

Independent Oversight
Inspection of
Emergency Management
at the



Carlsbad Field Office and Waste Isolation Pilot Plant

December 2007



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

Table of Contents

1.0 INTRODUCTION	1
2.0 RESULTS	3
3.0 CONCLUSIONS	5
4.0 RATINGS	7
APPENDIX A – SUPPLEMENTAL INFORMATION	9
APPENDIX B – SITE-SPECIFIC FINDINGS.....	10
APPENDIX C – EMERGENCY PLANNING.....	12
APPENDIX D – EMERGENCY PREPAREDNESS	24
APPENDIX E – READINESS ASSURANCE.....	30

Abbreviations Used in This Report

CBFO	Carlsbad Field Office
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CH	Contact-Handled
DOE	U.S. Department of Energy
EM	Office of Environmental Management
EMG	Emergency Management Guide
EAL	Emergency Action Level
EOC	Emergency Operations Center
EPHA	Emergency Planning Hazards Assessment
EPZ	Emergency Planning Zone
ERO	Emergency Response Organization
ERT	Emergency Response Team
EST	Emergency Services Technician
FRAM	Functions, Responsibilities, and Authorities Manual
FSM	Facility Shift Manager
FY	Fiscal Year
JIC	Joint Information Center
NARAC	National Atmospheric Release Advisory Center
RH	Remote-Handled
SEOM	Security and Emergency Operations Manager
TEDE	Total Effective Dose Equivalent
TRU	Transuranic
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant
WTS	Washington TRU Solutions, LLC

OVERSIGHT

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight inspected the emergency management program at DOE's Waste Isolation Pilot Plant (WIPP) from July through September 2007. The inspection was performed by Independent Oversight's Office of Emergency Management Oversight. Independent Oversight reports to the Chief, Office of Health, Safety and Security, who reports directly to the Secretary of Energy.

Within DOE, the Office of Environmental Management (EM) has line management responsibility for WIPP. EM provides programmatic direction for and funding of most activities, including emergency management program implementation at WIPP. At the Headquarters level, the EM Office of Safeguards and Security, Emergency Management is responsible for conducting line management oversight of the emergency management programs at EM field sites. At the site level, line management responsibility for WIPP operations and emergency management falls under the Manager of the Carlsbad Field Office (CBFO). CBFO also coordinates the transuranic (TRU – radioactive elements having a greater atomic number than uranium) program at waste-generating sites and national laboratories; this responsibility includes managing the system for collecting, characterizing, and transporting TRU waste. Under contract to DOE, WIPP is managed and operated by Washington TRU Solutions, LLC (WTS). The site's protective force is managed and operated by Santa Fe Protective Services, Inc. under subcontract to WTS.

The mission of the WIPP site is to provide permanent, underground disposal of TRU and TRU-mixed wastes (wastes that also have hazardous chemical constituents). TRU waste, which is contaminated with small amounts of plutonium and other TRU elements, consists of clothing, tools, and debris left from the research and production of nuclear weapons. Over the next 35 years, WIPP is expected to receive approximately 175,000 cubic meters of TRU waste (850,000 55-gallon drum-equivalents) from various DOE sites. Since the commencement of contact-handled

(CH) waste operations in March 1999, WIPP has received over 6,000 shipments, each containing the equivalent of up to 42 55-gallon drums. WIPP recently began receiving shipments of remote-handled (RH) waste, which is defined as having a surface radiation dose rate at the exterior surface of its inner container (e.g., outer drum surface) at levels greater than 200 millirem per hour. To protect nearby individuals, RH waste is enclosed within heavily shielded casks during shipping and handling operations outside of the hot cell.

The WIPP site is located in southeastern New Mexico, approximately 30 miles southeast of Carlsbad, within a remote 16-square-mile tract. The area has a very low population density. Approximately 16 permanent residents live within a 10-mile radius of the site, with the nearest residents about 3.5 miles from the center of the site. WIPP project facilities include excavated rooms 2,150 feet underground in an ancient, stable salt formation, as well as various surface structures designed for transporter unloading and drum transfer to the underground rooms. WIPP activities, which include transport container unloading, drum movement, and facility maintenance, involve significant quantities of hazardous materials, almost exclusively solid radioactive materials and beryllium in various types of containers.

The purpose of this Independent Oversight inspection was to assess the effectiveness of the emergency management program at WIPP as implemented by WTS under the direction of CBFO. The scope of the emergency management review at WIPP considered the results of the August 2002 Independent Oversight inspection. That inspection concluded that, overall, CBFO and WTS had effectively addressed nearly all of the weaknesses identified during the May 2000 Independent Oversight emergency management review and had implemented a hazardous material emergency management program that, with few exceptions, met Departmental expectations. Five of the six programmatic elements reviewed, including the emergency planning hazards assessment (EPA), were rated "Effective

Performance.” The Independent Oversight team also identified several programmatic and implementation concerns, including initial response procedures that did not adequately define all of the necessary time-critical actions (this concern was the primary contributor to the “Needs Improvement” rating in the area of program plans and procedures), inconsistent rigor of procedure usage by initial decision-makers during limited-scope performance tests, and inadequate training program definition for certain key initial responders.

This evaluation included an examination of selected elements of the emergency management program at WIPP, including those that were determined to need improvement during the August 2002 Independent Oversight inspection. Although Independent Oversight typically uses limited-scope performance tests to evaluate the effectiveness of emergency responders, Independent Oversight agreed to defer these tests to a later date to permit site operations and management staff to focus on a special waste-retrieval operation that occurred during the inspection period. Instead, Independent Oversight evaluated the site’s ability

to plan and conduct emergency response drills and exercises and self-evaluate responder performance. These activities, as well as reviews of corrective actions in other assessment areas, provided insights into the effectiveness of the CBFO and contractor feedback and continuous improvement systems, as well as EM’s emergency management oversight and operational awareness activities at WIPP.

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

2.0 Results

2.1 Positive Program Attributes

CBFO and WTS have established an emergency management program that is appropriately tailored to the site and that effectively focuses on the protection of personnel in the vicinity of an emergency event. Positive attributes of the emergency management program are discussed below.

WTS has established an appropriate framework and well-defined implementing mechanisms for several important elements of the WIPP emergency management program. WTS has devised an effective system for tracking the types and quantities of hazardous materials on site, including incorporating a set of rigorous administrative controls that limit the amount of material that can be stored. WTS has developed a set of objectives and requirements that is intended to support a comprehensive program of training and drills for emergency response personnel. Training is developed, delivered, and evaluated in accordance with a training program procedure that requires a post-training proficiency evaluation, and the administration of the training program is supported by a computer database to monitor completion of training and to control assignment to emergency response positions. The WTS exercise program is well-defined through detailed requirements that are specified in the WIPP emergency management plan and the exercise-related implementing procedure. These requirements appropriately address the use of objectives to clearly define the scope of the exercise, responsibilities for package review and approval, and completion of a job hazards analysis for each exercise. Furthermore, all elements of the emergency management program are scheduled for validation over a five-year period. Finally, the WTS assessment and issues management procedures appropriately define the process for conducting an assessment, preparing and approving corrective action plans, and tracking and verifying correction of findings from assessments, drills, and exercises.

The WIPP concept of emergency operations is generally well-conceived, appropriately described, and, with some exceptions, adequately implemented through operating and emergency response procedures. The WIPP emergency management plan adequately describes the site's emergency response organization and approach to emergency response, although weaknesses were noted in the definition and control of minimum staffing levels for some field response teams. With the exception of some weaknesses in integrating the defined operations and security responses, comprehensive event-specific operating procedures address the initial actions necessary to protect workers at the scene or in the vicinity of an event. Subordinate emergency response procedures provide a generally effective basis for ensuring accomplishment of the emergency response activities required for larger events (including, for example, the need to classify the event and initiate follow-up protective actions and notifications). Furthermore, the operations plan, supporting procedures, and position checklists for the joint information center address in a comprehensive fashion the activation and staffing of the joint information center, preparation of news releases, conduct of news briefings, and coordination of information activities.

2.2 Program Weaknesses and Items Requiring Attention

The Independent Oversight team identified significant weaknesses in the rigor of the foundation of the WIPP emergency management program. Concerns in the implementation of several other program elements were noted as well. Specific weaknesses are discussed below.

The hazards survey and EPHAs do not form an adequate basis for the WIPP emergency management program. The hazards survey and the EPHAs for both CH and RH activities contain numerous weaknesses in the analytical assumptions and utilize inconsistent analytical approaches, and the calculated event consequences have not been accurately captured in emergency

response procedures. For example, although TRU waste received at the site contains beryllium in various quantities and forms, the hazards survey does not list beryllium and does not describe the basis for screening hazardous materials from further consideration in the EPHA. In some cases, the material-at-risk quantities analyzed in the EPHAs are less than the maximum quantities permitted by the site's administrative limits. This weakness is similar to the situation found during the 2000 Independent Oversight inspection, but that situation was effectively addressed shortly afterwards as a result of a corrective action that was verified to be in place during the 2002 Independent Oversight inspection (and subsequently removed). The aircraft crash scenario, which is intended to represent the upper bound for a catastrophic site event, inappropriately assumes that none of the material-at-risk burns, and in six of 21 instances, the CH EPHA calculations used to determine the emergency action level (EAL) thresholds were in error by a factor of 10,000. Furthermore, the computer program used in the EPHAs to predict the consequences of a hazardous material release is outdated; hand calculations must be used to develop consequence predictions, and if some basic accident assumptions or calculational approaches are changed, the analyst has to alter the program's operating system (which is beyond the capability of site personnel). Finally, there are no procedures to establish roles and responsibilities, approval authorities, or processes for developing and approving hazards survey and EPHA documents to ensure quality in these program-critical documents. The collective result of these deficiencies is that the foundation of the WIPP emergency management program is poorly defined.

Some aspects of the training, drill, and exercise program for emergency response organization personnel are not fully implemented. Although the emergency management plan requires annual training and drill or exercise participation for the crisis management team, neither the operations representative nor the emergency operations center coordinator, both members of that team, are required in practice to participate in an annual drill or exercise. Additionally, initial or annual refresher training is not required for support personnel filling such staff functions as consequence assessment and security. Emergency drills are not an integral part of the training program for emergency response functions, and proficiency is not being maintained. For example, several key field response teams, including the emergency response team and emergency services technicians, are not adequately participating in emergency drills; the site's ad hoc field

monitoring capability for supporting consequence assessment has not been demonstrated during a drill or exercise; and integrated emergency response drills that include operations, fire, and security response personnel are not being conducted. Most of the drills planned for fiscal year (FY) 2007 involving other than basic evacuation or accountability objectives have neither been conducted nor rescheduled. Furthermore, although an onsite fire brigade is required to maintain minimum firefighting and hazardous materials response capabilities during non-day shift hours, no integrated drill or exercise has ever been conducted that demonstrates the ability to meet this expectation.

Readiness assurance activities conducted by both CBFO and WTS have not consistently identified and adequately addressed program weaknesses or promoted program improvements. Although CBFO conducts a variety of informal oversight activities, CBFO did not conduct any formal assessments of the WTS emergency management program in either FY 2005 or FY 2007, and the two assessments conducted in FY 2006 addressed only a few elements of the WTS program and did not identify any program aspects in need of improvement. WTS uses program assessments to identify areas in need of attention, but corrective actions have not been documented appropriately or completed for most of the findings resulting from WTS emergency management assessments, drills, and exercises. For example, none of the 31 findings identified during the FY 2005 and FY 2006 assessments, drills, and exercises were appropriately entered into the formal issues management process, and 27 of these issues remain unresolved. Furthermore, the corrective actions implemented to address issues identified during previous Independent Oversight inspections did not resolve all aspects of the identified weaknesses. For example, methodology weaknesses in the EPHA, which were corrected after the May 2000 inspection and verified to have been effective during the August 2002 Independent Oversight inspection, have re-emerged as a significant weakness, and a corrective action in response to the August 2002 inspection to develop specific guidance on when "shelter-in-place" and "evacuation" protective actions are appropriate was closed by WTS (with CBFO concurrence) even though such guidance was never developed. The various weaknesses identified during this 2007 inspection collectively indicate that site managers have not placed sufficient priority on maintaining the WIPP emergency management program, and the readiness assurance activities have been largely ineffective in facilitating meaningful program improvements.

3.0 Conclusions

The August 2002 Independent Oversight inspection of the WIPP emergency management program concluded that CBFO and WTS had effectively addressed nearly all of the weaknesses identified during the May 2000 Independent Oversight assessment. The site had implemented a hazardous material emergency management program that, with few exceptions, provided a system that would protect responders, site workers, and the public in the event of an emergency at WIPP, although the inspection team identified several concerns regarding emergency procedure content and training program implementation. This 2007 inspection found that despite isolated areas of program improvement since 2002, WIPP's level of emergency preparedness has largely declined over a period marked by a dramatic increase in the pace of waste receipt and storage activities at the site. Of particular concern is the erosion in the rigor of the EPHAs, which serve as the program foundation, coupled with mixed progress in addressing previously-identified concerns in several other important programmatic areas.

WTS's ability to create institutionalized frameworks and implementing mechanisms for several emergency management program elements remains a positive element. WTS has devised effective mechanisms for controlling the types and quantities of hazardous materials on site, developed a set of requirements intended to support a comprehensive training and drill program for emergency responders, and defined the WTS exercise program through detailed requirements delineated in associated implementing guidance. WTS has established an appropriate set of assessment processes that are being used to identify some programmatic weaknesses, and the WTS process for preparing, approving, and tracking corrective actions is clearly defined. Furthermore, except for the areas of operations/security interfaces and requirements for field response team capabilities, the WIPP concept of emergency operations is well-conceived and adequately described. Implementing procedures comprehensively address the initial actions necessary to protect workers in the vicinity of an

event and provide generally complete guidance for performing the critical tasks associated with the site's response to a hazardous material release affecting larger portions of the site or beyond.

The most significant concern from this inspection results from numerous deficiencies in the processes used to determine which potentially hazardous materials should be analyzed for emergency planning purposes and in the assumptions and analytical methodologies that were used. Because of these deficiencies, the EPHAs do not provide an adequate planning basis for the WIPP emergency management program. The deficiencies include the absence of a rationale for disregarding beryllium, a known waste constituent, as a potential hazard; use of a generally non-conservative radioactive material source term in the various EPHA release scenarios (a condition originally found during the May 2000 Independent Oversight inspection, subsequently addressed, and again noted as deficient during this 2007 inspection); and substantial errors in some calculated EAL thresholds. Consequently, there is little confidence that the site has appropriately characterized the severity of postulated emergency events or provided decision-makers with the response procedures and tools best suited to address postulated, high-consequence accidents.

Weaknesses in the implementation of program requirements were noted as well. In practice, the EOC support staff, including such key individuals as consequence assessment and security personnel, and some members of the EOC crisis management team are not required to participate in an annual drill or exercise. Emergency drills are not an integral part of the program to train field responders and to maintain their proficiency. Additionally, CBFO and WTS activities intended to identify program weaknesses and promote continuous improvement are, in many cases, defined appropriately but implemented poorly. In the past three years, CBFO has not conducted a comprehensive assessment of the WIPP emergency management program, and WTS has not systematically applied its issues management system to develop and implement effective

corrective actions for self-identified issues or for all of the issues identified during previous Independent Oversight inspections.

Overall, it is likely that WIPP emergency response decision-makers can adequately protect responders and site workers near an event for the more likely onsite accidents. However, there is substantially less confidence that WIPP decision-makers and emergency responders have all the necessary tools, training, and proficiency to effectively respond to a lower-

probability event involving a significant hazardous material release. Immediate CBFO and WTS line management attention is warranted to ensure that the EPHAs provide an adequate basis for the site's emergency management program. CBFO and WTS line management attention is also needed to address program definition and implementation issues and to sustain the effectiveness of corrective actions and program improvements.

4.0 Ratings

This inspection focused on a detailed assessment of five emergency management programmatic elements. No overall program rating has been assigned. The individual element ratings reflect the status of each WIPP emergency management program element at the time of the inspection. The ratings assigned below to the readiness assurance category are specific to those assessment, corrective action, and performance monitoring mechanisms applicable to the emergency management area.

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

Emergency Planning

Hazards Survey and EPHAs..... SIGNIFICANT WEAKNESS
Program Plans and Procedures..... NEEDS IMPROVEMENT

Emergency Preparedness

Training, Drills, and Exercises..... NEEDS IMPROVEMENT

Readiness Assurance

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

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APPENDIX A

SUPPLEMENTAL INFORMATION

A.1 Dates of Review

Scoping Visit	July 17 – 18, 2007
Planning Visit	August 7 – 9, 2007
Onsite Inspection Visit	August 20 – 27, 2007
Report Validation and Closeout	September 24 – 25, 2007

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Chief, Office of Health, Safety and Security
Michael A. Kilpatrick, Deputy Chief for Operations, Office of Health, Safety and Security
Bradley A. Peterson, Director, Office of Independent Oversight
Steven C. Simonson, Director, Office of Emergency Management Oversight

A.2.2 Quality Review Board

Michael A. Kilpatrick
Bradley A. Peterson
Dean C. Hickman
William T. Sanders
Robert M. Nelson

A.2.3 Review Team

Steven Simonson (Team Leader)

John Bolling
Teri Lachman
David Odland
Tom Rogers

APPENDIX B

SITE-SPECIFIC FINDINGS

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

FINDING STATEMENTS	REFER TO PAGES:
1. The WTS hazards survey does not identify all hazardous materials that require further quantitative assessment in an EPHA and does not describe the screening process and results of its application, as required by DOE Order 151.1C, <i>Comprehensive Emergency Management System</i> .	13
2. WTS processes for tracking and controlling hazardous materials do not ensure that emergency planners are notified, review potential consequences, and appropriately modify applicable plans and procedures prior to making significant changes in the site hazardous material inventory, as required by DOE Order 151.1C.	13
3. The WTS EPHA and EAL calculations do not use accepted assessment techniques to identify potential consequences from hazardous material releases and develop classification and pre-determined protective actions, as required by DOE Order 151.1C.	15
4. WTS has not developed procedures to establish connectivity with the National Atmospheric Release Advisory Center (NARAC) dispersion modeling program or to obtain and utilize NARAC modeling support during an emergency, as required by DOE Order 151.1C.	15
5. WTS emergency response procedures do not support effective response to security-related emergencies or fully address sheltering, evacuation, and accountability during an emergency, as required by DOE Order 151.1C.	19
6. CBFO has not developed and implemented integrated response plans and procedures to support and monitor the WTS response and execute DOE emergency response actions during an emergency, as required by DOE Order 151.1C.	19
7. The WTS training, drill, and qualification program does not provide initial and annual refresher training or require initial and annual demonstration of proficiency for all personnel comprising the emergency response organization, as required by DOE Order 151.1C and the WIPP emergency management plan.	25
8. Emergency response organization positions with core field response functions do not have minimum staffing requirements established to ensure that trained and qualified personnel are available for timely and effective response, as required by DOE Order 151.1C.	26
9. The WTS exercise program does not validate all required response capabilities over a five-year period and ensure that ERO elements and resources participate in a minimum of one exercise annually, as required by DOE Order 151.1C and the WIPP emergency management plan.	27
10. CBFO has not ensured that the WTS EPHAs serve as an adequate planning basis for the WIPP emergency management program, as required by DOE Order 151.1C.	31
11. The CBFO training and qualification program does not ensure that ERO members have completed all training requirements and are capable and proficient in fulfilling their assigned response functions before assignment to the ERO roster, as required by DOE Order 151.1C.	31

12. CBFO does not conduct formal, documented assessments of the WTS emergency management program every three years or self-assessments of the CBFO emergency management program annually, as required by DOE Order 151.1C.	32
13. WTS has not consistently developed and implemented effective corrective actions in response to identified emergency management program weaknesses resulting from assessments, drills, and exercises, as required by DOE Order 151.1C.	34

APPENDIX C

EMERGENCY PLANNING

C.1 Introduction

Two key elements of emergency planning are developing a hazards survey and emergency planning hazards assessments (EPHAs) to identify and assess the impact of site- and facility-specific hazards and threats, and establishing an emergency planning zone (EPZ). U.S. Department of Energy (DOE) sites and facilities use the results of these assessments to establish emergency management programs that are commensurate with the identified hazards. The site emergency plan defines and conveys the management philosophy, organizational structure, administrative controls, decision-making authorities, and resources necessary to maintain the site's comprehensive emergency management program. Specific implementing procedures are then developed that conform to the plan and provide the necessary detail, including decision-making thresholds, for effectively executing the response to an emergency, irrespective of its magnitude. These plans and procedures must be closely coordinated and integrated with offsite authorities that support the response effort and receive DOE emergency response recommendations.

This evaluation included a review of the Waste Isolation Pilot Plant (WIPP) hazards survey and EPHAs and their treatment of hazards associated with the WIPP site. Also reviewed were sitewide and facility-specific emergency plans and associated implementing procedures.

C.2 Status and Results

C.2.1 Hazards Survey and Emergency Planning Hazards Assessments

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

considered; and the rigor and accuracy of the analyses contained within the EPHAs. Operations at WIPP are generally separated into contact-handled (CH) and remote-handled (RH) activities, depending on their level of radioactivity. Due to the robustness of the shipping casks, the potential for a release to the environment is limited to within the waste handling building (WHB), the waste handling shaft into the underground, and the underground passages en route to the final storage location, which is designed for 10,000 years of safe storage.

The August 2002 inspection determined that Washington TRU Solutions, LLC, (WTS) had significantly improved the thoroughness of the hazards survey and EPHA documents since the May 2000 Independent Oversight review. Site hazards were effectively characterized, material-at-risk quantities were correctly quantified, and the spectrum of potential accidents and the consequences of potential releases was appropriately analyzed. A few EPHA weaknesses were noted at that time, including several instances where the documentation of assumptions within the EPHA was incomplete. However, these weaknesses did not significantly detract from the overall effectiveness of the EPHAs. This 2007 inspection found that the hazards survey and EPHA documents have not been maintained, previously-effective administrative inventory controls in place in 2002 have been removed, and the program has not kept pace with advances in available dispersion modeling capabilities and DOE Order requirements.

WTS has established three separate methods for tracking the types and quantities of hazardous materials present on site: the WIPP industrial hygiene program, waste characterization and tracking activities, and an emergency planning hazards survey. Administrators of the WIPP industrial hygiene program effectively identify, control, and track purchased hazardous materials (as well as hazardous materials from waste streams) through warehouse receipt inspections and documented quarterly walkdowns of surface buildings and storage lockers in accordance with a program procedure. Although this program does not include a mechanism to notify emergency planners of significant changes in hazardous material inventory, no significant quantities of hazardous materials are purchased for use

at WIPP. Shippers perform waste characterization of transuranic waste shipments and enter this data into the WIPP Waste Information System electronic database, which is widely accessible at WIPP. This database will not accept entries for containers whose contents are above allowable radioactivity and beryllium limits, so containers exceeding these limits cannot be shipped to the site. WTS has also established rigorous administrative controls that limit the amount of radioactive material that can be stored in the WHB and transported to their permanent storage location. These controls are in the form of technical safety requirements and are implemented through design features, storage arrays, and two-party verifications, as specified in detailed and closely-followed procedures.

The WIPP hazards survey was recently completed and approved under DOE Order 151.1C requirements. WTS has not developed a procedure that governs the development of the hazards survey; consequently, the hazards survey document was developed using DOE's supplemental emergency management guide (EMG) and the best judgment of responsible individuals. The hazards survey provides information on most of the topics required by DOE Order 151.1C and discussed in the EMG. For example, the survey identifies generic emergency conditions and their impacts at site buildings and underground, cites applicable governing requirements, and states the need for a quantitative assessment for CH and RH operations. Nevertheless, the hazards survey lacks details, and the description of the screening process is ambiguous. Specifically, there is no explanation of why the CH and RH operations require a further assessment, why identified calcium hypochlorite (National Fire Protection Association health rating 3) does not require further consideration, and most importantly, why beryllium (National Fire Protection Association health rating 3) is not identified as a hazardous material. The exclusion of beryllium is significant because some container types are allowed to contain as much as 100 kilograms of materials that can be in the form of easily-dispersible fines. Additionally, the hazards survey inexplicably refers to the far different screening criteria found in both DOE Order 151.1B and DOE Order 151.1C. There are no records that document how the hazards survey was developed or who performed the activities. Site nuclear safety personnel indicated that they conduct hazards survey walkdowns solely to evaluate the type and quantity of materials in the storage areas; allowable inventories are not considered, and administrative limits have not been established to ensure the accuracy of the hazards survey.

Finding #1: The WTS hazards survey does not identify all hazardous materials that require further quantitative assessment in an EPHA and does not describe the screening process and results of its application, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.

Furthermore, WTS has not established mechanisms that would alert emergency planners to new or increased inventories of hazardous chemicals that are above those considered during hazards survey walkdowns. As a result of these weaknesses, the hazards survey does not provide the appropriate level of completeness and rigor needed to identify all hazardous materials and record the basis of their exclusion, where appropriate, from further quantitative assessment in the EPHAs.

Finding #2: WTS processes for tracking and controlling hazardous materials do not ensure that emergency planners are notified, review potential consequences, and appropriately modify applicable plans and procedures prior to making significant changes in the site hazardous material inventory, as required by DOE Order 151.1C.

WTS evaluated the RH and CH operations in separate EPHAs, both of which address the topical areas discussed in the EMG, analyze consequences over a wide spectrum of event initiators, include a barrier analysis, and address the development of the EPZ and emergency action levels (EALs). However, the methodologies used in the supporting calculations, which are not contained within the EPHAs but instead reside electronically on a site server (to facilitate sitewide accessibility), differ from those stipulated in the EMG, differ from those used to develop the EALs (as explained in the EAL discussion below), and do not represent worst-case conditions. As a result, the calculations identify only one classifiable emergency for CH operations (aircraft crash) and three classifiable emergencies for RH operations (aircraft crash, malevolent act, and earthquake), even though far more classifiable emergencies are listed in the EAL tables. The EPHA's departure from worst-case considerations, due primarily to non-conservative source terms and the use of average (instead of severe) meteorology, reflects the fact that WTS used an approach more aligned to the development of a design basis document, founded on

typical conditions, rather than a worst-case approach that is appropriate for emergency planning. The EPHA methodology and consequence assessment calculations were further used for EPZ development, which generally follows the principles discussed in the EMG. For example, the correct protective action guide of 100 rem was used to establish the minimum EPZ size, and the EPHA results were considered for determining the maximum size of the EPZ. Nevertheless, the technical basis of the EPZ is not well founded because it is based on a problematic EPHA methodology, as illustrated by the following deviations from accepted EPHA analytical assumptions and techniques:

- The analyzed events do not reflect worst case scenarios: material-at-risk quantities are sometimes less than the maximum allowable quantities in drums (and are inconsistent with allowable drum storage configurations); the postulated releases usually reflect mitigated (i.e., filtered) releases; and worst-case weather conditions are not considered.
- The airplane crash scenario unrealistically assumes that none of the material-at-risk burns; burning of the material-at-risk is a likely outcome, given that aircraft fuel and breached drums would probably be involved.
- The releases resulting from different size fires are not modeled to reflect lofting of hazardous materials and plume dispersions.
- Committed effective dose equivalent (CEDE), rather than the higher total effective dose equivalent (TEDE), is used in the plume dispersion analyses, and the EPHAs do not justify CEDE use.

Furthermore, a number of other computational, descriptive, and record-keeping weaknesses in the EPHA documents and supporting calculations detract from their overall quality. Specific examples include:

- The CH EPHA contains unexplained differences in damage ratios used in calculating source terms for similar events (e.g., waste containers exposed to external explosions in the WHB vs. in the underground). Similarly, for the earthquake

scenarios, the RH EPHA assumes that confinement is breached, whereas the CH EPHA assumes confinement remains intact.

- The CH EPHA incorrectly states that the WHB is limited to 10 pallets of material, whereas the operational controls allow 18 pallets.
- The CH EPHA discussion of fires indicates that 25 rem is used as the protective action criterion, but the calculation actually uses 5 rem.
- The explanations for the supporting calculations are insufficient or incomplete, and there are no records that identify the EPHA author or who performed and verified the supporting calculations.

Calculations to determine the event classification thresholds for EAL development were performed separately from the calculations used for the EPHA event consequence determination, but were still developed using inappropriate methodologies. Although the EALs were developed as unmitigated releases, which alone would make them more conservative, they also were derived using the same inappropriate average weather conditions used in the EPHA plume dispersion calculations. Furthermore, contrary to DOE expectations, the calculations did not use the maximum *allowable* material-at-risk to determine the distance where protective action criteria are exceeded for use in identifying the areas under which pre-determined protective actions would be necessary. Instead, back calculations were performed to determine the material-at-risk quantities whose release would exceed protective action criteria at receptors of interest, irrespective of whether that amount of material could actually be present. This yielded a total of 31 EALs, which is significantly higher than the four classifiable events identified under the assumptions and computational methodologies used for the WIPP EPHAs. Five of the EALs include material-at-risk thresholds that are greater than the rigorously-applied administrative limits, and thus are unnecessary. Finally, six threshold values were incorrectly transferred from the EAL calculation spreadsheet to the CH EPHA and the EAL implementation procedure, with the result that the six affected EALs were in error by a factor of 10,000, some overly conservative and some non-conservative.

Finding #3: The WTSEPHA and EAL calculations do not use accepted assessment techniques to identify potential consequences from hazardous material releases and develop classification and pre-determined protective actions, as required by DOE Order 151.1C.

A significant contributor to the weaknesses found in the hazards survey and EPHA documents is the absence of a procedure that governs the development of these documents. Consequently, there are no established roles and responsibilities or approval authorities for document development, no quality review processes in place, and no activities identified that must be documented. In the absence of these expectations, the development of these documents is left to the judgment of the author. Additionally, specific corrective actions intended to address weaknesses observed by Independent Oversight during the 2000 and 2002 inspections were not implemented through adequate programmatic controls and have since been relaxed. For example, the administrative limits for material-at-risk quantities observed during the 2002 inspection have been lifted, a mechanism no longer exists to ensure that emergency planners are notified of hazardous material purchases, analytical errors found in 2000 (but not during 2002) were observed again during this inspection, and the protective action statements still do not establish whether to evacuate or shelter-in-place and do not state how far from a release point the protective actions apply.

Another contributor to observed weaknesses specific to the analytical results is the absence of a more sophisticated dispersion modeling program. Although the model that is used employs a standard Gaussian model for dispersion, this program is used to calculate atmospheric dispersion coefficients for a plume centerline at specified receptor points for use in calculating a source term. From this, estimated exposure is calculated by hand or by using a spreadsheet formula whose output is in terms of CEDE. Other modeling weaknesses include:

- Personnel from the emergency response consequence assessment team demonstrated that the modeling program, which is used in obtaining consequence predictions, is not easily manipulated to accept input data that reflects postulated event conditions, such as buoyancy effects from fires, and hand calculations are needed to arrive at a prediction.

- The modeling program does not provide plume plot and deposition footprints as output products for use in planning field monitoring activities.
- The modeling program does not provide a choice of analysis in terms of TEDE or CEDE, as other available models do.

Furthermore, WTS cannot connect to the National Atmospheric Release Advisory Center (NARAC) dispersion modeling program, even though the consequence assessment procedure notes that NARAC may be called for assistance during an emergency. Further, there are no implementing procedures to direct actions for NARAC modeling or coordinate NARAC support; that is, to identify the necessary input data or to govern the receipt and interpretation of output data. In addition, WTS has not ensured that site meteorological data and information on source terms would be available in a timely manner to facilitate near real-time computations. Finally, as noted in Section D.2.1, drills have not been conducted to familiarize responders with NARAC's capabilities and the processes necessary to use NARAC modeling support.

Finding #4: WTS has not developed procedures to establish connectivity with the National Atmospheric Release Advisory Center (NARAC) dispersion modeling program or to obtain and utilize NARAC modeling support during an emergency, as required by DOE Order 151.1C.

To summarize, WTS has effective mechanisms in place to identify and track hazardous materials in shipments and from purchases and waste streams. A hazards survey and EPHAs have been developed that contain most of the relevant information prescribed by the EMG, and additional analyses and calculations support EAL development. However, a number of identified weaknesses, including some previously observed by Independent Oversight, significantly detract from the accuracy and effectiveness of the hazards survey, EPHAs, and EALs. Emergency planners are not integrated into the hazardous material tracking and control processes, and consequently, no mechanism has been implemented to ensure that EPHAs are updated to reflect changes in the quantities of hazardous materials present on site. Although beryllium may be present in potentially significant quantities, it was not included in the hazards survey or the EPHAs. The EPHAs did not incorporate

conservative administrative control limits to establish material at risk for the hazards analyses, and the analytical methodologies did not analyze conservative, worst-case conditions regarding material-at-risk quantities, dispersion effects from fires, worst-case weather conditions, and loss of the confinement barrier for most of the analyzed scenarios. Furthermore, important calculations, such as the maximum distance where protective action criteria are exceeded, were not performed for use in developing EALs and the EPZ. Unexplained computational inconsistencies and descriptive errors in the hazards survey and/or the EPHAs, along with some missing information, also detract from the overall quality of these documents. Although the separate EAL calculations were based on some conservative assumptions, they resulted in a number of unnecessary EALs because they were not based on allowable radioactive inventories. The absence of a procedure for developing the hazards survey and EPHAs and using more advanced NARAC dispersion modeling capabilities contributes to the observed weaknesses. To some extent, the weaknesses in the EPHA are mitigated by the absence of large quantities of readily-dispersible hazardous materials (except in severe events), the use of robust shipping containers, the presence of secondary confinement barriers and protective systems, and the extremely low nearby population densities. Nonetheless, as a result of the collective weaknesses in the hazards survey and EPHAs, WIPP does not have a sound technical basis for its emergency management program.

C.2.2 Program Plans and Procedures

During the August 2002 inspection, the Independent Oversight team found that WTS had established emergency plans and implementing procedures that adequately addressed most response functions for well-trained and experienced decision-makers. However, as demonstrated during the performance tests, the emergency plan, its associated implementing procedures, and their supporting mechanisms were not sufficiently detailed or developed to ensure that key decision-makers could effectively implement event-specific protective actions and notify offsite agencies, irrespective of the time of a postulated event. This 2007 inspection found that plans and procedures continue to provide mostly effective instructions governing the protection of workers at the event scene. In addition, improvements have been made to the procedures and processes governing categorization, classification, and notifications. Nevertheless, weaknesses were noted in

the plans, procedures, and processes for responding to emergency events, and some previously-identified weaknesses in the plans and implementing procedures remain.

Overall planning for a response to an emergency at WIPP is described in an emergency management plan and a joint information center (JIC) operations plan. The WIPP emergency plan adequately explains the site's emergency response organization and the site's approach to emergency response, including designation of the facility shift manager (FSM) as the incident commander, a supporting crisis management team, and subordinate response teams. The plan properly addresses important emergency response functions, as well as the administrative elements of the emergency management program. The emergency plan is supplemented by the Resource Conservation and Recovery Act Contingency Plan, which provides additional detail regarding emergency response. In addition to the emergency plan, WTS has developed a comprehensive JIC operations plan that appropriately addresses the elements of a JIC and public information program, as described in the DOE order and the EMG. The JIC operations plan, for example, covers such activities as JIC activation and staffing, preparation of news releases, press briefings, and coordination of information release activities.

Although the WIPP emergency plan provides an adequate description of the site's emergency response, some weaknesses in the plan may contribute to inconsistencies in the response to site emergencies. Specific responsibilities for some support teams—such as the fire brigade, mine rescue team, and emergency response team—and the command and control relationship between the FSM (as the designated “incident commander”) and most “on-scene incident commanders” are not addressed in sufficient detail to ensure clear understanding and consistent implementation in other site plans and procedures. For example, although the emergency plan indicates that the “security manager will direct further security action (following immediate actions) at the direction of the FSM,” the security plans provide that the security shift captain is responsible for the response to security events.

The JIC operations plan is supported by an operating procedure that contains detailed checklists to guide the actions of the JIC staff, including the DOE spokesperson, JIC manager, media and public information managers, and the JIC writer. The JIC writer is further assisted by prepared templates that ease timely development of the initial and follow-up

news releases. Although the plan and supporting procedure are generally well conceived, some weaknesses and inconsistencies were noted. For example, planning for coordination with the Federal Bureau of Investigation for public relations activities during a security event is not addressed. Additionally, the JIC plan and procedure do not indicate which, if any, officials or agencies are expected to participate in the JIC (such as county, Bureau of Land Management, or Federal Bureau of Investigation officials). Finally, although news release templates are available for the initial and one-hour news releases, the JIC plan differs from DOE guidance in setting targets of 25 minutes and one hour “following JIC activation,” respectively, for issuing these news releases.

The WTS emergency plan is supported by event-specific operating procedures and emergency response procedures. The event-specific operating procedures provide detailed instructions for the initial response to such emergency events as hazardous material spills, radiological releases, fires, and earthquakes, and transition steps to the emergency response procedures. For example, an operating procedure addresses the initial actions necessary to evacuate workers and isolate the scene following a drum puncture, and subsequent actions lead to an evaluation of the potential for an event with larger scope. Although the event-specific procedures adequately address the anticipated events, some weaknesses and inconsistencies between the procedures and the emergency plan may impede an effective response. For example:

- Several procedures indicate that categorization and classification (a subsequent action) may be done by the crisis manager. However, this approach conflicts with the designation of the FSM as the incident commander and could result in untimely initial categorization, classification, and protective actions.
- In procedures for underground events, the underground facility engineer is tasked with some actions typical of an on-scene incident commander (such as evaluating the fire), but the plan and procedures do not fully describe command functions or roles and responsibilities for these events.
- Medical emergency procedures do not address mass casualty situations or the process for determining whether and how to administer chelation therapy, and the procedures leave the decision to request

mutual aid to the FSM, rather than to medically trained personnel.

In addition, accountability, an important function that supports both event-specific and emergency response procedures, is not formalized in plans and procedures. WTS has developed and implemented a process to perform accountability for personnel in most surface buildings during dayshift hours using an organization of office wardens, who operate based on training and informal documentation. Accountability for underground personnel is proceduralized and is achieved using a brass tag and sign-in/sign-out system that provides positive accountability. Nevertheless, a number of weaknesses in the process for performing accountability were identified. For example:

- Roles, responsibilities, and the need to achieve accountability for localized events resulting in evacuation of the WHB are not clearly established in procedures and processes (i.e., no one is specifically assigned to ensure accountability for personnel following building exit or to report accountability status to the incident commander for follow-up).
- The office warden process is not formally documented. As a result, building evacuation routes are not always published or are published in uncontrolled drawings; several potentially occupied buildings do not have an assigned office warden; some office warden positions are currently unfilled; and accountability for potentially contaminated personnel is not addressed.
- Although WTS personnel indicated that underground personnel are to report to their building office wardens following arrival at the surface, the uncontrolled evacuation plan drawing indicates that underground personnel would report to a separate staging area (for evacuation).
- Accountability for surface buildings during backshifts is assigned to security personnel, but there are no security procedures for this activity, and security personnel have a number of other potentially conflicting responsibilities during an emergency.

The site has a number of operating and security procedures and checklists that provide generally appropriate instructions to assist in responding

to security-related emergency events; however, weaknesses and inconsistencies were identified in the integration of the event-specific security emergency procedure and the protective force procedures, and in the completeness of events addressed by these procedures. These weaknesses include:

- The security emergency event and protective force procedures do not fully address the types of anticipated security events (e.g., suspicious packages in the proximity of hazardous material or an act of sabotage) and the coordinated response that would be necessary to respond to the security situation and protect the site and its workers.
- Security procedures indicate the security captain is the “incident commander,” although the emergency plan indicates the FSM is the “incident commander” for site events.
- Although the emergency procedure for responding to a security event indicates that the FSM will support the security shift supervisor, the procedure does not identify specific responsibilities and command and control interfaces.
- Protective action decision-making and the direction to take protective actions (such as take cover/shelter, evacuate, or remain in place) are split between the security captain and the FSM without clear delineation of overall responsibility and coordination.

To address the response to emergency events with the potential for effects beyond the local event scene, WTS has prepared a set of emergency response procedures. These procedures supplement the event-specific procedures and address such emergency response actions as event classification, activation of the emergency operations center (EOC), protective actions, and consequence assessment. These actions are described in two, nearly-identical supplemental emergency response procedures, one for CH waste and one for RH waste, that contain a number of positive attributes. For example, the procedure emphasizes timely event categorization, and determination of an Operational Emergency results in early activation of the EOC and JIC, performance of notifications, implementation of pre-determined protective actions, and event classification. Classification is performed using an attached table of EALs that presents event

descriptions, release indications, and classification thresholds. The EAL table includes a listing of pre-planned protective actions for both surface and underground events.

Although these procedures provide a generally adequate basis for an emergency response, a number of weaknesses and inconsistencies detract from their completeness and likely effectiveness during a high-consequence emergency event. Specifically:

- The EALs use general descriptions of release indicators (such as loss of filtration or differential pressure) rather than specific indicator alarms or numerical display values, which may contribute to confusion and errors during an event.
- The protective action tables include a number of actions that are redundant to actions contained in the event-specific operations procedures, which may lead to confusion as to whether or not additional actions are expected.
- The discretionary EAL contains numerous errors in applying the generic definitions from DOE Order 151.1C for determining the event classification.

Shelter-in-place and evacuation are addressed in the event categorization and classification procedures and in a specific supporting emergency response procedure, which appropriately advise the incident commander to shelter-in-place or evacuate personnel for classified emergencies. However, the procedures do not provide specific guidance to determine whether to shelter-in-place or evacuate, identify the area and distance to which the action applies, or address the special considerations necessary with personnel in the mine (such as when a surface plume is heading toward the mine air intake or when evacuation may bring the underground personnel into the plume). Other observed weaknesses include:

- The emergency response procedure indicates that the FSM determines the areas to shelter-in-place based on hazards and weather conditions, but provides no further guidance, such as considering the expected duration of the release against the expected time the shelters would provide effective protection.

- The EPHA provides a discussion of shelter-in-place as the most viable protective action, but this guidance is not included in the response procedures.
- The action steps for shelter-in-place do not address the operation of the ventilation systems to enhance the protective action, and the procedure does not provide the FSM with guidance in determining whether personnel accountability is required.
- The procedures do not provide instructions for the implementation of protective actions by some personnel who may be essential to an emergency response, such as security personnel and mine operators, and do not prompt the FSMs to provide safe routes of ingress and egress for personnel responding to the event or personnel evacuating or relocating on the site.

These concerns were validated during scenario-based interviews of FSMs, in which actions for shelter-in-place, evacuation, and safe routes of travel were applied incompletely and inconsistently.

Finding #5: WTS emergency response procedures do not support effective response to security-related emergencies or fully address sheltering, evacuation, and accountability during an emergency, as required by DOE Order 151.1C.

DOE responsibilities for response actions are delineated in the WTS emergency plan and in a checklist that provides guidance for the DOE management representative's actions in the EOC, including performing such important notifications as contacting the DOE Headquarters Watch Office and cognizant managers, verifying that notifications have been made by WTS, and reviewing press releases. However, a number of significant weaknesses exist in the plan. The emergency plan indicates that the DOE "may" provide a management representative to the EOC during an emergency and the EOC may be declared operational without the DOE representative being present, but the plan does not discuss how the response oversight role of the Carlsbad Field Office (CBFO) is expected to be performed if the CBFO representative is not present in the EOC. Furthermore, neither the checklist nor other DOE procedures address roles, responsibilities, and authorities for oversight and

direction of the contractor's critical emergency response decisions, including event classification and protective actions. Additionally, other plans and implementing procedures do not exist for such important DOE field office responsibilities as coordinating actions with local, state, and Federal agencies, and designating On-Scene Coordinators, Senior Federal Officials, and/or Senior Energy Officials under the national emergency response plans.

Finding #6: CBFO has not developed and implemented integrated response plans and procedures to support and monitor WTS response and execute DOE emergency response actions during an emergency, as required by DOE Order 151.1C.

To summarize, WTS has established emergency management plans that adequately describe the site's emergency response organization and overall response to events at the site. In addition, WTS has developed a comprehensive JIC operations plan and detailed supporting checklists for the JIC positions. The emergency plan is supported by event-specific and emergency response procedures. These procedures provide adequate instructions for categorization, classification, and protective actions to protect the workers at the event scene and to implement follow-on actions to protect both site workers and the public. Following the 2002 Independent Oversight inspection, WTS implemented improvements to the site's ability to make timely notifications, although other identified weakness have not been corrected. The WTS emergency plan and implementing procedures provide a basis for a generally effective response to emergencies, but some actions for key functions, such as response to security events, shelter-in-place, evacuation, and accountability, are not addressed in sufficient detail to ensure their effectiveness (as confirmed during scenario-based interviews of FSMs). In some cases, these weaknesses are representative of concerns identified in previous Independent Oversight inspections that have not been adequately addressed. Further, CBFO has not established plans and procedures to ensure adequate oversight and direction of the WTS emergency response or implementation of field office response actions. Overall, the site's plans, procedures, and processes support an adequate response to most emergency events, particularly those actions required near the event scene. However, the integration of security and operations-related plans and procedures

and the specificity of procedures used to protect site workers away from the immediate event are important concerns that warrant attention.

C.3 Ratings

A rating of SIGNIFICANT WEAKNESS is assigned to the area of hazards survey and EPHAs.

A rating of NEEDS IMPROVEMENT is assigned to the area of program plans and procedures.

C.4 Opportunities for Improvement

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

Carlsbad Field Office

- To enhance DOE's emergency response, consider the following actions:
 - Develop a plan and supporting procedures or checklists that specifically describe the CBFO roles and responsibilities for oversight, support, and response during an event. These documents should specify actions to be taken to support WTS, as well as those to be taken if CBFO does not agree with the WTS response. The documents should also specify the limits of authority of the senior CBFO responder and clearly indicate how CBFO's responsibilities for monitoring the contractor's emergency response are executed if CBFO personnel are not present in the EOC.
 - Clarify DOE's roles and responsibilities for providing protective action recommendations to state and local government officials.
 - Specify DOE's roles and responsibilities for events that involve other governmental entities (such as the Federal Bureau of Investigation and Bureau of Land Management); include the

On-Scene Coordinator, Senior Federal Official, and/or Senior Energy Official functions.

- Develop a procedure and/or additional checklists to implement the plan, specify actions for DOE emergency management team members, and serve as a basis for their training.
- Establish an agreement with the Federal Bureau of Investigation governing JIC operation for those events in which the Bureau will be the Lead Federal Agency.

Washington TRU Solutions, LLC

- To strengthen the EPHA's role in establishing a comprehensive, institutionalized technical planning basis for the emergency management program, consider formalizing the hazards survey and EPHA development process by describing the process in a procedure. Some important actions to consider for procedure development include:
 - Specify roles and responsibilities for authors, reviewers, approval authorities, emergency planners, and facility/operations managers for initial document development and its maintenance.
 - Define a clear set of screening criteria and require a record of disposition for the hazardous materials screened as described in the EMG.
 - Define a set of databases, design-basis documents, and other data sources that are to be reviewed to help establish the type and quantity of hazardous materials on site.
 - Require facility walkdowns by authors with facility managers to identify hazardous materials and their forms, inventory control mechanisms, allowable storage configurations, and allowable operations that will serve as bounding assumptions for a quantitative analysis.
 - Incorporate a systematic approach and use the methodologies recommended by the EMG, including use of worst-case (but allowable) material-at-risk quantities, worst-case and average weather conditions, filtered/

confined and unfiltered/unconfined releases, recommended protective action criteria, estimated exposures that represents the TEDE, and calculations that determine distances at which protective action criteria are exceeded. Where applicable, document the justification for any deviations from EMG methodology and assumptions.

- Require records of personnel performing document development activities, including supporting calculations that are not contained within the EPHAs.
- When establishing mechanisms to identify significant changes to hazardous material inventories, consider the following:
 - Establish a list of allowable hazardous materials and quantities at facilities in which they are stored and used. In doing so, consider historical inventories recorded in available databases. Base allowable quantities on thresholds that would support operations and are bounded by the assumptions in the existing hazards survey and EPHAs. Incorporate the list into the quarterly walkdown of chemical inventories so that implementers will recognize and alert emergency planners of conditions inconsistent with the listed information.
 - Establish a mechanism to identify significant changes to hazardous material inventories in the purchasing process so that emergency planners are notified in advance of the need to consider the impact on potential release consequences.
 - Make use of existing administrative controls and activities established within technical safety requirements, the WIPP industrial hygiene program, and the WIPP Waste Information System to keep the EPHAs current with operations.
- Strengthen the technical bases for the EPZ by incorporating EMG recommendations into the process. Specific items to consider include:
 - Calculate maximum distances to where thresholds to early lethality and the protective

action criteria are exceeded using conservative quantitative methodologies. Use the former as the smallest EPZ radius, and consider the latter as part of the analysis of the largest EPZ radius.

- Use worst-case weather conditions and the most severe quantitative analysis results, and utilize the referenced event exclusions when developing the size of the EPZ.
- Document justifications for reducing the maximum EPZ radius when it is less than that derived from the quantitative analysis.
- When strengthening the technical bases and the effectiveness of EALs, consider incorporating the following EMG recommendations into their development.
 - Use conservative assumptions and results from quantitative assessments as the basis for the EAL thresholds.
 - Link event classifications to predetermined protective actions that utilize calculated maximum distances (based on conservative assumptions) to where protective action criteria are exceeded.
- Consider enhancing the WIPP consequence assessment capability and minimize the vulnerability to errors by obtaining more sophisticated plume dispersion modeling programs. Specific selection criteria should include:
 - Programs already used by consequence assessment team members through performance of their radiological assistance program function
 - Programs that will provide estimated exposures in terms of TEDE and will provide graphic representation of plume plots and ground deposition levels
 - Programs that easily model dispersions from explosions and the lofting effects of fires
 - Programs that can be pre-loaded with material-at-risk quantities that represent plausible storage configurations.

- Enhance the ability to provide public information in a coordinated fashion. Specific actions to consider include:
 - Identify local and state government officials and agency representatives who will participate in the JIC, and allocate space and equipment for their use.
 - Prepare plans, procedures, and processes to integrate outside officials into JIC activities, such as news releases and press conferences.
- Consider revising the JIC operations plan to be consistent with DOE guidance related to the timeliness of the initial news release.
- To improve the emergency management plan, consider the following actions:
 - Review and revise the roles and responsibilities of key emergency response decision-makers (such as on-scene incident commanders) and their command and control relationships, and revise the emergency plan to address these subjects in more detail.
 - Evaluate staffing and critical tasks, particularly during off-normal shifts, to ensure that adequate support is available to complete assigned tasks in a timely manner.
 - Revise the emergency plan to address the differences in the response to events that occur during off-normal shift operations and day shift.
 - Include plans for medical emergencies, such as mass casualties and chelation therapy, in the emergency plan, and define the roles and responsibilities for medical decision making.
- Upgrade the ability to achieve timely, consistent accountability by considering the following actions:
 - Revise the operations emergency procedures to specify roles and responsibilities for completing building accountability following evacuation from local events.
 - Formally document the accountability process in plans and procedures that address roles and responsibilities and accountability actions for shelter-in-place, building evacuations to onsite and offsite locations, and site evacuations.
 - Include building evacuation routes and staging and assembly areas in formal plans or procedures so that they are appropriately reviewed, approved, and controlled.
 - Review and revise, as necessary, the process for achieving accountability on the back shifts and include the actions in plans and procedures.
- Enhance the usefulness of the EALs in facilitating timely protective actions by considering the following actions:
 - Revise the emergency procedures to identify specific release indicators with alarms or readings that indicate loss of confinement or air filtration.
 - Review and revise the protective action tables to eliminate actions that may be redundant with those in the operations emergency procedures, and clarify the actions for classified events that have potential impact beyond the initial event scene.
- Consider the following actions to improve the implementation of protective actions:
 - Provide procedural guidance for the incident commander in determining whether to shelter-in-place or evacuate buildings or the site.
 - Add instructions or guidance for protective actions for mine workers during surface emergencies, such as reduction in air flow to the mine and the potential for evacuation (including routes) based on expected duration of releases and wind direction.
 - Add instructions in procedures to enhance the effectiveness of shelter-in-place, particularly securing outside air intake to ventilation systems.

- Adjust the guidance for use of shelter-in-place to reflect those buildings where inability to secure outside air intake diminishes the effectiveness of the protective action.
- Revise procedures to ensure that incident commanders are prompted to provide safe paths of ingress and egress for personnel who are responding to the incident or moving on the site.
- Verify that plans and procedures address protective actions for all essential personnel, such as emergency response organization members, security personnel, and mine operators.
- When taking corrective actions to establish the capability to implement consequence assessment activities through NARAC, consider the following:
 - Set up hardware and software capability to connect with NARAC.
 - Prepare equipment or processes so that site weather data will be readily available for use in the NARAC models.

- Revise the existing procedure or prepare a new procedure to provide the instructions to access and utilize the NARAC models and interpret the outputs.

Washington TRU Solutions, LLC and Santa Fe Protective Services

- Consider the following actions to address security events:
 - Revise the emergency plan, operations emergency procedures, and security procedures to specify roles and responsibilities for anticipated security events.
 - Ensure that command, control, and coordination for security response and protective actions for site workers are clearly specified in appropriate procedures.
 - Consider the use of “take cover,” remain in place, or an equivalent protective action for security events in which it is important to quickly stop the movement of site workers, and periodically train site workers on actions to take during a security event.

APPENDIX D

EMERGENCY PREPAREDNESS

D.1 Introduction

A coordinated program of training, drills, and exercises is necessary to ensure that emergency response personnel and organizations can effectively respond to emergencies impacting a specific facility or the site as a whole. This response includes the ability to make time-urgent decisions and take action to minimize the consequences of the emergency and to protect the health and safety of responders, workers, and the public. To be effective improvement tools, exercises should be used to validate all elements of an emergency management program over a multi-year period using realistic, simulated emergency events and conditions, and to provide emergency response organization (ERO) members an opportunity to practice their skills.

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

D.2 Status and Results

This Independent Oversight evaluation of the training, drill, and exercise program began with a review of the results of the previous inspection in April 2002. That inspection determined that Washington TRU Solutions, LLC (WTS) had implemented corrective actions in the training, drill, and exercise program that satisfactorily addressed most of the weaknesses identified during the May 2000 Independent Oversight review. The resulting improvements provided increased assurance that crisis management team members would maintain an acceptable level of proficiency, and strengthened the utility of the drill and exercise program in identifying areas needing further attention.

However, the training, drill, and exercise program did not ensure that new facility shift managers (FSMs) or crisis management team members were adequately prepared to fulfill their emergency response duties, and did not require either annual refresher training or periodic participation in drills or exercises by FSMs. In addition, the effectiveness of the exercise program may have been impacted by various weaknesses in implementing procedures; the sequencing of drills and exercises; the exercise evaluation process; and the absence of any significant drill or exercise activities that focused on FSM performance during times when emergency operations center (EOC) support was not available. This 2007 inspection found that WTS had not maintained several improvements that were intended to address weaknesses identified during the 2000 Independent Oversight review, and some important program weaknesses exist regarding minimum training and proficiency requirements and expectations for field response capabilities.

Training and Drills

WTS has developed a sound framework for the ERO training program, including effective mechanisms to support a comprehensive, coordinated, and documented program of training and drills. WTS has established an adequate set of objectives and requirements for training and qualification of most emergency response personnel, and training is designed, developed, delivered, and evaluated in accordance with corporate procedure WP 14-TR.01, *WIPP Training Program*. Initial and refresher training activities provide a mixture of classroom, self-study, and hands-on training, followed by a proficiency evaluation consisting of a practical evaluation for positions requiring "qualification" and job performance measures for other positions. WTS has identified qualification requirements for several emergency response positions; these are supported by detailed qualification standards and processes. Further, management of the training program is supported by a strong administrative system and computer database to monitor completion of training and to control the assignment of active emergency response

positions. General employee training provides adequate instructions to the onsite population regarding alarms, sirens, and protective actions at the site. Finally, general employee proficiency is adequately demonstrated during annual site evacuation drills conducted for surface WIPP operations/facilities in accordance with 29 CFR 1910.38, *Emergency Plans*, and semi-annual evacuation drills conducted for underground WIPP operations in accordance with 30 CFR 57.4361, *Underground Evacuation Drills*.

Independent Oversight examined the training and qualification for some of the key positions in the WIPP ERO, including the FSMs/facility operations shift engineers, EOC safety representatives, and EOC crisis managers. Training and qualification records for these individuals were completed using qualification criteria stated in the emergency management plan; however, a number of other ERO positions, including consequence assessment, public affairs, human resources, safety, security, and central monitoring room operators, receive no emergency management training (other than National Incident Management System) and are not required to participate in response drills. Although the emergency management plan identifies numerous emergency response and support groups, in practice (and as reported in quarterly metrics submittals), WTS has incorrectly defined the WIPP ERO as consisting of only the FSM, crisis manager, and EOC safety representative. Consequently, training and participation requirements are not applied to all required emergency response positions, and training and participation records are not required or maintained for all emergency responders.

Some aspects of the design and implementation of the training program are also incomplete, and as a result, WTS has not established the mechanisms necessary to ensure that all individuals expected to respond to an emergency event are proficient in their assigned function. For example, the emergency responder training program is not effectively integrated and coordinated with the security training program, and as identified in several WIPP exercise critiques, this shortcoming results in confusion over control at the event/incident scene. Furthermore, training requirements for most ERO positions, including the EOC tactics team, operational assistance team, and the ad hoc field monitoring team, are not based on an analysis of the tasks necessary to perform the required duties. Additionally, a process to evaluate individual ability to perform key positional tasks prior to ERO assignment exists for only three EOC positions (crisis

manager/deputy crisis manager, FSM/facility engineer, and EOC safety representative), which utilize a job performance measure intended to be used during a drill or exercise; however, WTS has not developed any guidance for their use.

Overall, drills conducted during the last two fiscal years have not been used to routinely develop and maintain proficiency for several emergency response capabilities identified in the WIPP emergency management program. Although drills are required in the emergency management plan, in practice, they are not an integral part of the training program for all response functions, and several key emergency response teams—including the emergency response team, first line incident response team, and emergency services technicians (ESTs)—do not have drill participation requirements. Additional drill program weaknesses include the following:

- Integrated emergency response drills that include facility operations, fire, and security response personnel are not being conducted.
- Drills are not conducted for specialized emergency response capabilities, including field monitoring and consequence assessment, environmental sampling and analysis, and decontamination.
- The site has numerous memoranda of understanding with local emergency response groups, including Eddy County, city of Hobbs, city of Carlsbad, and the Bureau of Land Management, but has not provided emergency-related information and training on site-specific conditions and hazards to offsite personnel who may be asked to participate in response to an emergency at the site.
- Drills that develop and maintain proficiency with such offsite agencies as the Bureau of Land Management, which is the primary responder to wildland fires within the WIPP land withdrawal area, are not conducted.

Finding #7: The WTS training, drill, and qualification program does not provide initial and annual refresher training or require initial and annual demonstration of proficiency for all personnel comprising the emergency response organization, as required by DOE Order 151.1C and the WIPP emergency management plan.

The WIPP emergency management plan and the WIPP Resource Conservation and Recovery Act Contingency Plan establish the structure and constituents of the site's overall emergency response capability. However, minimum staffing levels are not defined for some key emergency response functions, possibly resulting in the response capability being unavailable when needed during actual events. For example, two ESTs are assigned to each shift to operate emergency apparatus and serve as the principal onsite responders for medical, hazardous materials, and fire emergencies. However, WTS has not established a minimum EST staffing level, and both ESTs are required to staff the five-person shift fire brigade. Furthermore, the emergency response team (ERT), an all volunteer organization designated to support the EST response, currently has eleven qualified members who primarily work on day shift. The number of qualified ERT members needed per shift to achieve a minimum response capability is also not established, nor does the FSM track the daily shift availability of ERT staffing. During 2006, only three ERTs participated in an emergency drill or exercise, and none have participated during 2007. The field response team participation problem exists in other field response elements as well, and this issue was self-identified by staff in exercise critiques. Likewise, the first line initial response team has only two qualified members and has staffing and participation issues similar to the ERT. Lastly, the FSM has no written administrative process that defines required actions for when a site response capability (e.g., fire brigade, ERT, EST) falls below a staffing level considered less than the minimum required for a safe and effective response.

Finding #8: Emergency response organization positions with core field response functions do not have minimum staffing requirements established to ensure that trained and qualified personnel are available for timely and effective response, as required by DOE Order 151.1C.

To summarize, the WIPP emergency plan provides a sound framework for the ERO training and drill program, including suitable mechanisms to support a comprehensive, coordinated, and documented program of training and drills. A limited training and qualification program is effectively implemented for a small set of ERO members; however, WTS has not adequately defined the training needs and conducted

the training necessary to ensure that all ERO members have the requisite skills and disciplines to respond to an event. For example, a number of ERO members, such as consequence assessors and security personnel, have not been provided initial and annual refresher training. In addition, many ERO members are not required to maintain response proficiency through participation in drills, and the drill program has not been used to promote an effective, integrated response. Further, staffing and participation weaknesses currently exist for several key emergency response positions. Finally, WTS has not developed and provided training material on site-specific hazards and emergency response protocols for use by offsite personnel who may respond to an emergency at the WIPP site. Overall, although critical ERO members, such as the FSM and crisis manager, receive adequate training, the training and drill program does not ensure that all of the site's emergency responders are available and prepared to execute their emergency response functions.

Exercises

The site's exercise program is appropriately defined in the WIPP emergency management plan, and the implementing procedure for planning and conducting exercises provides detailed guidance for developing and approving exercise scenarios. Typically, WTS conducts an annual exercise, and additional functional exercises are scheduled as needed. Most functional exercises are designed to demonstrate an appropriate set of response capabilities, commensurate with the hazards and types of scenarios identified in the emergency planning hazards assessments, including scenarios for contact-handled and remote-handled waste operations, underground operations, and security events. Each exercise package establishes the exercise scope, specifies the emergency response functions to be demonstrated, identifies the extent of organization and personnel participation, and identifies the breadth and depth of exercise activities. Furthermore, the exercise objectives, along with underlying criteria and evaluation modules, provide adequate guidance for the pool of qualified drill/exercise controllers and evaluators. The annual emergency readiness assurance plan provides a comprehensive short-range planning schedule for the current fiscal year's exercises and long-range planning and scheduling for future exercises that would validate all elements of the emergency management program over a five-year period. A scheduling weakness noted is that with less

than 45 days remaining in fiscal year 2007, seven of the ten scheduled functional exercises and the annual site exercise have not been completed.

Most site exercises are functional exercises, generally focused on exercising plans, policies, procedures, and personnel associated with overall command and control of the event; typically the movement of most field teams and equipment is only simulated. The remainder of the site exercises involve a few aspects of field operations and other elements not included in the functional exercises. However, WTS does not validate all required elements of the WIPP emergency management program because integrated capabilities (e.g., allocating resources and personnel, assessing equipment capabilities, activating personnel and equipment, and testing communications systems and procedures) are not demonstrated. For example, during calendar year 2007, no exercise to date has included participation of field response teams (e.g., EST, ERT, first line incident response team, security, or mine rescue team) or tested such response functions as command, control, and communication and event-scene activities through realistic simulations of emergency events. Furthermore, although a “collateral duty” onsite fire brigade provides minimum firefighting and hazardous materials response capabilities during non-day shift hours, no integrated exercise has been conducted to demonstrate the ability of the FSM, ESTs, and security officers to fulfill these requirements. Lastly, WIPP has not demonstrated during an exercise the required capability to have connectivity to the National Atmospheric Release Advisory Center, ensuring that meteorological data and information on source terms for actual or potential releases of hazardous materials to the atmosphere are available or can be made available to the National Atmospheric Release Advisory Center in a timely manner to facilitate near real-time computations.

Finding #9: The WTS exercise program does not validate all required response capabilities over a five-year period and ensure that ERO elements and resources participate in a minimum of one exercise annually, as required by DOE Order 151.1C and the WIPP emergency management plan.

To summarize, WTS has an appropriately defined exercise program with detailed requirements specified

in the WIPP emergency plan and an implementing procedure, including processes for developing and approving exercise scenarios. The exercise schedule includes both annual site exercises and functional exercises. Exercise packages adequately establish exercise scope, specify participating response functions, identify the breadth and depth of activities, and provide adequate exercise objectives for the evaluators. Nevertheless, a number of programmatic weaknesses were identified. Most site exercises are functional exercises and generally focus on exercising plans, policies, procedures, and personnel associated with overall direction and control of the event by the FSM, while simulating movement of most field teams and equipment. Consequently, the exercise program does not ensure effective validation for some elements of the WIPP emergency management program, including key field response elements and staff support functions. If implemented, the fiscal year 2007 exercise plan would constitute a comprehensive site exercise program; however, most of the scheduled exercises have not been completed or rescheduled, including the annual exercise. Further, current evaluated demonstrations of the sites’ integrated response capability do not exist. Overall, although the site validated several response capabilities during the 2006 annual exercise, current exercise program weaknesses have resulted in missed opportunities for some ERO elements to meet annual participation requirements and to verify that onsite response elements can appropriately interact with other response organizations.

D.3 Rating

A rating of NEEDS IMPROVEMENT is assigned to the area of training, drills, and exercises.

D.4 Opportunities for Improvement

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

Carlsbad Field Office (CBFO)

- To promote WIPP emergency plan completeness, consider adding the training, drill, and exercise requirements for the CBFO management representative and joint information center positions.
- To more effectively manage the status of CBFO ERO training and drill participation, consider utilizing the WTS training records system to identify near-term and overdue requirements.

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- To better communicate the requirements and expectations of the ERO training program, consider developing a training plan that includes the following attributes:
 - Using a matrix or table, identify the training and qualification requirements for each emergency responder position. Include the complementary training provided by organizations external to the emergency management organization, such as security, that is needed to prepare individuals for their ERO duties.
 - Establish criteria to demonstrate successful completion of course material, and describe remedial training requirements when completion criteria are not met.
 - Define the processes for determining an individual's initial and continued placement on an ERO roster. The processes should include:
 - Demonstration of proficiency in assigned ERO tasks
 - Removal of an individual from the ERO roster when continuing training requirements are not satisfied
 - Identification of records to be maintained as evidence of successful completion of training requirements.

- Enhance the process for managing the drill and exercise program to better ensure that all ERO members have an adequate opportunity to participate and to evaluate all program elements and facilities over a multi-year period. Specific actions to consider include:
 - Develop a master schedule that includes all planned drills and exercises.
 - Track completion of drills and exercise on a sitewide and facility basis.
 - Clearly define how ERO members can use actual emergency responses, site exercises, and periodic evaluated drills to meet proficiency requirements.
 - Plan the execution of drills and exercises with consideration of shift rotations and off-normal work hours, perhaps as part of an operational drill program (i.e., drills originating in a building/facility that require the response of only building/facility personnel to emergency or abnormal operations) to provide opportunities for all primary and backup members to participate and to test response plans and procedures when there is reduced staffing on site.
- To more effectively evaluate program elements and promote improvements through the drill and exercise programs, consider the following actions:
 - Expand the pool of drill/exercise controllers and evaluators to include individuals with technical expertise/skills and responsibility in the specialized areas of response, including facility operations, security, medical, hazardous materials, rescue, firefighting, decontamination, and field monitoring, sampling, and analysis.
 - Require emergency management personnel to review drill after-action reports and identify any sitewide or cross-cutting issues.
 - Define the process for resolving conflicts identified during the exercise scheduling process. The process should include:

- A description of the process for coordinating organizational resources for development, conduct, response, and critique of exercises
- A means to identify and resolve operational conflicts with the development and execution of exercises

- Review of training and drill records or status reports to ensure that exercise participants are eligible to be on the ERO roster.
- To ensure that offsite responders and hospitals are adequately prepared to respond to site emergencies, develop and distribute training materials for use by offsite authorities, informing them of site hazards and response protocols.

APPENDIX E

READINESS ASSURANCE

E.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 Carlsbad Field Office (CBFO) and Washington TRU Solutions, LLC (WTS) will facilitate an effective response to an emergency at the Waste Isolation Pilot Plant (WIPP) site. Readiness assurance activities include implementation of a coordinated schedule of program evaluations, appraisals, and assessments. Key elements of the readiness assurance program include the active involvement of Department of Energy (DOE) line organizations in monitoring program effectiveness, implementing self-assessment programs, and ensuring that timely and effective corrective actions are taken for identified weaknesses. DOE field elements also have direct responsibility for performing some emergency response activities, including oversight of the site's emergency response and activities related to the release of emergency public information to site workers and the public.

This inspection examined the processes by which CBFO provides guidance and direction to and maintains operational awareness of the WIPP emergency management program. The inspection included reviews of CBFO emergency management program assessment processes, WTS emergency management self-assessment and issues management processes, and the status of actions taken to address findings identified in the previous Independent Oversight inspection.

E.2 Status and Results

E.2.1 DOE Line Program Management

The August 2002 Independent Oversight inspection determined that CBFO's monitoring of the WIPP emergency management program was effectively implemented through program assessments, exercise evaluations, document reviews, and routine communications. The feedback provided to WTS from

these activities had resulted in significant program enhancements and improved emergency response capabilities. Additionally, CBFO had been proactive in identifying and addressing lessons learned that had applicability to the emergency management area. Notwithstanding the above, the requirements and expectations for CBFO oversight activities were not clearly documented, and consequently, the program was dependent on corporate knowledge to maintain its effectiveness. This 2007 inspection found that CBFO has continued to conduct some line oversight activities in the emergency management area; however, performance monitoring of the WIPP emergency management program has declined, due in large part to the absence of clearly documented requirements and expectations for CBFO oversight and the retirement of the previous CBFO emergency management program manager in 2003.

CBFO is engaged in frequent, but informal oversight of the WTS emergency management program. The CBFO security and emergency operations manager (SEOM) has regular interactions with the designated representative from DOE's Office of Environmental Management (EM), Office of Safeguards and Security, Emergency Management to discuss the WIPP emergency management program and associated issues. The CBFO contractor oversight plan outlines the overall oversight model for WIPP and requires oversight of the contractor's emergency preparedness activities. As part of the implementation of the oversight plan, the SEOM provides informal feedback regularly to WTS regarding emergency management documents provided for review and performance of the emergency management program observed during facility walkthroughs, drills, and exercises. CBFO and WTS do not have routine meetings to discuss emergency management performance; however, the SEOM raises emergency management issues to CBFO and WTS senior management as issues occur. In addition, the SEOM is actively involved in developing exercise scenarios and evaluating the annual site exercise. Further, the SEOM participates in the DOE technical qualification program, but the qualification requirements applicable to the SEOM position do not include the emergency management functional area qualification standard.

CBFO actively performs several of its emergency management programmatic responsibilities; however, other programmatic responsibilities have not been adequately implemented. CBFO ensured that the WTS contract was modified to include DOE Order 151.1C as well as DOE Orders 226.1 and 414.1C. The CBFO safety management functions, responsibilities, and authorities manual (FRAM) requires CBFO approval of hazards surveys and emergency planning hazards assessments (EPHAs), and the latest versions of these documents have been reviewed and approved by CBFO. However, the CBFO review did not ensure that these critical documents were adequate, as the review did not identify the fundamental weaknesses in the EPHAs that are noted in Section C.2.1 of this report. In addition, the remaining requirements of DOE Order 151.1C for the cognizant field element are not included in the CBFO FRAM or other CBFO documents, and many of these requirements have not been implemented by CBFO. For example, CBFO did not approve the latest version of the emergency plan or previous annual site exercise packages, and the WTS contract does not contain performance measures or financial incentives for WTS to improve or maintain the quality of their emergency management program.

Finding #10: CBFO has not ensured that the WTS EPHAs serve as an adequate planning basis for the WIPP emergency management program, as required by DOE Order 151.1C.

CBFO has identified training and qualification requirements for the DOE management representatives in the emergency operations center (EOC); however, CBFO does not document or track all of the training and qualification requirements, and no demonstration of competency is required before the individual is added to the emergency response organization (ERO) roster. Training and qualification requirements for the DOE management representative are documented in the CBFO WIPP Facility Representative program plan and include appropriate training courses, required reading of the WIPP emergency management plan, and optional participation in an annual drill or exercise. The CBFO SEOM also requires the DOE management representatives to complete annual refresher training, take a National Incident Management System course, and participate annually in a drill or exercise. However, these additional requirements are not included in the CBFO WIPP Facility Representative program plan or any other CBFO documents. While the

WTS technical training group tracks training course completion, neither WTS nor CBFO tracks the annual participation of the DOE management representatives in a drill or exercise or completion of required reading. Further, participation in a drill or exercise or other demonstration of proficiency is not required for new DOE management representatives before being added to the ERO roster. As a result, CBFO does not have assurance that all individuals filling the EOC position of DOE management representative have completed all training and qualification requirements and are able to perform their assigned duties.

Finding #11: The CBFO training and qualification program does not ensure that ERO members have completed all training requirements and are capable of fulfilling their assigned response functions before assignment to the ERO roster, as required by DOE Order 151.1C.

CBFO has established adequate plans and procedures for assessing contractor and CBFO activities. The CBFO procedure for conducting operational assessments requires that the contractor be assessed as necessary to evaluate operations in areas affecting environment, safety, and health. The CBFO procedure for conducting management assessments defines the process for self-assessing CBFO activities, but the assessment topics are left to the discretion of CBFO management. These CBFO procedures have standardized formats for reporting assessment results and require trained assessors; however, the definition of a finding is not provided for contractor assessments, and the use of specific, objective evaluation criteria is not required for self-assessments.

CBFO has not conducted formal, comprehensive assessments of the WTS or CBFO emergency management programs. Two assessments of the WTS emergency management program were documented by CBFO in fiscal year (FY) 2006; however, only a few of the 15 emergency management program elements were covered, and the report did not specify the evaluation criteria that were used. No other formal assessments of the WTS emergency management program were conducted by CBFO in FY 2005 or FY 2007; consequently, several elements of the WTS emergency management program were not assessed over the past three years. Furthermore, although required annually, CBFO did not conduct any self-assessments of the CBFO emergency management program during the last three years.

Finding #12: CBFO does not conduct formal, documented assessments of the WTS emergency management program every three years or self-assessments of the CBFO emergency management program annually, as required by DOE Order 151.1C.

CBFO has established procedures for issues management to ensure that corrective actions are effective and will prevent recurrence of findings, although some weaknesses were noted. Corrective actions are required for all conditions adverse to quality that are identified by CBFO. In addition, changes to due dates for corrective actions require formal approval, and the closure process for corrective actions includes CBFO verification that the corrective action has been completed. However, the closure process does not clearly include validation that the corrective action was effective in resolving the original condition adverse to quality. Furthermore, root cause analysis and corrective actions designed to prevent recurrence are only required for significant conditions adverse to quality, and CBFO has not provided written guidance to CBFO personnel on the process for performing a root cause analysis.

To summarize, CBFO is engaged in frequent, but informal, oversight of the WTS emergency management program and is in regular contact with the responsible EM Headquarters element. Furthermore, CBFO performs several of their emergency management programmatic responsibilities, including ensuring that the relevant DOE orders are included in the WTS contract and approving the latest versions of the hazards survey and EPHAs. However, the weakness noted during the 2002 Independent Oversight inspection—specifically, CBFO’s dependence on corporate knowledge, rather than a clearly documented set of requirements and expectations for CBFO oversight activities—is a significant contributor to the weaknesses identified during this inspection. CBFO did not identify fundamental weaknesses in the EPHAs during their review and has not completed some other emergency management programmatic responsibilities. CBFO has specified the training and qualification requirements for their emergency responders; however, a few of the training requirements are not documented or tracked, and ERO members are not required to demonstrate their proficiency before being added to the ERO roster. Finally, although

CBFO has developed adequate plans and procedures for assessing WTS and CBFO activities and managing the resulting issues, CBFO has not conducted formal comprehensive assessments of the WTS or CBFO emergency management programs or identified any issues related to emergency management during the past three years.

E.2.2 Contractor Feedback and Improvement

The August 2002 inspection determined that the WIPP emergency response capabilities had significantly improved since the May 2000 Independent Oversight review of the WIPP emergency management program. WTS had effectively identified and addressed additional weaknesses through an ongoing program of drills, exercises, and programmatic assessments. WTS had also incorporated requirements for corrective action tracking in the applicable procedures, and issues were being effectively tracked. In addition, WTS had implemented programmatic improvements using feedback from assessments conducted by CBFO and EM. Although the FY 2002 WTS emergency management assessment did not include an evaluation of all program elements, prompt corrective actions were initiated to ensure that subsequent annual assessments would be comprehensive. This 2007 Independent Oversight inspection found that WTS continues to use drills, exercises, and programmatic assessments to identify program weaknesses. However, issues are no longer being effectively tracked and resolved.

WTS has established comprehensive assessment processes that are mostly effective in identifying many programmatic weaknesses. The WTS procedure for conducting management assessments details the process for conducting an assessment and includes requirements for initial and refresher training for assessors and a management assessment toolbox with assessment templates. Assessments of the emergency management program are conducted according to the requirements of the WTS management assessment procedure using an abbreviated set of criteria based on DOE’s emergency management guide. The criteria are commensurate with the complexity of the WIPP emergency management program, except in the area of EPHAs, where more detailed criteria are warranted given the issues identified in Section C.2.1 of this report. WTS has also implemented a detailed process to track and verify the correction of issues identified

in assessments, drills, and exercises. A comprehensive definition of an issue is provided in WTS procedures, and all issues meeting the definition are required to be documented on a WIPP Form (which is the tool used to capture, evaluate, and track the resolution of issues through the WIPP issues management process) for further review and screening. The issues management steering committee reviews WIPP Forms, determines the priority, assigns a responsible manager for issue resolution, approves the corrective action plan that is developed by the responsible manager, and reviews and approves closure of the corrective actions and associated issue after all corrective actions are completed.

Emergency management program assessments conducted by WTS are effective in identifying program and performance issues. The annual assessments include all 15 elements of the WTS emergency management program (although assessments of the exercise, emergency medical support, and emergency public information elements have not been completed for FY 2007), and the assessments have identified numerous program and performance weaknesses over the last three years. However, weaknesses in documenting the assessments limit their effectiveness in identifying all of the issues requiring resolution. The assessment reports do not always document how it was determined that the evaluation criteria were met, and for the FY 2005 and FY 2006 assessments, they did not specify the documents that were reviewed for some of the elements. In addition, several examples of non-compliance with DOE Order 151.1B requirements were noted in the FY 2005 assessment checklist, but these were not included as findings in the assessment report. These non-compliances included an out-of-date hazards survey that did not contain all of the required content, security procedures that did not correlate with WTS emergency response procedures, and meteorological data that was not continuously available in the EOC for the consequence assessment team. The inadequate hazards survey was subsequently re-identified as a finding in the FY 2006 assessment.

WTS has identified many programmatic areas in need of attention, but past issues management weaknesses have diminished the site's ability to implement meaningful improvements in the WIPP emergency management program. Although findings from the recently-completed FY 2007 assessment were appropriately documented and a corrective action plan is being prepared, corrective actions were not

completed in FY 2005 and FY 2006 for most findings from WTS emergency management assessments, drills, and exercises. The lack of completing corrective actions resulted in large part from the findings not being documented on WIPP Forms even though they met the definition of issues requiring resolution through the WIPP Form process. WTS addressed several of the findings, including replacing broken mine rescue team equipment, updating the hazards survey, and replacing an inoperable EOC computer. However, corrective actions were not prepared or implemented for most of the remaining findings, including the following items (two of which are related to concerns identified in Section C.2.2 of this report regarding the completeness of shelter-in-place and evacuation procedures):

- An FY 2006 drill identified that because the evacuation/shelter-in-place procedure was not followed, a safe evacuation route was not determined and no information was given to evacuating employees.
- The FY 2006 site exercise identified that evacuation announcements to personnel underground did not give the location of the event (in this case, a fire) that caused the evacuation.
- An FY 2006 drill identified that an operational emergency was incorrectly classified due to a misinterpretation of the source term data.

Corrective actions were completed for the findings identified during the August 2002 Independent Oversight inspection, but the actions taken did not resolve all of the aspects of one of the two findings. The August 2002 report contained a finding that the WIPP emergency plans, procedures, and notification systems did not ensure that the appropriate protective actions were communicated in a timely and accurate manner. The WTS response to this finding included a corrective action to revise the evacuation/shelter-in-place procedure so that it contained specific guidance on shelter-in-place versus evacuation requirements and clear direction on situations and time frames appropriate for each. While WTS closed the corrective action and CBFO concurred, the revision of the evacuation/shelter-in-place procedure used as evidence of closure did not include any such guidance or direction. Subsequent revisions to the evacuation/shelter-in-place procedure have also not included this information.

Finding #13: WTS has not consistently developed and implemented effective corrective actions in response to identified emergency management program weaknesses resulting from assessments, drills, and exercises, as required by DOE Order 151.1C.

To summarize, WTS has established comprehensive assessment processes that are effective in identifying many programmatic weaknesses, but the effectiveness of the feedback and improvement system is hampered by weaknesses in implementing the corrective action processes. The criteria used to conduct the emergency assessments are generally commensurate with the complexity of the WIPP emergency management program, except for EPHAs, which merit a more detailed set of criteria based on their importance to the program and their technical nature. Further, WTS has implemented a comprehensive issues management process that requires issues be screened, prioritized, assigned to a responsible manager, and tracked to resolution. Moreover, emergency management program assessments have been effective in identifying program and performance issues, although the value of the assessments was weakened by several instances where non-compliances with requirements were not included as findings in the assessment report. In addition, weaknesses in assessment documentation may limit their value somewhat. Furthermore, corrective actions were not completed for most emergency management findings. With the exception of the FY 2007 assessment, findings were not entered into the WIPP Form process as required by WTS procedures. Although a few findings were resolved, corrective actions were not prepared or implemented for the remaining emergency management findings. Finally, corrective actions did not resolve all of the aspects of one of the two findings from the August 2002 Independent Oversight inspection report. A corrective action to revise the evacuation/shelter-in-place procedure was not revised as indicated, although both WTS and CBFO agreed that the action had been completed. Overall, WTS assessment processes have appropriately identified many programmatic weaknesses, but program improvements have been hampered by drawbacks in processes for follow-up and corrective action implementation.

E.3 Rating

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

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

E.4 Opportunities for Improvement

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

Carlsbad Field Office

- To formalize and promote timely reviews and approval of contractor emergency management documents, consider developing written protocols that:
 - Identify the technical disciplines (e.g., safety analysis experts and Facility Representatives) required within CBFO to review the emergency plans, hazards surveys, EPHAs, emergency planning zones, emergency readiness assurance plans, and site exercise packages.
 - Establish an overall timeline and due dates for all reviews.
 - Include checklists and/or procedural guidance to address such review activities as verifying facility material-at-risk quantities, sampling release calculations, reviewing protective action criteria and associated distances, understanding the derivation of emergency action levels and associated protective actions, and reviewing the determination of the emergency planning zone.

- Incorporate a mechanism that confirms receipt by the National Nuclear Security Administration Office of Emergency Operations (NA-40) and DOE/EM of approved emergency plans, hazards surveys, EPHAs, emergency planning zones, emergency readiness assurance plans, site exercise packages, exercise after-action reports, and final emergency reports.
- Consider adding emergency management performance measures to the WTS contract designed to promote improvements in the WIPP emergency management program.
- Improve the effectiveness of the training program for CBFO ERO members. Specific actions to consider include:
 - Implement a process to track training, required reading, and drill/exercise participation for CBFO personnel.
 - Implement a qualification process that verifies that CBFO personnel possess the required knowledge, skills, and abilities prior to being placed on the ERO duty roster.
- Consider improving the implementation of the assessment program by identifying the effort and resources necessary to execute the program through the development of a detailed, resource-loaded assessment plan. Specific actions to consider include:
 - Identify contractor assessments by emergency management program functional areas over the three-year cycle.
 - Determine the extent to which each emergency management program element will be examined during the annual CBFO self-assessment, and include the justification in the assessment report or other formal document.
 - Identify the resources needed to complete the assessment plan, and for activities that require outside expertise, identify how that expertise will be obtained.

- Include the updated assessment plan in the emergency readiness assurance plan.
- To strengthen and formalize the CBFO corrective action process, consider taking the following actions:
 - Expand the use of root cause analysis for issues requiring corrective action.
 - Evaluate all proposed corrective actions to ensure that they will address underlying causal factors and prevent recurrence of the issue.
 - Document the process for conducting root cause analysis.
 - Validate that corrective actions have been effective in resolving the original issue.

Carlsbad Field Office and Washington TRU Solutions, LLC

- Improve the effectiveness of assessment programs by providing formal, written expectations to appropriately trained evaluators. Specific activities to consider include the following:
 - Balance assessment activities between evaluations of program document content and their field implementation.
 - Conduct assessments using approved evaluation criteria that are identified in assessment checklists.
 - Provide written guidance and training to evaluators on the application of inspection criteria and the standards of acceptable performance.

Washington TRU Solutions, LLC

- Consider developing a detailed, resource-loaded self-assessment plan for completing the required program assessments. Identify the resources needed to implement the self-assessment plan, and for activities that require outside expertise, identify how that expertise will be obtained.

- To promote continuous program improvement through the emergency management issues management process, consider the following actions:
 - Use the WIPP Form process for all issues identified during assessments, drills, and exercises.
 - Evaluate proposed corrective actions to ensure that completion of the actions will adequately address the underlying causal factors.
 - Ensure that corrective action plans incorporate activities for verifying completion and validating the effectiveness of the corrective action.