoy Commander in Charge (CCIC), as the U.S. Department of Energy (DOE) Senior Energy Official, participates in a unified ICS that implements command and control of the emergency response until relieved by a Headquarters-designated Senior Energy Official. Assignments to the ICS positions are established at a pre-trip briefing so that the positions are filled automatically if the ICS goes into effect. The CCIC initially receives support from the TECC in performing his duties. Initial responder assets, such as law enforcement and emergency services, are dispatched by state or local governments and are led by their respective commanders, and they coordinate with the CCIC to manage the response. Additional assets, such as an explosive ordnance disposal team, the Federal Bureau of Investigation, the DOE Radiological Assistance Program (RAP), and the DOE Accident Response Group (ARG), respond as necessary, depending on the event severity and other circumstances, with further transfer of command and control dictated by procedure.

In the event of an incident, the TECC recalls the Emergency Response Duty Officer (ERDO) to the TECC where event categorization, initial notifications, and verification of protective action recommendations issued by the IC, if available, take place. The TECC staff will also recall emergency response organization (ERO) members to the EOC if the ERDO decides that EOC activation is warranted. Protective action recommendations are provided through a protective action recommendation card (PAR card) system where a PAR card is selected, using logic diagrams, based on event conditions. Appropriate PAR cards

and Emergency Response Guides (ERGs) are predesignated on the manifest during shipment planning. Once the OST EOC is operational, it becomes the command and control center for managing an emergency situation.

The 2004 Independent Oversight inspection evaluated the OST emergency management exercise with the Nevada Test Site and identified widely-varying levels of performance, including weaknesses in the protection of responders and implementation of effective contamination control measures. OST responders did not establish an effective unified ICS with the host site to mitigate event consequences. Weaknesses were also identified in the form of establishing command in a safe location, ensuring that responders don respiratory protection, and establishing responder accountability. This 2007 inspection noted performance improvement in addressing these weaknesses.

### E.2.1 Incident Command by Federal Agents

The ICs participated in the two ground transportation LSPTs during which an OST convoy was simulated en route from Los Alamos National Laboratory to the Pantex Plant. Outside the community of Adrian, Texas, a large cargo-type vehicle carrying explosives rammed the loaded safeguards transporter. Once the scene was stabilized, with no evidence of further hostility, the CCIC was made aware that the trailer was breached and that the shipment was exposed to a large fire. Following these initial reports, the field team implemented the ICS and began implementing checklists, quickly determined the appropriate PAR card, and ordered Federal agents to don respiratory protection. These actions provided prompt and adequate short-term protective actions for Federal agents.

ICs were knowledgeable of their roles and responsibilities, OST protocols in implementing the emergency response, and methods used in keeping personnel safe, and most tools were available to support their decision-making. A national security area was immediately established for both ground transportation event scenarios. The CCIC or IC promptly notified the TECC and provided information about the status of the shipment and convoy and their location. ICs also requested the aid of local law enforcement agencies, firefighting personnel, emergency medical services, DOE ARG and RAP assets, and an explosive ordnance disposal team.

Overall, the OST incident command teams demonstrated the ability to implement an effective ICS with external response organizations and lead the field response. Entry control points and incident command posts (ICPs) were established at safe locations for all scenarios, and during one scenario, in which the wind shifted, the IC appropriately considered relocating both posts. The entry control point and ICP locations were widely communicated, and safe route information, along with designated safe staging areas, was provided to responding units.

ICs provided PAR cards to local responders and described areas that should be sheltered and actions to take to increase sheltering effectiveness. Both ICs ensured that hospitals were advised that the patients were potentially contaminated with radioactive material, and one field team equipped arriving Emergency Medical Technicians with such personal protective equipment as gloves, tape, and masks. However, during one scenario, the IC recommended an evacuation rather than shelter-in-place, as stipulated by the PAR card, for populations downwind.

Overall, the field response was effective, but some areas needing improvement were noted. Response actions did not consistently ensure effective contamination control and provide information on hazardous materials to responders in a timely manner. Neither IC provided hazardous material information to arriving police or county fire departments when asked. During one scenario, the police responder challenged the IC about the radioactive cargo after seeing it mentioned on the PAR card, prompting the IC to then disclose the hazard. One IC did not have an ERG available to enable him to review and discuss its contents with local responders until he called the TECC to obtain the information. Finally, Federal agents who were not casualties were not surveyed by available State Radiological Control staff when there was indication injected that Federal agents were spreading contamination.

### E.2.2 Transportation and Emergency Control Center

The TECC participated in both the two ground transportation LSPTs previously described and the two aviation scenarios. The aviation scenario began when the controller provided the TECC with flight summary

information and informed the TECC that the aircraft had disappeared from radar. Following these initial reports, the TECC assumed command of the initial response and began implementing their checklists.

TECC supervisors demonstrated the ability to maintain contact with the ICs, provide effective support, and obtain updated information on a regular basis. During both the ground transportation and aviation scenarios, effective command and control was demonstrated, with support from the TECC Duty Officer, ERDO, and Aviation Operations Duty Officer. The TECC used the ERO pager system effectively to activate the OST EOC. The use of checklists and procedures was thorough during all responses.

The TECC, in coordination with the ERDO, accurately categorized the events and provided timely notifications and protective action recommendations to other Federal agencies and state, tribal, and local governments. However, the TECC did not always ensure that the response information obtained was correctly recorded and communicated to the ERDO and EOC. For example, although the standard protocol for reporting wind direction is "from" a direction, during one of the ground transportation scenarios the TECC recorded and reported the wind direction as "to" the northwest, opposite the actual condition, which resulted in incorrect protective action recommendation decisions. Also, during one of the four scenarios, the TECC team supervisor received and recorded casualty information, but the information was not effectively communicated, and as a result the EOC was not aware of the status of convoy personnel for over an hour. Nonetheless, the overall performance of the TECC in providing support to the IC and EOC was timely and competent.

### E.2.3 Emergency Operations Center

Overall, the EOC team demonstrated familiarity with most EOC operations and their assigned responsibilities during all four scenarios. OST consistently established an operational EOC within 30 minutes of the operational emergency declaration. ERDOs demonstrated good initial command and control, provided briefings to the arriving EOC cadre as the interim EM, and ensured that initial event information was appropriately disseminated. EMs consistently developed initial strategies, contingency plans, and tactical priorities to mitigate the events; reviewed and concurred with protective action recommendations determined by the IC and TECC; and assigned responsibility for communication with Federal agencies and state, tribal, and local governments to designated EOC staff. Periodic briefings were provided by the EMs and Crisis Coordinators to review and update the EOC on event status and response. Initial press releases and DOE Headquarters situation reports were completed within one hour of declaring the EOC operational for all scenarios.

The EOC team concurrently developed mitigation and recovery strategies and assigned priorities to the specific tasks for all events. Close coordination between the logistics advisor, operations advisor, and aviation advisor occurred to identify and assemble the necessary resources at the event scenes. Several options were explored for most tasks. For example, options to get radiological monitoring assets on scene were identified, including dispatching the corresponding regional RAP team, airlifting the Region 4 RAP team to the scene, requesting Civil Support Teams through the Department of Defense Joint Nuclear Accident Coordinating Center, and utilizing available state resources. Furthermore, the law enforcement agency liaison ensured that planned tasks were coordinated and communicated with appropriate Federal, state, local, or tribal law enforcement agencies. While these response activities were being developed and implemented, the engineering advisor planned a recovery strategy, identifying the equipment and assets needed to implement the recovery plan.

Although most EOC team functions were effectively performed, consequence assessment was not accurately performed. For example, during one of the aviation scenarios, the environment, safety and health (ES&H) advisor, responsible for the consequence assessment function, incorrectly (due to a data entry error) derived a 75-foot radius protective action recommendation distance rather than the 10 miles recommended on the PAR card, and responders were allowed to enter the area. There was no subsequent discussion in the EOC as to why there was such a discrepancy between these protective action distances. During a second aviation scenario, the ES&H advisor obtained a plume plot for a tritium release that was representative of the accurate source term and event location. However, he ran the model as a point-source release and not as a fire, and assumed only 50 percent of tritium being released as oxide instead of 100 percent, as used in the emergency planning hazards assessment (EPHA) and PAR card development. This resulted in a protective action

recommendation distance of 2,000 yards, whereas the PAR card for this event recommended a protective action distance of 10 miles. Additionally, the ES&H advisor misled the EM by significantly understating the personnel and environmental hazards associated with a tritium release. As a result, simulated local responders entered an environment that had the potential to be extremely hazardous.

ES&H advisors obtained accurate weather data for three of the four events; however, during one of the ground transportation scenarios, the advisor recommended protective actions out to 10 miles, based on the PAR card in the north-northwest direction, without resolving conflicting information from the National Atmospheric Release Advisory Center (NARAC) plume plot (using the actual meteorological data), which indicated an east-northeast wind direction and a protective action distance out to 30 miles. Lastly, during one of the ground transportation scenarios, a release fraction and airborne release fraction were not used as dispersion modeling input, although available in the EPHA. This resulted in overestimating consequences, unnecessarily placing more areas under protective actions. In this case, the ES&H advisor never realized that an explosion had occurred and therefore did not model the plume as an explosive release.

**Finding #5: During LSPTs, consequence assessors did not always formulate protective actions and protective action recommendations commensurate with the hazards to provide for the safety of responders and the public, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

Although OST emergency response functions were generally well coordinated, communications between event scene responders, TECC, and EOC were not always effective, contributing to the errors previously discussed. The most significant problems related to the use of inaccurate information or not seeking available information, such as the status of the shipment and convoy, location of the event, wind direction at the event scene, and the nature of casualties. EOC decision-makers responded appropriately to known information, but incorrectly for the postulated event. Additionally, during one scenario, the issued press release communicated inaccuracies on evacuation distance and did not properly identify the incident location to the media. Lastly, entries in the EOC event record were edited and updated so that the information that was used for initial decision-making was deleted, thereby losing historical data and event chronology. As a result, OST would not be able to reconstruct an accurate timeline of an emergency event, or establish an auditable and supportable record of emergency response actions and offsite notifications.

**Finding #6: During LSPTs, communication weaknesses hampered an effective response, and record keeping practices did not support the development of accurate historical records of event activities for use during the event or subsequent event reconstruction, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

## E.3 Conclusions

During the LSPTs, OST field teams and TECC teams demonstrated the ability to implement an effective emergency response and demonstrated good knowledge of their roles and responsibilities, implemented effective command and control, and in most cases took prompt and effective actions to protect OST personnel, local emergency responders, and the public. EOC teams also demonstrated familiarity with their roles and responsibilities in providing support to the IC and with most of the EOC protocols, such as making required notifications, establishing an operational EOC, preparing press releases, and providing event information to DOE Headquarters. The overall performance of the emergency response decision-makers demonstrated that they are adequately prepared to respond to emergency events when provided with correct information. However, although consequence assessment tools are in place, they were not accurately used, and properties of the hazardous materials involved were not clearly understood or communicated. Additionally, the EOC cadre did not reconcile significant differences between protective action distances in PAR cards and those developed by plume modeling prior to transmittal to response organizations. Communication weaknesses and the absence of a rigorous process for confirming event information also hindered responder performance. Finally, record keeping practices did not support the development of accurate historical records of event activities for use during the event or subsequent event reconstruction.

## E.4 Rating

A rating of NEEDS IMPROVEMENT is assigned to emergency response decision-making.

## 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 Federal line managers and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

- To further enhance command and control functions, consider the following actions:
  - Extend the conditions for the EOC becoming operational by also requiring a prerequisite direct briefing by the ERDO to the EOC cadre on event conditions and the response status.
  - Ensure that periodic training is provided in the areas of incident command protocols, accountability, personnel contamination control measures, hazard mitigation, and integrated ICS procedures and checklists. In particular, emphasize communication of the material-at-risk to first responders as a priority item.
  - Establish documented protocols for rescue of viable casualties to assure timely treatment.
- Consider building upon the existing ERO knowledge base of the ERG by documenting and providing training on the purpose and scope of OST's conservative decision methodology used in PAR card development. Include in the documentation information on the health effects of radiological and hazardous materials transported by OST, and provide it in a form that can be given to responders to maximize responder and public safety and efficiency in mitigation efforts.
- Enhance the consequence assessment output products. Specific actions to consider include:
  - Determine all needed consequence assessment tools and ensure that consequence assessment personnel have all needed tools readily available to conduct a continuous and ongoing consequence assessment during an emergency event.
  - Preload EPHA-specific source term data into the dispersion model programs to enable a timely initial assessment that uses current weather conditions while obtaining other event-specific data to support source term refinement.
  - Revise consequence assessment procedures and checklists to incorporate the use of field measurements instead of computer modeling outputs as the basis for recommending reduction of protective action distances.
  - Develop procedures or checklists that provide specific guidance (e.g., use of software tools, modeling assumptions) on the development of required output products.
  - Perform more frequent drills with consequence assessment personnel to ensure integration of activities (e.g., using modeling output data to determine where RAP or Civil Support Teams should be deployed, back-calculating the source term using field measurements) and improve their proficiency.
- When strengthening ERO communications protocols, consider the following actions:
  - Adopt the protocol of always reporting and recording wind direction as "from" a direction, versus "to" a direction.
  - Provide all known information on DOE fax notifications.
  - Utilize software for the EOC information management system that will provide a formal method to record, sequence, validate, and track the flow and chronology of emergency information.
  - Continuously project the applicable PAR card protective action recommendations on an EOC display board.

- Adopt a protocol for the consequence assessment personnel to provide a briefing to the EM that discusses all protective action recommendation information in use, including the PAR card (and its event type basis), all sections in the ERG stipulated by the shipment's manifest, and predicted dispersion plots.

# 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 Office of Secure Transportation (OST) will facilitate an effective response to an emergency. 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 OST line organizations in monitoring program effectiveness, implementing self-assessment programs, and ensuring that timely corrective actions are taken for identified weaknesses. OST line organizations also have direct responsibility for programmatic direction, management overview, performance accountability, and funding of landlord activities and infrastructure operations, including emergency management. This Independent Oversight inspection examined the OST emergency management self-assessment and issues management processes and the status of actions taken to address findings identified in the previous Independent Oversight inspection.

## F.2 Status and Results

### F.2.1 Feedback and Improvement

The February 2004 Independent Oversight inspection determined that OST had a comprehensive self-assessment program that included adequate provisions for planning, reporting, corrective action development, and verification of corrective action completion. Additionally, self-assessments were effective in identifying and correcting weaknesses. Issues management systems were adequate to capture, track, and ensure closure of all emergency management issues; however, weaknesses in implementation of the issues management systems existed. This 2007 inspection found that while OST has established effective self-assessment and issues management processes, weaknesses exist in the implementation of the processes by the Emergency Management Branch (EMB). Some corrective actions taken by OST in response to the 2004 Independent Oversight inspection report were not wholly effective. Additionally, exercise findings are not formally tracked and addressed in an issues management system.

OST has established an effective self-assessment program that contains all essential elements. The OST self-assessment procedure establishes the process for conducting annual comprehensive self-assessments and includes specific requirements for assessment criteria, review approach, and self-assessment report content. In addition, the data compilation form used by assessors to document self-assessments provides clear definitions for a finding versus an observation. Findings from the previous year's self-assessment are also included in the review to determine the effectiveness of completed corrective actions. EMB assesses the fifteen emergency management program elements over a three-year cycle, with five elements assessed annually at all OST facilities using criteria based on DOE Order 151.1C, *Comprehensive Emergency Management System*, and the associated guide.

However, performance of self-assessments by the EMB is sometimes inconsistent regarding whether an issue is a finding or an observation. For example, the 2005 self-assessment of the OST Aviation Program contained an assessment criterion that facilities must track, address, verify, and document closure of corrective actions in response to findings. The self-assessment found that the Aviation Operations Branch had no record of closing out past corrective actions from findings, as required in the Aviation Facility Emergency Plan. Although this example met the definition for a finding (requirement not being met), EMB recorded it as an observation (requirement met with minor deviations). Similarly, a 2006 self-assessment of the OST Agent Operations Western Command contained an assessment criterion to determine whether the hazards survey documents the generic emergency events, conditions, and potential hazards for each facility and operation. Although the report identified that the hazards survey did not meet this criterion, the issue was recorded as an observation rather than a finding. As a result, these observations did not require formal corrective actions, and the assessed facility personnel could use their discretion on whether to take any actions.

A comprehensive issues management process is in place for corrective actions resulting from OST self-assessments. Corrective actions are required for all findings identified during OST self-assessments, and changes to corrective actions and due dates are formally managed. Additionally, assessors review corrective action plans to ensure that corrective actions are adequate based on the root cause analysis, and are realistic and achievable. Finally, the OST program manager tracks the corrective actions to closure and the assessor validates the completion of the corrective actions. However, EMB does not maintain closure evidence files, and the validation statements included in the tracking database do not always explain the actions taken to validate completion of the corrective actions. The significance of this is evidenced by a 2006 self-assessment of the OST Agent Operations Western Command that identified a repeat finding from the previous year. Although EMB validated the completion of the corrective action associated with the finding, the 2006 self-assessment did not find any indication that the facility took any corrective actions.

OST completed corrective actions for the findings listed in the 2004 Independent Oversight inspection report, but the actions taken were not effective in resolving all of the underlying issues. As discussed in Appendix C of this report, weaknesses still exist in the analysis of hazardous materials, spectrum of events, and accident consequences in the OST emergency planning hazards assessment. Weaknesses also still exist in the OST training program for the emergency operations center (EOC) cadre, as discussed in Appendix D. As a result, some weaknesses identified in the 2004 Independent Oversight inspection report still exist despite OST completing corrective actions and verifying effectiveness. Additionally, numerous corrective actions were closed prematurely, and in some cases corrective actions are still not complete. For example, corrective actions to integrate EOC procedures and checklists into a change control system were closed in June 2004, but checklists were only placed under an informal change control system in December 2006. The inclusion of the EOC checklists into a formal change control system is still pending. In another case, EMB closed a corrective action to combine the EOC and OST Emergency Management Training Plans in July 2004, yet the combined training plan is still a draft document.

**Finding #7: OST has not ensured that prior corrective actions were effective in resolving the identified weaknesses and preventing recurrence of the same or similar weaknesses, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*, and DOE Order 414.1C, *Quality Assurance*.**

Although OST has established a comprehensive issues management process for findings resulting from self-assessments, they have not done so for findings resulting from exercises. The OST Emergency Management Plan requires that exercise findings be entered into the OST tracking system if they are not corrected within five days; however, EMB has not entered any exercise findings into the OST tracking system. EMB self-identified that the issues management process for exercises needs improvement and developed a spreadsheet in October 2005 to begin informally tracking findings, observations, and improvement items resulting from exercises. However, the spreadsheet does not include recommended actions for all findings, corrective action due dates, or the date of closure, and EMB does not validate the completion of recommended actions in all cases. Additionally, several recommended actions that were taken only corrected the performance of the current EOC cadre members and would not prevent future EOC cadre members from repeating the actions that led to the original finding. Although the draft OST EMB Drill and Exercise Program Plan does provide some additional requirements for corrective actions associated with exercise findings, the draft plan does not contain requirements addressing root cause analysis, change control of corrective actions, and closure of corrective actions. Consequently, though EMB has taken some actions, additional work remains to ensure that an adequate process is in place to correct weaknesses identified during exercises.

**Finding #8: OST has not implemented a corrective action process for weaknesses observed during exercises to ensure that identified weaknesses are corrected, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.**

## F.3 Conclusions

OST has established an effective self-assessment program that contains all essential elements. Assessments of the fifteen emergency management program elements are conducted over a three-year cycle using established criteria; however, in some cases EMB self-assessments erroneously identified observations that met the definition of a finding, and any actions taken were left to the discretion of the facility assessed. In addition, a comprehensive issues management process for self-assessment findings establishes appropriate requirements, such as change control and validation of completion of corrective actions. However, inconsistent application of this process has resulted in corrective actions being closed prematurely, ineffective validation of corrective actions, and some recurring weaknesses. Specifically, corrective actions taken in response to the 2004 Independent Oversight inspection report were not effective in resolving two of the findings, and in some cases OST closed corrective actions that were not yet complete. Additionally, although self-identified, EMB has not established an adequate issues management process for exercise findings.

## F.4 Rating

A rating of NEEDS IMPROVEMENT is assigned to the area of 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 Federal line managers and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

- Enhance the ability of the self-assessment program to identify weaknesses in the emergency management program. Specific actions to consider include:
  - Provide additional guidance and/or training to evaluators for discerning a finding from an observation.
  - Place emphasis on the use of approved and implemented programs or documents to determine compliance with self-assessment criteria.
  - Finalize and implement the Emergency Management Self Assessment Program Plan.
- To further improve the corrective action process for emergency management findings, consider implementing the following specific actions:
  - Consider using the corrective action process that is in place for self-assessments to address weaknesses identified during evaluated drills and exercises.
  - Improve the process for determining the root causes of identified findings and recurring problems by implementing 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.
  - Emphasize the timely completion of corrective actions.
  - Close corrective actions based only on programs or documents that are approved and implemented.
  - Create and maintain closure evidence files to document the basis for corrective action closures.

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