Volume I

Inspection of
Environment, Safety,
and Health Management
at the

Waste Isolation Pilot Plant

August 2002

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

INDEPENDENT OVERSIGHT
INSPECTION OF
ENVIRONMENT, SAFETY, AND HEALTH MANAGEMENT
AT THE
WASTE ISOLATION PILOT PLANT

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Acronyms

AHA	Activity Hazard Analysis
AL	Albuquerque Operations Office
ALARA	As Low As Reasonably Achievable
CBFO	Carlsbad Field Office
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
cm^2	Square Centimeter
CY	Calendar Year
DEAR	Department of Energy Acquisition Regulation
DOE	U.S. Department of Energy
dpm	Disintegrations per Minute
EM	Office of Environmental Management
EMS	Environmental Management System
EM-1	Assistant Secretary for EM
EPA	U. S. Environmental Protection Agency
ES&H	Environment, Safety, and Health
FRAM	Functions, Responsibilities, and Authorities Manual
FY	Fiscal Year
HAZWOPER	Hazardous Waste Operations
ISM	Integrated Safety Management
ISO	International Standards Organization
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
M&O	Management and Operating
MDA	Minimum Detectable Activity
mrem	Millirem
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NNSA	National Nuclear Security Administration
OA	Office of Independent Oversight and Performance Assurance
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
OSO	CBFO Office of Safety and Operations
POD	Plan of the Day
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPD	Quality Assurance Program Document
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SRAS	Status Report and Assessment Strategy
S/RID	Standards and Requirements Identification Document
TSR	Technical Safety Requirement
TRU	Transuranic
WIPP	Waste Isolation Pilot Plant
WTS	Westinghouse TRU Solutions, LLC

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INDEPENDENT OVERSIGHT INSPECTION OF ENVIRONMENT, SAFETY, AND HEALTH MANAGEMENT AT THE WASTE ISOLATION PILOT PLANT

VOLUME I

1.0 INTRODUCTION

The Secretary of Energy's Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health (ES&H) and emergency management programs at the Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) in July and August 2002. The inspection was performed as a joint effort by the OA Office of Environment, Safety and Health Evaluations and the Office of Emergency Management Oversight. This volume discusses the results of the review of the WIPP ES&H programs. The results of the review of the WIPP emergency management program are discussed in Volume II of this report, and the combined results are discussed in a summary report.

The Office of Environmental Management (EM) is the lead program secretarial office for WIPP. As such, it has overall Headquarters responsibility for programmatic direction, funding of activities, and ES&H at the site, and is responsible for providing overall program guidance and direction to the Carlsbad Field Office (CBFO). At the Headquarters level, the WIPP Office (EM-23) provides program implementation support to EM.

CBFO manages DOE's National Transuranic (TRU) Waste Program Office and the WIPP site. TRU refers to radioactive elements having a greater atomic number than uranium. CBFO coordinates the TRU program at waste-generating sites and national laboratories, which includes managing the system for collecting, characterizing, and transporting TRU waste. Within CBFO, the Office of Safety and Operations (OSO) provides direction regarding the site ES&H program. WIPP is managed and operated by Westinghouse TRU Solutions, LLC (WTS), under contract to DOE.

The mission of the WIPP site is to provide permanent, underground disposal of TRU and TRU-mixed wastes (wastes that also have hazardous chemical components). TRU waste consists of clothing, tools, and debris left from the research and production of nuclear weapons. TRU waste is contaminated with small amounts of plutonium and other TRU radioactive elements. Over the next 35 years, WIPP is expected to receive approximately 175,000 cubic meters of waste from various DOE sites. Since WIPP began operations in March 1999, it has received approximately 1,000 shipments (each shipment contains up to 42 55-gallon drum equivalents). WIPP is now operating at the target goal of approximately 25 shipments per week, with plans for as many as 40 shipments per week by next year.

The WIPP site is located in southeastern New Mexico, approximately 30 miles southeast of Carlsbad, New Mexico, within a remote 16-square-mile tract. 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. Eventually, approximately 850,000 55-gallon drum equivalents of TRU waste will be contained within the underground structure. WIPP activities, which include transport container unloading, drum movement, mining, and facility maintenance, involve various potential hazards that need to be effectively controlled, including exposure to external radiation, radiological contamination, and various physical hazards associated with mining

activities and facility operations (e.g., subsurface hazards, toxic gases, confined space, machine operations, high-voltage electrical equipment, pressurized systems, and noise).

Throughout the evaluation of ES&H programs, OA reviews the role of DOE organizations in providing direction to contractors and conducting line management oversight of the contractor activities. OA is placing more emphasis on the review of contractor self-assessments and DOE line management oversight in ensuring effective ES&H programs. In reviewing DOE line management oversight, OA focused on the effectiveness of EM and CBFO in managing the WIPP contractor, including such management functions as setting expectations, providing implementation guidance, allocating resources, monitoring and assessing contractor performance, and monitoring/evaluating contractor self-assessments. Similarly, OA focuses on the effectiveness of the contractor self-assessment programs, which DOE expects to provide comprehensive reviews of performance in all aspects of ES&H.

The purpose of the ES&H portion of this inspection was to assess the effectiveness of selected aspects of ES&H management as implemented by WTS under the direction of CBFO. The ES&H portion of the inspection was organized to evaluate three related aspects of the integrated safety management (ISM) program:

- Implementation of selected guiding principles of ISM by CBFO and WTS
- CBFO and WTS feedback and continuous improvement systems
- WIPP implementation of the core functions of safety management for various work activities, including mining operations, surface/facility operations, maintenance, waste management operations, environmental monitoring, and subcontracted work.

The OA inspection team used a selective sampling approach to determine the effectiveness of CBFO and WTS in implementing DOE requirements. The sampling approach involves examining selected institutional programs that support the ISM program, such as CBFO and WTS assessment programs. To determine the effectiveness of the institutional programs, the OA team examined implementation of requirements by selected WIPP organizations, including Waste Operations, Surface Operations, and Mining Development.

As discussed throughout this report, the ISM program at WIPP is generally effective. Although improvements are warranted in some areas, the current programs have contributed to overall effective ES&H performance and a good safety record at WIPP.

Section 2 of this volume provides an overall discussion of the results of the review of the WIPP ES&H programs, including positive aspects and weaknesses. Section 3 provides OA's conclusions regarding the overall effectiveness of CBFO and WTS management of the ES&H programs. Section 4 presents the ratings assigned as a result of this review. Appendix A provides supplemental information, including team composition. Appendix B identifies the specific finding that requires corrective action and follow-up. Appendix C presents the results of the review of selected guiding principles of ISM. Appendix D presents the results of the review of the CBFO and WTS feedback and continuous improvement processes. The results of the review of the application of the core functions of ISM for the selected WIPP activities are discussed in Appendix E.

2.0 RESULTS

2.1 Positive Attributes

Overall, the ISM program at WIPP is effectively implemented, although improvements are warranted in a few areas. Several positive attributes were identified in the institutional work control systems. Many aspects of ISM implementation at the facility and activity level were also particularly effective.

The overall effective ISM program has resulted in an excellent safety record at WIPP. The WIPP site has one of the best safety records in the DOE complex, as measured by such performance indicators as injury rates and environmental incidents. This good safety record is particularly significant considering that a large fraction of the WIPP work activities involve potentially hazardous activities, such as mining and handling containers of radioactive material. The WTS ISM program is mature and effective, with few deficiencies, and has resulted in the good safety record. The workforce demonstrated a safety-conscious approach to work activities and support for ISM programs. Workers were knowledgeable of hazards and controls. CBFO and WTS line managers are also supportive of ISM and were actively involved in ensuring that safety is an integral part of mission operations and work activities. EM, CBFO, and WTS roles and responsibilities are well defined and understood. WTS has effective processes for identifying applicable requirements and incorporating them into clear and concise procedures and work controls.

CBFO and WTS managers have demonstrated support for continuous improvement, and WTS has applied an aggressive approach to correcting deficient conditions. In accordance with ISM principles, WTS managers, with the support of CBFO, have implemented various initiatives to continuously improve ES&H programs and performance. WTS has established and implemented an extensive program of self-assessments and crosscutting reviews that is effective in identifying and correcting deficient conditions. Various external organizations also perform regulatory inspections at WIPP. WTS has been aggressive in responding to individual deficiencies identified by all appraisals, including the WTS self-assessments, CBFO observations, surveillances, and findings, and external regulator inspections. Further, WTS has regularly analyzed the collective assessment results to identify trends, root causes, and crosscutting issues, and has taken appropriate corrective actions. For example, WTS analyzed trend data and implemented actions to further improve procedural compliance, and analyzed injury data leading to a focused effort to further reduce injuries to hands and fingers. WTS has also proactively solicited ideas for improvement from workers through various programs, such as safety committees, and has used that feedback to improve ES&H programs. These efforts have contributed to the overall good safety performance and continued positive trends in performance measures. WTS has also responded aggressively to the deficiencies identified during this OA inspection and has implemented or initiated corrective action for most of them.

Several WTS initiatives in the industrial hygiene area are effective and proactive. The WTS Industrial Hygiene Status Report and Assessment Strategy Program is an effective process used by WTS Industrial Hygiene to assess and document workplace exposures, identify appropriate hazard controls, and recommend medical surveillance and industrial hygiene monitoring. The program has been designed with the intent of fulfilling the baseline hazard survey requirements of the DOE worker protection requirements. WIPP is one of the few sites in the DOE complex that is meeting these objectives, as well as meeting the intent of the recent DOE Industrial Hygiene Practices Standard. In addition, the WTS Mine Engineering, Mine Operations, and Industrial Hygiene organizations have been proactive in identifying and analyzing the hazards for diesel particulate matter air contaminants in underground workspaces. Pending Mine Health and Safety Administration regulations for diesel particulate matter will

impose considerable technical challenges to controlling mine ventilation systems, and will limit the exposure of workers to diesel particulate matter, a contaminant that had previously not been regulated. At WIPP, initial air sampling for diesel particulate matter has been conducted for a variety of diesel equipment used underground in order to characterize the diesel particulate matter hazard, although the new diesel particulate matter regulations are not yet in effect. In addition, several interim corrective actions to mitigate diesel particulate matter air contaminants have already been identified and implemented (e.g., new tagging procedure).

WTS has developed and defined an effective and proactive environmental management system based on ISM and International Standards Organization (ISO) 14001 concepts and has implemented that system using a suite of environmental management procedures that are technically accurate, concise, and well written. WIPP has obtained and maintains ISO 14001 certification. External requirements, such as those in the Resource Conservation and Recovery Act permit, have been effectively incorporated in operating procedures for management of the environmental aspects of TRU mixed waste disposal. As a result, TRU, TRU mixed, hazardous, and non-hazardous waste operations are being performed as required by environmental regulations. In addition, effective working relationships have been established with external regulators.

2.2 Program Weaknesses

Most aspects of the WIPP ISM program are effective, and only one finding that requires a formal corrective action plan was identified. The finding addresses weaknesses in some aspects of hazards analysis processes for certain types of work activities. In addition to the hazard analysis finding, management attention is needed to enhance the formality and rigor of some aspects of CBFO line management oversight activities.

The work control process for some underground operations is not sufficiently documented to ensure that all hazards are adequately identified, analyzed, and documented. In the underground mining and maintenance areas, the WTS organization generally identified and analyzed most hazards, typically through some combination of training and/or job safety analysis and work packages. However, the lack of a well-documented work control process for some underground operations has resulted in hazards at the underground fabrication shop not being identified, analyzed, or documented and may have contributed to the recent accident where a load-haul-dump (LHD) vehicle tipped over. Also, some potential environmental hazards were not sufficiently analyzed, documented, or reported. The skill-of-the-craft program is insufficiently documented to ensure that management expectations are consistently followed.

Some aspects of CBFO line management oversight activities are not sufficiently rigorous and formalized to ensure that management expectations are communicated, understood, and effectively implemented. CBFO is implementing most aspects of its line management responsibilities and is contributing to the overall effective ISM program at WIPP. However, CBFO has not established and documented specific management expectations for OSO line management oversight activities, and their current processes are not rigorous and systematic. A few safety and environmental deficiencies were identified on this OA inspection that had not been previously identified by CBFO or WTS. CBFO conducts few formal assessments, and most of the CBFO observations are not documented in a manner that enables CBFO to systematically evaluate WTS ES&H performance. Although the CBFO line management oversight program needs to be enhanced, when combined with an effective WTS self-assessment program, the good safety culture of the WIPP workforce, and experienced CBFO safety professionals, the program is meeting CBFO management expectations and contributing to the good safety performance at WIPP.

3.0 CONCLUSIONS

CBFO and WTS have worked cooperatively to establish and implement an effective ISM program at WIPP. The excellent safety record and the overall good compliance with requirements observed on this OA inspection indicate that the ISM program is well designed and effectively implemented.

CBFO and WTS managers at all levels were actively involved in and supportive of ISM and continuous improvement. CBFO and WTS have worked cooperatively to establish a set of contractual requirements that is appropriate for the hazards and conditions at WIPP. EM, CBFO, and WTS roles and responsibilities are adequately defined. Workers are appropriately empowered to stop work to resolve safety questions and have multiple avenues to express any safety concerns. Management has numerous programs to ensure that workers are involved in safety and to solicit ideas for improvement. A few shortcomings were identified in CBFO and WTS requirements management processes (not adhering to a DOE Acquisition Regulation [DEAR] clause requirement for review of DOE directives, administrative errors in Attachment H of the contract, a deficient adherence assessment, failure to include some parts of DOE Manual 435.1 requirements in the standards/requirements identification document, and insufficient identification of underground lighting and hazardous waste operation [HAZWOPER] training requirements) that indicate a need for increased management attention on the formality and rigor of current processes.

The OA team's observation of numerous work activities conducted at WIPP indicates that work activities were conducted safely and, with few exceptions, hazards were identified, appropriate controls were in place, and the work was properly authorized. In most cases, WTS has effectively translated the applicable requirements to clear and concise work instructions. Workers demonstrated a safety-conscious approach to their work activities. Most aspects of environmental protection programs are effective and have been successfully integrated into ISM.

Although most hazards are effectively analyzed and controlled, certain aspects of hazards analysis processes need to be enhanced to ensure that all hazards are adequately identified, analyzed, and documented. Areas that need additional management attention include the formality of work control processes for some underground activities (e.g., fabrication shop and ground control), some environmental concerns and radiological controls, the skill-of-the-craft program for low-hazard work, WIPP visitor training, and the hazard analysis templates used by work planners and line managers.

The feedback and continuous improvement programs at WIPP are effective in identifying and correcting deficiencies. WTS conducts frequent self-assessments, and external organizations perform regulatory reviews. WTS, with the support of CBFO, has been aggressive in correcting individual deficiencies in a timely manner. WTS has also systematically analyzed the root causes of identified deficiencies and analyzed trends, and used the results to achieve improvements in ES&H performance. CBFO personnel are actively involved in monitoring contractor performance, are maintaining operational awareness, and are contributing to improvements by identifying problems to WTS for corrective action. However, the CBFO program is not rigorous and relies primarily on the expertise and initiative of the individual CBFO personnel.

Overall, the ISM program at WIPP is effectively implemented and is resulting in safe operations. Work observed by the OA team was performed with a high regard for safety and environmental protection. While some deficiencies were identified, CBFO and WTS have a good understanding of the remaining deficiencies and have a demonstrated history of taking effective corrective actions.

4.0 RATINGS

The ratings reflect the current status of the reviewed elements of the WIPP ISM program:

Safety Management System Ratings

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

Feedback and Improvement

Core Function #5 – Feedback and Continuous Improvement..... EFFECTIVE PERFORMANCE

WIPP Implementation of Core Functions for Selected Work Activities

Core Function #1 – Define the Scope of Work..... EFFECTIVE PERFORMANCE
Core Function #2 – Analyze the Hazards ..... EFFECTIVE PERFORMANCE
Core Function #3 – Establish Controls ..... EFFECTIVE PERFORMANCE
Core Function #4 – Perform Work Within Controls..... EFFECTIVE PERFORMANCE

APPENDIX A

Supplemental Information

A.1 Dates of Review

Scoping Visit	May 29-30, 2002
Onsite Inspection Visit	July 29-August 8, 2002
Report Validation and Closeout	August 20-22, 2002

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Director, Office of Independent Oversight and Performance Assurance
Michael A. Kilpatrick, Deputy Director, Office of Independent Oversight and Performance Assurance
Patricia Worthington, Director, Office of Environment, Safety and Health Evaluations
Thomas Staker, Deputy Director, Office of Environment, Safety and Health Evaluations

A.2.2 Quality Review Board

Michael Kilpatrick
Charles Lewis
Robert Nelson
Patricia Worthington
Dean Hickman

A.2.3 Review Team

Kathy McCarty, Deputy Director, Office of Emergency Management Oversight (Team Leader)
Bill Miller, ES&H Topic Lead

Safety Management Systems
Jack Riley
Steve Kirchhoff
Al Gibson (Feedback and Improvement)

Technical Team
Mike Gilroy
Vic Crawford
Joe Lischinsky
Jim Lockridge
Edward Stafford

A.2.4 Administrative Support

Sandra Pate
Tom Davis

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APPENDIX B

Site-Specific Finding

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

FINDING STATEMENT	REFER TO PAGE
1. The work control process for some underground operations (e.g., ground control and fabrication) is not sufficiently documented to ensure that all hazards are adequately identified, analyzed, and documented.	33

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APPENDIX C

Guiding Principles of Safety Management Implementation

C.1 INTRODUCTION

The Office of Independent Oversight and Performance Assurance (OA) evaluation of safety management systems focused on selected guiding principles of integrated safety management (ISM) as applied at the Waste Isolation Pilot Plant (WIPP). OA examined: Guiding Principle #2—Clear Roles and Responsibilities—and Guiding Principle #5—Identification of Standards and Requirements.

The OA team reviewed various documents and records, including the WIPP ISM system description; associated procedures; Functions, Responsibilities, and Authorities Manuals (FRAMs); and WIPP plans and initiatives. In the evaluation of the guiding principles, OA considered the results of the OA review of the core functions. Office of Environmental Management (EM), Carlsbad Field Office (CBFO), and Westinghouse TRU Solutions, LLC (WTS) personnel were interviewed to determine their understanding of the ISM program and their responsibilities, as well as the status of ongoing initiatives and corrective actions.

C.2 RESULTS

C.2.1 Clear Roles and Responsibilities

Guiding Principle #2: Clear and unambiguous lines of authority and responsibility for ensuring safety shall be established and maintained at all organizational levels within the Department and its contractors.

EM/CBFO

DOE line management responsibility for ES&H at WIPP resides with EM and its subordinate CBFO. The roles and responsibilities of these organizations are clearly defined and understood. The Assistant Secretary for EM (EM-1) has clearly stated that line management responsibility resides with EM-1 and that other EM organizations provide program support to EM-1. The EM FRAM, last updated in March 2000, is being updated to reflect EM-1 expectations and current practices.

In September 2000, CBFO was established as a field office reporting directly to EM-1. The roles and responsibilities of CBFO are appropriately defined in a formal delegation of authority from EM-1. In addition, the line of authority between DOE line management and WTS is clear and well understood. All direction from DOE flows from EM to CBFO to WTS.

Prior to September 2000, CBFO was an area office within the Albuquerque Operations Office (AL). AL continues to have specific responsibilities in support of CBFO (including Contracting Authority for the WIPP Management and Operating [M&O] contract with WTS) and may provide support services to CBFO on request in a wide range of areas, such as security, training, communications, and legal. AL and CBFO have an appropriate memorandum of agreement (revised March 2002) that defines their respective organizational roles and responsibilities. AL is currently transitioning to a service center, in accordance with National Nuclear Security Administration (NNSA) re-engineering initiatives. During this transition, EM has proactively announced that it will assume responsibility for the human resources and contracting roles on an interim basis to ensure continuity. EM personnel indicated that they plan to evaluate future

options for performing these functions and obtaining needed technical support as the NNSA transition progresses.

The CBFO FRAM contains a comprehensive list of safety functions, responsibilities, and authorities. These are clearly identified by organization and position and include a tabular listing of functions and the respective responsibilities of CBFO managers and staff. Within CBFO the Office of Safety and Operations (OSO) is responsible for line management oversight and implementation of programs pertaining to transuranic waste disposal, worker health and safety, and environmental protection. OSO has developed an operational plan that specifies mission-oriented objectives and actions for fiscal year (FY) 2002 and, in most cases, identifies OSO staff who are responsible for implementing ES&H responsibilities identified in the FRAM.

OSO currently has one Facility Representative and is proposing to add a second. The OSO Facility Representative program plan clearly outlines the position, duties, responsibilities and authorities for the Facility Representative and establishes the protocol for internal and external reporting relationships. This program plan is consistent with the guidance provided in DOE Standard DOE-STD-1063, *Facility Representatives.*

In one case, the OSO operational plan identified ES&H responsibilities that were not fully implemented. Specifically, the OSO operational plan identifies an Industrial Hygienist position and assigns certain responsibilities to that position. However, the Industrial Hygienist position was vacant when the plan was written (as recognized in the plan) and has not been filled. The plan did not delegate these responsibilities to other staff, and some of the responsibilities were not fully performed (e.g., safety and health audits and appraisals are specified as a responsibility, but no documented audits were performed in FY 2002). CBFO reported that the responsibilities assigned to the Industrial Hygienist position have now been assigned to another OSO individual.

Although broad areas of responsibilities are well defined, OSO has not established and formally communicated specific expectations for its staff (other than the Facility Representative) to implement their responsibilities. For example, the OSO Safety Officer is designated as responsible for performing safety assessments at WIPP, but there are no implementing procedures, plans, or assessment schedules that define management expectations (e.g., scope and frequency of assessments, reporting requirements, and corrective action monitoring).

Although specific management expectations have not been formally documented, OSO personnel have received informal direction and are expected to individually determine the level and extent of line management oversight activities that are appropriate to monitor WTS ES&H performance in their areas of responsibility. OA interviews with individual OSO staff members indicate that they are performing frequent ES&H line oversight activities (e.g., walkthrough assessments), informally identifying deficient conditions to WTS for corrective action, and informally monitoring corrective actions. Further, most OSO staff have significant expertise in their technical areas (e.g., mine safety, radiological controls, and industrial safety) and many OSO staff have specific experience in mining and/or with the Mine Safety and Health Administration or the Occupational Safety and Health Administration. In addition, OSO currently has a technical assistance contractor providing technical support in such areas as industrial hygiene and safety analysis.

The good safety record at WIPP and the overall high level of compliance with ES&H requirements observed on this OA inspection indicates that CBFO's informal approach to implementing its ES&H line management responsibilities has been sufficient to date to ensure that WTS effectively implements ES&H requirements and takes timely corrective action when deficiencies are identified. However, in the absence of specific expectations, CBFO does not have clear mechanisms for holding individuals or organizations

accountable for their performance of ES&H responsibilities. Also, CBFO needs to ensure that performance can be sustained as personnel and circumstances change and that they perform sufficient assessments to effectively evaluate WTS ES&H performance.

CBFO has established processes for evaluating WTS and holding WTS accountable for ES&H performance. Performance-based indicators are reviewed and evaluated quarterly through a formal performance evaluation and measurement plan that provides the standardization necessary to ensure effective development, administration, and coordination of the fee determination process. This plan contains objective and subjective criteria to determine whether WTS achieved the minimum performance requirements during the evaluation period and includes an evaluation of WTS safety performance and the WTS Safety Management System. The contract provides appropriate provisions for factoring ES&H performance into the award fee and withholding any or all fee if ISM is unsatisfactory.

Although the appropriate framework is in place for holding WTS accountable, the informal CBFO approach to oversight, discussed above and in Appendix D, results in a situation where the CBFO evaluation of WTS ES&H performance is based largely on a subjective evaluation. For example, the performance evaluation depends largely on the information about ES&H deficiencies provided through informal channels to the CBFO evaluators. These individuals do not have the benefit of a systematic and rigorous set of formal CBFO assessment reports and ES&H performance and trend data (e.g., the number of deficiencies, the timeliness of corrective actions, and performance trends).

WTS

The ES&H roles and responsibilities for WTS personnel at all levels of the organization are clearly defined in WTS policies, manuals, and procedures, such as the ISM system description, environmental management system description, maintenance operations instruction manual, and conduct of operations procedure. The organizational interfaces among operations, maintenance, and safety personnel are also clearly defined and understood. OA's discussions with Surface Operations Maintenance and Industrial Safety and Hygiene personnel indicate that these organizational interfaces function well and help ensure that the safety professionals have a clearer understanding of the work packages and a greater knowledge of existing safety conditions at the work location.

In the environmental management area, the WIPP pollution prevention program plan describes the goals and the objectives of the pollution prevention program, including goals for reductions in WIPP waste streams. This plan also discusses International Standards Organization 14001 and environmental management system focus on continuous improvements and clearly identifies the requirements and the responsibilities for waste minimization practices, pollution prevention, greening of government, and the implementation of the affirmative procurement program.

WTS has established a number of effective mechanisms to ensure accountability for safety and to promote continuous improvements in ES&H. Performance expectations are clearly communicated through the line management organizational structure. For example, the program plan for the WTS Office of ES&H sets annual objectives, which are translated to manager-level program plans for the individual ES&H offices (e.g., Industrial Safety and Hygiene). Performance expectations for individual WTS employees are further communicated to each level of management through the WTS performance assessment surveys, which include job-specific goals related to safety. Personnel are held accountable for the specific goals through their annual performance reviews.

Worker Participation and Empowerment

CBFO and WTS have established appropriate policies and mechanisms to involve workers in safety, empower workers to stop work if safety concerns arise, and report safety concerns to management. Within CBFO and WTS, stop-work authority is supported and understood by all levels of management and the workers. Discussions with CBFO and WTS management and workers and observations of work activities indicated that personnel have a clear understanding of their responsibility to stop work and are willing to stop work when they believe it is appropriate.

To encourage employee participation and ownership for safety, WTS uses safety committees and positive employee incentives, such as recognition at safety meetings, spot awards, and the "Continuous Improvement Through You" (CITY) program. WTS has established 16 standing committees, which typically include managers and workers, that report periodically to the WIPP Executive Safety Council and address such specific topics as electrical safety, conduct of operations, lessons learned, and safety awareness. The WIPP Executive Safety Council, consisting of senior managers from WIPP, a bargaining unit representative, the occupational medical director, and a non-management exempt employee, meets to review the current activities of the various standing committees and to resolve safety concerns between CBFO and WTS.

In addition, WTS is developing a behavior-based safety program to further improve the safety culture, and actively involves workers in efforts to improve safety. In the past two years, WTS has set specific safety goals to promote employee involvement in safety and reductions in injury rates. For example, WTS is on track to meet a 2002 goal for a 20 percent reduction in hand and finger injuries. Increased worker involvement in the review and selection of hazard controls (e.g., personal protective equipment) is contributing to the reduced injury rates.

Summary of Guiding Principle #2. EM and CBFO have established institutional roles and responsibilities that are consistent with ISM expectations. CFBO has adequate processes for holding WTS accountable for ES&H performance. CBFO's OSO maintains appropriate awareness of contractor safety and operational status and OSO line management oversight efforts are contributing to the overall effective ES&H performance at WIPP. However, CBFO has not established and documented specific management expectations for OSO line management oversight activities, hindering the ability to hold individual OSO staff accountable for their performance. CBFO needs to focus on ensuring that performance is sustained as personnel and conditions change and that CBFO bases its assessment of WTS ES&H performance on formal assessment results and documented findings/corrective actions.

WTS has clearly identified roles and responsibilities for safety and is effectively implementing processes to hold organizations and individuals accountable for performance. Worker involvement in safety is also appropriate. The WTS processes have contributed to the overall good ES&H safety performance and are positive aspects of the WIPP ISM program.

C.2.2 Identification of Safety Standards and Requirements

Guiding Principle #5: Before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards shall be established that, if properly implemented, will provide adequate assurance that the public, the workers and the environment are protected from adverse consequences.

DOE

CBFO is responsible for ensuring effective ES&H programs at WIPP, providing direction to the WIPP contractor, approving the standards and requirements identification document (S/RID), and ensuring that the contractor meets applicable requirements. As the "Head of Contracting Authority" for the M&O contract with WTS, AL is responsible for incorporating changes into the contract.

Working with WTS, CBFO and AL established a generally adequate S/RID and set of DOE order requirements, which are incorporated into the M&O contract as Attachment H. The S/RID establishes an appropriate set of ES&H requirements for protecting workers, the public, and the environment. The S/RID adequately reflects the applicable requirements of Federal, state, and local laws/regulations (source documents), DOE directives, relevant industry codes and standards, and other relevant standards. The requirements are sufficiently detailed and specific to WIPP to allow implementation of the requirements through lower-level implementing documents, such as plans and procedures. CBFO and WTS have undertaken a streamlining effort to ensure that non-applicable requirements are deleted from the contract.

Although most aspects of contractual requirements are adequate, a few errors in Attachment H of the DOE/WTS contract were identified. For example, DOE Order 4330.4B, *Maintenance Management Program*, was prematurely deleted from Attachment H approximately one year ago and replaced by the revised maintenance order—DOE Order 433.1, *Maintenance Management Program for DOE Nuclear Facilities*—although WTS had not completed their evaluation of the benefits and impacts of implementing DOE Order 433.1.

Although the ES&H impacts of the errors in Attachment H are limited, the errors indicate a need for improvements in the CBFO processes for determining the applicability of DOE orders and for better interactions between CBFO and AL to ensure that the M&O contract is accurately maintained.

Also, AL and CBFO did not implement a formal system for reviewing changes in DOE directives in accordance with DOE Acquisition Regulation (DEAR) requirements. Historically, AL implemented this responsibility, but communication between AL and CBFO was not sufficient to ensure that the function was continued when AL stopped performing this function. As a result, at least one applicable directive, DOE Notice 471.3, *Reporting Incidents of Security Concern*, which was issued in April 2001, has not been incorporated into the contract. After recognizing this discrepancy, CBFO agreed to take over the DEAR Clause requirements as is reflected in the CBFO FRAM, and assigned CFBO staff to implement this process. If properly coordinated with AL, the recent CBFO actions are appropriate to reduce the likelihood of recurrences of similar problems in the future.

WTS

The S/RID is appropriately structured to correspond to WIPP organizational responsibilities, operations, and activities. WTS has assigned a qualified functional area manager to each of the 20 S/RID functional areas. WTS also has a robust process for flowdown of ES&H requirements to programs, plans, and procedures. For the most part, these implementing documents specify the ES&H requirements in clear and concise steps. As discussed elsewhere in this report, with a few exceptions, ES&H requirements are implemented in compliance with applicable requirements, indicating that the flowdown of requirements to the working level is effective in almost all cases (see Appendix E for discussion of deficiencies in implementation of requirements related to underground lighting and Hazardous Waste Operations [HAZWOPER] training requirements).

WTS performs adherence assessments to validate implementing documents and adherence to the implementing documents during work activities, including regular (every other year) reviews of all source documents to verify that appropriate implementing requirements are in place. In addition, when S/RID source documents change, WTS performs a complete review of all the affected implementing requirements. These assessments have resulted in corrective actions on a number of occasions and the process is effective with some exceptions (discussed below).

WTS has established processes to maintain the contractual requirements (i.e., the S/RID and Attachment H of the WTS contract) up to date. WTS uses a structured process to determine the applicability and impact of new, revised, and draft regulatory requirement documents to WIPP activities. WTS also has implemented an informal process for supporting changes to the WTS prime contract. In the environmental area, there is a specific contract deliverable requiring a monthly summary report of environmental-based regulations, Executive orders, DOE orders, and Federal register notices for their impact on WIPP.

Although most aspects of the processes for maintaining contractual requirements are effective, CBFO and WTS have recognized that some aspects need to be enhanced to ensure that effective performance is sustained:

- **WTS was not systematically reviewing changes to DOE orders, Federal regulations, or industry standards for applicability to WIPP (other than in the environmental protection area)**. Until recently (August 6, 2002), WTS did not have a formal procedure for assessing the impact of new requirements on WIPP procedures and operations. In addition, WTS did not have an impact assessment coordinator for a period of about one year. Although there was no formal process, WTS ES&H professionals were expected to stay current on laws and regulations related to their area of responsibility and were capable of identifying any significant regulation changes.

- **The absence of formal procedures contributed to a failure to clearly specify a few requirements.** The key procedures that provided a process for flowing down requirements from the WIPP S/RID to lower-tier documents were in draft form at the start of the OA inspection and had been for some time. In the absence of a formal procedure, effective flowdown was dependent upon the initiative of WTS technical specialists to select the appropriate requirements and ensure that they are properly implemented. Although these individuals performed well in most cases, requirements for job-site underground lighting and HAZWOPER training were not clearly specified for some operations.

In addition, OA identified that low-level radioactive waste management requirements from Chapter 4 of DOE Manual 435.1-1, *Radioactive Waste Management Manual*, were not included in the WIPP S/RID. Low-level waste is generated and stored at WIPP. Compliance with these requirements would have prevented low-level waste storage deficiencies observed by the OA team. WIPP procedures require verifying adherence to S/RID requirements based on a review of objective evidence. The adherence assessment for DOE Manual 435.1-1 did not include such a review of objective evidence.

WTS is taking prompt corrective actions to address these items. WTS formalized their impact assessment process and re-established the impact assessment coordinator position. WTS is accelerating efforts to finalize its administrative procedures, and expects to finalize them in the near future. WTS is performing a review of DOE Manual 435.1-1, and the adherence assessment will be redone.

Subcontractors

WTS processes adequately flowdown ES&H requirements to subcontractors. The WTS ES&H organization developed an appropriate template of ES&H requirements for incorporation into subcontracts. Each subcontract is reviewed by safety and health professionals to ensure that the contractual ES&H provisions are adequate. In addition to the specific subcontract provisions, WTS provides its subcontractors with a booklet of general health and safety requirements, which reflects applicable Federal regulations and WIPP health and safety requirements.

WTS has appropriate processes for verifying subcontractor compliance with ES&H requirements. The Industrial Safety and Industrial Hygiene professionals assigned to the Operations Department frequently observe subcontractor work activities. In addition, WTS ES&H Department personnel routinely observe subcontractor safety and work practices and document the results. The Subcontractor Technical Representative provides a focal point for ensuring that any ES&H deficiencies are transmitted to the appropriate subcontractor for corrective action.

The current processes have been effective in ensuring that the work performed by WIPP subcontractors—which constitutes a significant fraction of the work activities at WIPP—is performed safely. There have been no significant safety issues involving subcontractors since the inception of the present M&O contract.

Summary of Guiding Principle #5. CBFO and WTS have adequately implemented most elements of an effective requirements management system. Requirements are adequately flowed down to subcontractors. With few exceptions, the contractual requirements are comprehensive and complete, and are effectively translated into implementing procedures. WTS processes for updating the contractual requirements and verifying their adequacy are appropriate and have been effective in most cases.

Although generally adequate, shortcomings were identified in CBFO and WTS processes in a few areas (adherence to DEAR clause 48 CFR 970.5204-78 requirements, errors in Attachment H of the contract, a deficient adherence assessment, failure to include some parts of DOE Manual 435.1-1 requirements in the S/RID, procedures that are not finalized, and insufficient identification of underground lighting and HAZWOPER requirements). Although improvements are warranted in a few areas, CBFO and WTS processes for identifying requirements, translating requirements to implementing procedures, and verifying implementation at the work-activity level have generally been effective and have contributed to the good safety record at WIPP.

C.3 CONCLUSIONS

Overall, EM, CBFO, and WIPP have adequately defined and implemented most aspects of their roles and responsibilities and identified and implemented an appropriate set of requirements, consistent with ISM requirements. Some aspects of the WIPP ISM program, with respect to the evaluated guiding principles, are particularly effective (e.g., worker involvement in ES&H, WTS systems for flowdown of requirements to implementing procedures, and systems for holding individual WTS organizations and individuals accountable for performance) and are contributing to overall effective ISM performance at WIPP. Although the overall programs are effectively implemented in the areas reviewed, increased management attention is needed in a few areas (specific and documented CBFO management expectations for implementation of line management oversight of ES&H and increased formality and rigor in processes for updating contracts and performing adherence assessments).

C.4 RATINGS

The ratings of the guiding principles reflect the status of the reviewed elements of the WIPP ISM program.

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

C.5 OPPORTUNITIES FOR IMPROVEMENT

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

CBFO

1. Ensure CBFO roles and responsibilities for line management oversight and requirements management are incorporated into office-level implementation procedures or processes.

- Revise existing plans, such as the annual OSO operational plan, to clearly reflect current staffing levels and assigned responsibilities.
- Expand the OSO operational plan to address annual ES&H oversight objectives and actions.
- Formalize the process for documenting CBFO observations to enable tracking, trending and analysis.
- In coordination with EM and AL, formalize processes for transmitting DOE directives to WTS.
- Conduct a review of contract Attachment H against the current list of DOE directives prior to the next scheduled annual update, and ensure that future annual reviews are conducted more rigorously.

WTS

1. Further enhance S/RID adherence assessments and maintenance assessments.

- Expand the assessments performed by the responsible functional area managers to include a review of the complete source documents—not just requirements carried over from the initial assessment.
- Ensure that assessments are sufficient to uncover inaccuracies and gaps in the S/RID.

APPENDIX D

Feedback and Continuous Improvement (Core Function 5)

D.1 INTRODUCTION

The Office of Independent Oversight and Performance Assurance (OA) evaluation of feedback and improvement at the U.S. Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) included an examination of programs and performance of the DOE Headquarters Office of Environmental Management (EM) and Carlsbad Field Office (CBFO). The OA team examined the CBFO line management oversight of WIPP integrated safety management (ISM) processes and implementation, including the Facility Representative program, environment, safety, and health (ES&H) program management, and the award fee/performance evaluation and measurement process. At the contractor level, the OA team reviewed Westinghouse TRU Solutions, LLC (WTS) institutional processes, such as assessments/inspections, lessons learned, and corrective action/issues management. Selected WTS facility- and activity-level feedback mechanisms were also reviewed. OA held discussions with external environmental compliance organizations, including state and Federal regulators to determine their views on WIPP's responsiveness to their observations.

DOE line management oversight of WIPP is performed by CBFO for the Assistant Secretary for Environmental Management (EM-1). CBFO has established an Office of Safety and Operations (OSO) at the WIPP site to perform line management oversight of WIPP safety and environmental activities. OSO staffing consists of an Assistant Manager and six staff members (including one Facility Representative). All six staff members have been assigned ES&H responsibilities. In addition to OSO line management oversight activities, the CBFO Office of Regulatory Compliance performs regular environmental surveillances, and the CBFO Quality Assurance (QA) Team performs assessments of WTS and CBFO QA programs.

D.2 RESULTS

D.2.1 EM/CBFO Line Management Oversight

Operational Awareness. Operational awareness is a key element in the DOE oversight policy described in DOE Policy 450.5, *Line Environment, Safety and Health Oversight.* EM Headquarters personnel appropriately monitor ES&H performance at WIPP and provide feedback to support management decisions by EM-1. The EM staff maintains an awareness of operational activities at the site through frequent phone calls to CBFO and WTS and through visits to the site. The staff participates in weekly conference calls with CBFO management and monitors ES&H performance indicators published by the site.

CBFO has established several mechanisms to maintain an awareness of contractor work activities. OSO was established at the WIPP site to provide line management oversight through direct observation of work activities. The OSO staff understands that they are expected to spend most of their time in the field observing contractor activities, and OA inspection results indicate that they are meeting this expectation. OSO observations are typically provided verbally to WTS workers and managers and to CBFO management. CBFO awareness is enhanced through frequent communications with WTS management, including discussion of ES&H issues at the biweekly Plant Manager Meetings. Safety findings discussed during these meetings are documented in meeting minutes and are tracked by WTS to ensure correction. CBFO chairs the WIPP Executive Safety Council, which serves as a forum for addressing safety

complaints or safety regulations that are not resolved through regular channels. Membership includes WTS management and bargaining unit representatives as well as the chairpersons of numerous WIPP safety committees and councils. Other CBFO mechanisms for maintaining operational awareness include monitoring performance measures published monthly by WTS and an employee concerns program, which is consistent with DOE Order 442.1A, *Department of Energy Employee Concerns Program.*

CBFO management demonstrated good awareness and involvement in the review of a recent event involving tipping of an underground bucket loader; for example, CBFO management requested that corrective actions be expanded to include a broader assessment of hazards identification.

Although work at WIPP is typically performed safely, and routine safety oversight by OSO safety professionals has contributed to this good performance, the CBFO operational awareness program has not been fully effective in identifying safety and environmental deficiencies in a few work activities at WIPP. Deficiencies in safety processes, procedures, and practices that had not been identified by CBFO or by WTS include:

- The hazards for work activities in the underground fabrication shop were not fully analyzed or encompassed by a structured work control process.

- Underground emergency response procedures did not address alarm conditions for high carbon monoxide, high concentrations of flammable vapors, or low concentrations of oxygen.

- The time spent by workers surveying their hands for radioactive contamination was variable and often insufficient.

The OSO staff approach to oversight lacks rigor and formality. When an OSO staff member observes deficient conditions or practices, appropriate workers and WTS management are notified and are expected to correct the identified problem. The OSO staff does not typically document such observations. However, WTS has been proactive in documenting many OSO observations. OSO staff members routinely inform their management of observations and follow up to ensure corrective action is taken when they believe such follow-up is needed. CBFO management expectations are not clearly defined for documenting or reporting observation results, or for verifying corrective actions.

The OSO program for maintaining operational awareness relies primarily on the expertise and judgment of individual staff members. With their current approach, OSO does not realize the benefits of a structured and documented program that clearly specifies management expectations and priorities. The current OSO assessment and operational awareness activities are based on informal judgments of need and the experiences of the OSO staff rather than a systematic assessment of previous events and deficiencies and formal assessment of ES&H program effectiveness. With the informal approach to planning and conducting OSO activities, CBFO does not demonstrate that they systematically considered all WIPP activities in their planning process and assessed the relative risks, previous ES&H deficiencies, and operational conditions. Also, the informal selection of assessment activities may not cover a sufficient scope to draw conclusions about overall WTS ES&H performance and may not ensure that OSO staff resources are optimally allocated to cover the range of WIPP facilities, activities, and safety and health topical areas.

CBFO has a QA program that delineates CBFO expectations for reporting "conditions adverse to quality" (including safety deficiencies) and tracking them to resolution. However, OSO staff do not normally document adverse safety conditions as required by CBFO procedures (Management Procedure 3.1, *Corrective Action Reports*), and no safety-related deficiencies have been documented through this process to date in 2002. Thus, few safety conditions adverse to quality are analyzed or trended by CBFO pursuant

to CBFO procedures (Team Procedure TP No. 3.2), and corrective actions are not consistently tracked or verified by CBFO as required by CBFO Management Procedure 3.1. The safety observations of OSO staff members may be documented by WTS in meeting minutes, walkthrough inspection reports, and corrective action requests. Because WTS corrective action requests do not usually attribute recorded OSO observations to CBFO/OSO and may not include all relevant OSO observations, there is no complete record or database of CBFO/OSO observation results available for future analysis.

OSO has been assigned responsibility for environmental oversight. However, the OSO staff has limited expertise in this area and has focused mostly on safety rather than environmental matters. Most environmental oversight has been performed by the CBFO Office of Regulatory Compliance, which is not located at the WIPP site. Surveillances performed by this office have been effective in assessing performance in specific areas of environmental compliance but have not been of sufficient frequency or scope to maintain full awareness of day-to-day environmental activities at the site. For example, neither CBFO nor WTS identified some deficient environmental conditions identified by the OA team (e.g., contaminated soil resulting from compressor blowdown into an underground condensate tank, rusted drums of low-level radioactive waste stored outside and unprotected from rain for several years, or inadequate reporting of the environmental monitoring of contaminants associated with saltwater intrusion into a ventilation shaft). See Appendix E for further discussion.

Periodic Appraisals. The DOE policy on line management oversight specifies that line management should perform periodic, value-added appraisals of sufficient frequency and duration to confirm the contractor's safe performance of work and the effectiveness of the self-assessment program. CBFO has performed some periodic value-added assessments. For example, periodic assessments of the WTS QA program have contributed to strengthening of the program. CBFO has performed adequate assessments of equipment important to ES&H, such as the impact of salt fouling of effluent air sample probes and the condition of confinement ventilation systems. Surveillances by the CBFO Office of Regulatory Compliance have provided critical assessment of WTS environmental programs and controls (two surveillances this year, and four in the past 12 months).

Although some appraisals are conducted, CBFO does not have a rigorous and systematic program to implement the periodic appraisal provisions of the DOE oversight policy, and the scope of appraisals has not been determined using performance measures, operational awareness results, and the results of contractor self-assessments (as specified by DOE policy). For example, in the area of safety, the scope of appraisals has been driven principally by regulatory requirements, and the number and scope of assessments in this area has not been sufficient to fully evaluate contractor safety performance. No safety surveillance or audit has been conducted in 2002 and only two are scheduled (confined space entry and hearing conservation). The WTS self-assessment program had not been formally assessed by DOE since December 1999, and no assessment of this program is currently scheduled. Annual assessments of the WTS QA program have confirmed that required WTS self-assessment program elements are in place, but these assessments have not specifically assessed the effectiveness of the WTS self-assessment program in the ES&H arena.

In accordance with DOE Policy 450.5 provisions, CBFO conducts an annual review of the WIPP ISM program, with the most recent review in December 2001. This review was conducted without a procedure or protocol that would specify the evaluation criteria or approach used to conduct the annual ISM assessment and was based upon a review of WTS ISM self-assessment documentation. CBFO did not independently develop a set of criteria and a review and approach to independently examine WTS, as suggested by DOE ISM guidance.

The DOE oversight policy also specifies that contractor performance be periodically reviewed against formally established performance expectations. CBFO periodically reviews the ES&H performance of

WTS against formally established performance expectations as a basis for awarding fee in accordance with the DOE/WTS contract. CBFO has established appropriate ES&H performance expectations in the comprehensive performance measure in the WIPP Performance Evaluation Measurement but has not developed a plan for assessing performance against these expectations. Such a plan is needed to ensure that sufficient objective information is gathered during the appraisal period, through observations and assessments, to support conclusions at the end of the period.

The DOE oversight policy also identifies operational readiness reviews and authorization basis document reviews as functions of the DOE field element oversight. CBFO has performed these functions effectively. For example, the operational readiness review for contact handling of transuranic wastes was rigorous and effective. Critical reviews of authorization basis documents by CBFO have contributed to the good quality of these documents. In addition, OSO routinely reviews and provides critical feedback on such WTS document submittals as fire hazard analysis reports, safety analysis report revisions, and Price Anderson Amendment Act non-compliance responses.

DOE Self-Assessment. The CBFO QA program description and the Functions, Responsibilities, and Accountability Manual (FRAM) require management assessments of oversight effectiveness to be conducted regularly and reported annually by CBFO. Assessments of the CBFO QA program have been performed, annual reports have been issued, and corrective actions have been taken, but application of the QA program to ES&H was not assessed and thus the effectiveness of CBFO ES&H oversight was not fully assessed. Continuous informal assessment by CBFO line management has identified opportunities for improvement in ES&H oversight and steps have been taken to strengthen this program, such as providing contractor support to mentor and provide technical support to the Federal staff.

Issues and Corrective Action Management. For some findings (i.e., formal quality assurance audits and surveillances), CBFO applies a formal process for documenting, tracking, and analyzing conditions adverse to quality. The process includes provisions for documenting conditions adverse to quality in corrective action reports and can be used to address deficiencies identified by CBFO and/or WTS.

However, safety observations by the CBFO staff that are not identified during formal audits or surveillances are not normally documented in CBFO corrective action reports, which are CBFO's formal processes for tracking, analyzing, and verifying corrective actions. Although WTS records some OSO observations in the WTS corrective action request system, this system does not attribute the observations to DOE and thus does not provide a record of CBFO observations for periodic appraisal of contractor performance by CBFO. Although individual staff members are performing follow-up activities in some cases, there is no process or clear management expectation for the CBFO staff to confirm documentation by WTS or to verify completion or effectiveness of corrective actions.

For technical assessments, CBFO does not have a formal process for transmitting recommendations or requests to WTS. In at least one case, the absence of a formal transmittal appears to have contributed to a delayed response (i.e., a January 2002 report recommending improvements in the maintenance and testing of electrical power systems).

Current safety concerns and the status of previously identified safety concerns are discussed at biweekly Plant Managers Meetings. Meeting minutes verify that concerns raised by CBFO are addressed by WTS.

External Regulators. The U.S. Environmental Protection Agency (EPA) provides both oversight of WIPP monitoring activities and works with CBFO on development of WIPP re-certification documentation. Overall, EPA and CBFO have developed a strong working relationship. A professional relationship between WIPP and the regulator—the New Mexico Environmental Department—has also

been established for Resource Conservation Recovery Act activities at WIPP. Interviews indicate that WIPP is generally timely in responding to deficiencies identified by external regulators.

CBFO Partnering Approach to Line Management Oversight. Although CBFO does not have a rigorous and systematic process for performing line management oversight, the informal processes currently in place are achieving EM and CBFO management objectives. In addition to an effective Facility Representative program, CBFO places emphasis on partnering with WTS to monitor and assess ES&H performance and many of the CBFO line management activities are performed in conjunction with WTS self-assessments and operational activities. CBFO and WTS have worked together to develop systems to communicate regularly, including the formal biweekly Plant Management meetings between CBFO and WTS. These meetings are regularly used to communicate and discuss ES&H issues and solutions, and WTS maintains documentation of the minutes that confirm ES&H items are regularly discussed and resolved. In addition, the WIPP site is relatively small and focused on a single mission, and OSO personnel are in constant communication with each other and their management, as well as their WTS counterparts.

Although not documented, CBFO management has set expectations that its staff should spend most of their time in the WIPP facilities to observe work and maintain awareness of the ES&H programs and status of operations. When problems are identified, CBFO expects that OSO staff will work with WTS to ensure that the problem is corrected as soon as possible and will ensure that the problems are recorded in the WTS tracking system for tracking, trending, and analysis.

Although lacking a rigorous and formal process for planning and conducting assessments, CBFO is performing some assessments, including those required by the Occupational Safety and Health Administration and assessments selected by the OSO staff. For example, OSO personnel, based on an informal analysis, determined that electrical safety needed to be examined.

OA's review of CBFO and WTS ES&H programs and operations indicate that this partnering approach is achieving CBFO objectives, that the OSO personnel have a good understanding of management expectations, and that CBFO management has a good awareness of the ES&H status and issues. Although there is little specific documentation of OSO safety activities and observations (other than WTS records), OA's selective review of OSO activities and WTS records confirms that OSO personnel are identifying deficiencies and that corrective actions are being taken in a timely manner.

Although some aspects are working adequately, increased CBFO management attention is needed to enhance the current systems while maintaining the positive aspects of the partnering approach. Specifically, CBFO has not developed a rigorous process for regularly reviewing the adequacy of contractor self-assessments, which is needed to ensure that CBFO can continue with the limited approach to DOE line management oversight as permitted by DOE Policy 450.5. In addition, OSO personnel are not documenting findings in accordance with CBFO QA requirements. Further, the CBFO organization has not documented and implemented a systematic and rigorous approach to performing regular assessments of contractor ES&H performance (although some assessments are being performed).

CBFO management recognizes that additional enhancements in CBFO line management oversight are needed and has some actions ongoing. For example, they recognize that the CBFO QA organization needs to increase its emphasis on ES&H programs and anticipate that QA reviews will focus more on ES&H quality in the future. While there is a clear need for improvement in some areas, the CBFO line management oversight efforts, when viewed in concert with the overall effective WTS self-assessment program, are contributing to safe operations at WIPP, generally high levels of compliance with ES&H requirements, and timely corrective actions.

D.2.2 WTS Feedback and Improvement

Assessments. WTS has established a self-assessment program, with an appropriate set of procedures, to implement the DOE ISM policy and QA requirements. The program includes independent assessments of programs and procedures by the QA Department and management assessments by line managers to determine performance of their organizations. Procedures are also established for process-, system-, and program-level assessments by line organizations. Assessments are scheduled by calendar year and scheduled dates are normally met. The QA Department assists line organizations in conducting assessments upon request to ensure consistency across the site. Periodic inspections, which are required by regulation, such as inspections of radiation safety, lockout/tagout, and confined space entry programs, are conducted as required. Many WTS assessments and inspections are performance based and include observations of work activities.

WTS assesses the effectiveness of the WIPP ISM program annually. The most recent assessment, completed in August 2002, was performed as a combined review of the Voluntary Protection, Worker Protection, and ISM programs. The scope and rigor of this review were appropriate.

WTS requires each department to report the results of management assessments to the QA Department annually for inclusion in an annual roll-up report. Overall, the annual reports provide useful information. However, the report for calendar year 2001 did not include results for some of the WTS self-assessments that were conducted. Further, the annual report did not include an assessment of overall performance to identify crosscutting issues requiring increased management attention.

Issues and Corrective Action Management. WTS documents conditions adverse to quality in corrective action requests, which is a formal corrective action program that contains adequate procedures for initiating and closing the corrective action requests. Corrective actions are tracked in a separate commitment tracking system. The corrective action request procedure and commitment tracking system are being used effectively to address ES&H deficiencies.

WTS performs a semiannual trend analysis of reported non-compliant conditions, in accordance with CBFO corrective action reports and WTS corrective action request procedures, the DOE Occurrence Reporting and Processing System (ORPS), the Environmental Compliance Assessment Program, and independent assessment and surveillance reports. Reported conditions are classified by cause, using a common set of cause codes developed for this analysis, and data is trended by cause. Corrective actions are assigned and tracked in the WTS Commitment Tracking System. The results of WTS trend analysis provide useful insights into common causes of crosscutting issues. For example, the report for the first two quarters of fiscal year 2002 identifies failure to follow procedures as the most common cause of operational deficiencies. Management attention is being focused on procedural compliance to address this concern and corrective actions are being tracked in the Commitment Tracking System.

Root cause analysis procedures have been developed and used effectively to identify and address underlying causes of ES&H occurrences. For example, formal root cause analyses of five radiological events resulted in identification of root causes and appropriate corrective actions.

Lessons-Learned Program. WTS has developed a lessons-learned program that is consistent with DOE-STD-7501-99, *The DOE Corporate Lessons Learned Program.* Information from a wide variety of sources is distributed to members of a Lessons Learned Working Group who meet monthly to assess applicability to WIPP. Items judged to have sitewide applicability are disseminated to the site staff by bulletin and are posted on a lessons-learned Web page. Items that appear to be of more limited applicability are distributed to line managers for further review and action as appropriate. When

appropriate, lessons learned are sent to the Training Department for incorporation into lesson plans. A computer-based program for preparing work instructions has a lessons-learned module that helps planners to identify applicable lessons learned.

Some events that occurred at WIPP, which appear to have potential lessons learned, were not brought to the attention of the Lessons-Learned Working Group. Responsibilities for bringing such events to the attention of the group are not clearly stated in the lessons-learned procedure or in procedures for related programs, (e.g. ORPS, Computerized Accident and Incident Reporting System, Near-Miss, Root Cause Analysis, and Price Anderson Amendment Act).

Near-Miss Program. WTS has a near-miss program, which is described in the WIPP ISM system description. WTS policy and procedures require reporting of near misses and significant near misses. However, few near misses have been reported, and WTS has not taken full advantage of opportunities to learn from near misses. The lack of an effective near-miss program was identified during the ISM system verification (Phase I and II) conducted in September 1998 by EM, but has not been fully addressed by the subsequent corrective actions.

The lack of clear terminology and reporting thresholds contributes to the infrequent use of the near-miss program. In an event that occurred during the OA inspection, people from a tour group were observed to be standing on or near a salt pile that presented a potentially hazardous situation. When noticed by a WTS manager, they were told to move. The area was not posted or barricaded, and the potential for an injury existed. WTS took prompt corrective actions (installing a barricade and posting) as part of their management response to an identified deficiency. This event was not reported as a near miss, and the thresholds for reporting are not sufficiently defined to definitively determine whether events of this type must be reported for evaluation and trending. While a more effective near-miss program could provide for corrective action to preclude similar events of more serious consequence, WTS has a number of other processes (e.g., ORPS and lessons learned) that could address some of the same events, and WTS often takes prompt corrective actions for identified shortcomings that could impact ES&H.

Activity-Level Feedback and Improvement. WTS managers are expected to visit work sites frequently to review safety and seek feedback from workers. Interviews and review of records indicates that this expectation is being met. Good coverage by supervisors and safety specialists was also evident for work observed by the OA team. The supervisors' ability to identify hazards has been enhanced by recent training in hazards recognition.

WTS effectively implements a wide range of programs for involving workers in safety and soliciting safety suggestions from workers. These include job planning and post-job reviews, numerous safety-related committees and working groups, employee concerns programs, and a continuous improvement program that provides incentives for suggestions that improve ES&H (see Appendix C for additional information on these programs). These programs are effectively implemented and have contributed to safety improvements at WIPP.

In addition, a behavioral-based safety program is being developed and implemented to provide additional worker involvement in hazard recognition and control. The program will rely upon comments from peer work reviews to improve job site safety. Peer observations will be recorded, tracked, trended and corrected to improve safety. The program was recently initiated with observations by supervisors and full implementation is scheduled for September 2002.

D.3 CONCLUSIONS

CBFO line management oversight has positive attributes that have contributed to safety improvements at WIPP, and CBFO is effectively partnering with WTS. However, CBFO line management oversight is not systematic or rigorous, and is largely dependent upon the expertise of the current CBFO staff. A few safety and environmental deficiencies were identified during this OA review that had not been previously identified by CBFO or WTS. Enhancements to CBFO line management oversight are needed to improve the evaluation of the contractor self-assessment program and to provide for systematic assessments of ES&H programs and crosscutting issues.

WTS has established a formal self-assessment program and has effectively applied this program to ES&H activities at WIPP. A willingness to accept feedback from internal and external sources in order to improve performance was evident at all levels of management. Root cause analyses are conducted when appropriate to identify and address event causes and periodic trend analyses are used effectively to identify and address crosscutting issues. Several feedback and improvement mechanisms have been established and used effectively to obtain feedback and make improvements at the activity level. Overall, the WTS feedback and continuous improvements programs are effective, with few deficiencies.

While there is a need for improvement in some aspects of CBFO line management oversight efforts, the effective WTS feedback and continuous improvement program, in combination with the informal CBFO line management activities, are resulting in safe operations at WIPP and generally high levels of compliance with ES&H requirements.

D.4 RATING

Core Function #5 – Feedback and Continuous Improvement.....EFFECTIVE PERFORMANCE

D.5 OPPORTUNITIES FOR IMPROVEMENT

CBFO

1. **Develop a structured program for fully implementing operational awareness provisions of DOE Policy 450.5 and performing periodic appraisals of contractor ES&H performance.** Specific actions to consider include:

    - Include a mechanism for documenting and analyzing observations by CBFO.

    - Clearly convey management's expectations for such activities as frequency and scope of reviews, threshold and methods for documentation of observations, distribution of reports, corrective action follow-up, and contractor response.

    - Establish and implement an operational awareness program for reviewing operational activities at the WIPP site that have the potential for adverse environmental impact.

    - Ensure that individuals who are assigned responsibility for environmental awareness reviews

have qualifications commensurate with this responsibility.

- Strengthen the CBFO annual review of ISM systems by independently assessing WTS performance against a predetermined set of criteria, review, and approach documents.

- Establish and implement a plan for independently assessing WTS performance against the ES&H performance expectations specified in the performance evaluation and measurement plan.

- Establish a structured program to implement the periodic appraisal provisions of DOE Policy 450.5.

- Include provisions for planning operational awareness activities and appraisals based upon performance measures, operational awareness results, and the results of contractor self-assessments.

- Ensure that appraisals and operational awareness activities are performed with sufficient frequency, scope, and depth to independently verify safe work performance by WTS and the effectiveness of the WTS self-assessment program.

- Coordinate the efforts of OSO with other CBFO organizations (Regulatory Compliance and QA) to ensure effective and efficient use of CBFO technical resources and sufficient coverage of WIPP activities.

2. **Enhance processes for documenting deficiencies identified by CBFO and monitoring and verifying contractor corrective actions.** Specific actions to consider include:

   - Document as corrective action reports any safety conditions adverse to quality that are identified by the CBFO staff.

   - Establish and implement a formal CBFO process for transmitting and tracking recommendations and action requests provided to WTS.

3. **Strengthen CBFO self-assessments processes.** Specific actions to consider include:
   - Perform periodic assessments of the effectiveness of CBFO ES&H line management oversight of WTS, including a review of operational awareness activities.

   - Increase the focus on CBFO QA program implementation in the ES&H arena in annual management assessments of the CBFO QA program.

WTS

1. **Enhance processes for developing the annual roll-up report of management assessment results so that it provides a more comprehensive and rigorous assessment of ES&H performance.** Specific actions to consider include:

   - Ensure that the results of all assessments performed by WTS are collected and included.
   - Analyze results for crosscutting issues.

2. **Strengthen and increase the use of the WIPP Near-Miss Program.** Specific actions to consider include:

- Better define reporting thresholds, including provisions for analysis and corrective action management.

- Provide training to the WTS staff on management expectations for identifying, reporting, and analyzing near misses.

3. **Identify opportunities to share lessons learned with other DOE sites.** Specific actions to consider include:

   - Modify WTS procedures to ensure that events at WIPP are brought to the attention of the WIPP Lessons-Learned Working Group**.**

   - Ensure that events are analyzed to determine whether the associated lessons learned might benefit other DOE sites and disseminate the lessons learned accordingly.

APPENDIX E

Core Function Implementation (Core Functions 1-4)

E.1 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Independent Oversight and Performance Assurance (OA) evaluation of work planning and control and implementation of the first four core functions of integrated safety management (ISM) at the Waste Isolation Pilot Plant (WIPP) focused on safety performance during conduct of facility maintenance and operations associated with surface (above-ground) and mining activities. Observed work activities included maintenance, mining operations, facility operations, welding, and environmental controls. Procedures and policies, such as stop-work policies, were evaluated, and hazard analysis and control systems were examined. This approach enabled OA to evaluate the implementation of work control processes governing a broad spectrum of work in the areas of operations, maintenance, and environmental protection.

E.2 STATUS AND RESULTS

E.2.1 Core Function #1 – Define the Scope of Work

Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

Operations

Detailed operating procedures are used to define the scope of operations within WTS. These procedures, supplemented with operating plans as needed, adequately define the scope of work for facility operations. Authorized operations at WIPP are clearly defined in the WIPP safety analysis report (SAR) and associated technical safety requirements (TSRs). The WIPP SAR and TSR documents are current and address the Contact Handled Waste, which is currently being handled at WIPP.

WIPP authorization basis documents (e.g., SAR, permits, authorization agreement) clearly define the safety envelope and authorized work activities. WTS activities involving handling, storage, and disposal of radioactive materials at WIPP are conducted in accordance with the terms and conditions of a signed authorization agreement from the Carlsbad Field Office (CBFO). The authorization agreement summarizes the terms and conditions binding Westinghouse TRU Solutions, LLC (WTS) for operation of the facility.

Maintenance

WIPP generally has an adequate definition of work for its maintenance work packages as required by the maintenance process management control procedure and the maintenance operations instruction manual. The majority of the maintenance work packages are straightforward tasks that are well understood by the crafts personnel. Plan of the Day (POD) and Plan of the Week (POW) meetings with managers ensure that daily priorities are established and that required resources are coordinated where necessary. Work tasks that impact other operations or maintenance are identified in the POD document and discussed.

Walkdowns for maintenance work are effectively used to correctly identify the scope of work. A large percentage of maintenance work in WIPP surface operations involves preventive and corrective maintenance. These work packages have been performed many times by an experienced crew of craft personnel, so the scope of these types of jobs is well understood. Walkdowns for maintenance packages (other than skill-of-the-craft and preventive maintenance) typically include a craft foreman, the cognizant engineer, and the planner. The walkdown is performed to clarify the scope of work, establish cost estimates, and identify any job-or location-specific hazards for developing a job hazard analysis (JHA) for the work package and to ensure the work steps are appropriate. Safety professionals are involved where appropriate.

WTS is using a process to identify and define many low-hazard work activities as skill-of-the-craft. The WTS groups that perform skill-of-the-craft work activities have developed work documents that define the nature of the work. The skill-of-the-craft matrix checklist is a useful tool for line management to evaluate a work activity for skill-of-the-craft work applicability and to pre-qualify crafts expertise to perform work without the need for an extensive or involved work package. For those tasks that have been designated as skill-of-the-craft, hazards and hazard controls are identified.

However, the skill-of-the-craft process is not adequately defined in WIPP procedures. Although flowcharts in the maintenance process procedure have included a skill-of-the-craft workflow process, the procedure does not adequately define the applicability of the process and roles and responsibilities, and does not specify processes/expectations for maintaining, updating, and documenting the skill-of-the-craft matrix checklist. In addition, some groups that are not part of the maintenance process (e.g., Underground Operations) have "skill-of-the-craft-like" activities (e.g., metal fabrication) that are not considered maintenance and therefore are not addressed in the maintenance process procedure or any other procedure.

Environmental Protection

The WIPP site is governed by a Resource Conservation and Recovery Act Part B permit, issued by the New Mexico Environment Department in October1999. In defining the environmental aspects of mixed transuranic (TRU) (radioactive and hazardous) waste management, the authorization basis documents effectively reflect conditions/requirements in that permit.

To protect the environment and implement the ISM concept, WIPP has developed an effective and well-documented environmental management system (EMS), which establishes environmental programs to provide safeguards for the community, the workplace, and the environment. To strengthen environmental management, WIPP has obtained and maintains International Standards Organization (ISO) 14001 certification through semi-annual audits by an independent company that is approved as a registry for ISO 14001. The WIPP EMS provides the necessary organizational structure, planning processes, procedures, and resources for developing and maintaining the WTS environmental management policy. The WIPP environmental management system implementation document describes the elements of the WTS EMS and the processes necessary to implement the EMS in accordance with the WTS environmental management policy. This EMS implementing document is incorporated in the CBFO ISM system description.

Summary. WTS maintenance, operations, and environmental protection activities have effective processes for defining the scope of work and most processes are effectively implemented. Most hazard control plans and work instructions that were reviewed adequately defined the work activities. These processes can be further improved by better procedures to define expectations for skill-of-the-craft activities.

E.2.2 Core Function #2 – Analyze the Hazards

Hazards associated with the work are identified, analyzed, and categorized.

Project, Program, and Facility-Level Hazard Analysis

The analysis of hazards associated with TRU waste operations is adequately addressed in the WIPP SAR. The development of hazards analyses in the SAR reflects proposed changes of work scope evaluated in the National Environmental Policy Act (NEPA) documentation and from changes in facility/system configurations described in engineering change proposals or engineering change orders. The process for evaluating and documenting major scope and design changes are described in the NEPA compliance procedure, and the engineering, conduct of operations, and maintenance and operations instruction manuals. The OA review of the SAR concluded that the most significant hazards to workers, the public, and the environment (e.g., fire and seismic event) were identified and sufficiently analyzed and documented in the SAR. Hazards associated with modification work packages reviewed during the OA inspection, such as the Mining of Main Entries South of Panel 2, were identified and adequately addressed in modification work packages and job safety analyses (JSAs).

The OA team identified several noteworthy project or facility-level hazard analysis programs. For example, the WTS Industrial Hygiene Status Report and Assessment Strategy (SRAS) program is an effective process used by WTS Industrial Hygiene to assess and document workplace exposures, identify appropriate hazard controls, and recommend medical surveillance and industrial hygiene monitoring. Furthermore, the SRAS program has been designed with the intent of fulfilling the baseline hazard survey requirements of the DOE worker protection order (DOE Order 440.1A). WIPP is one of the few sites in the DOE complex that is meeting these objectives, as well as meeting the intent of the recent DOE Industrial Hygiene Practices Standard.

In another example, WTS Mine Engineering, Mine Operations, and Industrial Hygiene have been proactive in identifying and analyzing the hazards for diesel particulate matter air contaminants in underground workspaces. Pending Mine Safety and Health Administration (MSHA) regulations for diesel particulate matter will impose considerable technical challenges to controlling mine ventilation systems, and will limit the exposure of workers to diesel particulate matter, a contaminant that had previously not been regulated. At WIPP, initial air sampling for diesel particulate matter has been conducted for a variety of diesel equipment used underground to characterize the diesel particulate matter hazard, even though the new MSHA diesel particulate matter regulations are not yet in effect. In addition, several interim corrective actions to mitigate diesel particulate matter air contaminants have already been identified and implemented (e.g., new tagging procedure).

The Resource Conservation and Recovery Act (RCRA) permit-required groundwater monitoring is being effectively implemented to allow the identification of potential hazards to underground disposal. The well sampling system, for example, has been designed to aid in the characterization of groundwater contaminants. The wells are closed and locked to prevent tampering. An air-conditioned van has been outfitted to provide power to the deep pumps (600-900 feet) to enable the connection of sample lines from within the mobile laboratory for collection and/or analysis, and to collect the purge water in a trailer behind the van for later disposal in an evaporation pond.

Activity-Level Hazard Analysis

Hazards associated with operations activities are analyzed during the procedure development and review process. As part of a documented process, procedures are routed to the appropriate health and safety organizations for review. All review comments must be addressed. In addition, a document review

committee reviews all new procedures and procedures that have undergone a full revision. The responsibilities of this committee include verifying that operations procedures receive the appropriate technical review to ensure compliance with applicable administrative controls; nuclear, radiological, and industrial safety requirements; technical design limits; site permits; and various Federal regulations. This system provides an effective method to ensure operational hazards are sufficiently analyzed, and the appropriate controls are identified and implemented.

The hazards for almost all surface and mine maintenance tasks (i.e., preventative, predictive and corrective maintenance) were identified and documented, and the hazards analysis was sufficient to identify the appropriate controls. Maintenance work control and hazard analyses processes are described in the WTS maintenance operations instruction manual and are flowcharted in the WTS maintenance process procedure. For maintenance work activities, other than skill-of-the-craft, hazards are effectively identified and documented through work instructions, a JHA checklist, or though updated versions of the JHA checklist, such as the Work Integration Template, or the SIMON computer-based hazard analysis process, which was developed for use at WIPP. The SIMON program, which is gaining greater use in maintenance work planning, aids the work planner by identifying potential hazards and inserting the appropriate cautions, hold points, and hazard controls into the work instructions.

Low to moderate hazard maintenance work that is performed as skill-of-the-craft does not require a written work instruction, but is identified through an action request and/or a work order. Hazards are documented in generic skill-of-the-craft hazard assessments, which are prepared for a variety of routine maintenance work activities, such as "rework lighting." For a maintenance work activity to qualify as a skill-of-the-craft activity, a skill-of-the-craft questionnaire must be completed. The questionnaire provides an effective way to define skill-of-the-craft work. In general, skill-of-the-craft job hazard templates and the accompanying skill-of-the-craft proficiency cross references address the most likely hazards and hazard controls for routine maintenance activities. Of concern, however, is that the skill-of-the-craft process is insufficiently documented in WTS procedures. The skill-of-the-craft process is not discussed in maintenance operations instruction manual, and is minimally addressed in the maintenance process procedure through a few flow charts and a checklist. These two procedures lack a description and application of the hazard analysis process for skill-of-the-craft activities and management expectations for skill-of-the-craft books (e.g., development, review, approval, use by workers, required reading, and involvement of workers and ES&H organizations). Furthermore, it is not clear under what conditions, if any, pre-job briefings and job walkdowns are required for skill-of-the-craft work, or how the graded approach to performing hazard assessments is integrated with skill-of-the-craft work. For some maintenance groups, such as underground maintenance, over one-third of all work is performed through the skill-of-the-craft process.

Although many work activity-level hazards are identified, analyzed, and/or sufficiently documented, some underground operations (i.e., Ground Control, Mining and Fabrication) do not have a documented work control process to define how hazards are to be identified, analyzed, and controlled. Therefore, some hazards were not adequately analyzed (i.e., underground fabrication shop work, and load-haul-dump [LHD] machine tipping accident). For "skill-of-the-craft-like" activities, conducted by the Mining and Fabrication Group, Mining Operations has developed 21 JSAs for a number of underground work activities. Although the content and quality of these JSAs are good, there is no WTS work process document that describes this "skill-of-the-craft-like" process, the types of work activity which can be performed under a JSA; the limitations of the JSA process; or processes for developing, reviewing, approving, and revising JSAs. The JSA process is informally described in an instruction set and through an MSHA instruction guide, but this JSA process is not described in or bounded by any other WTS work control processes. Similarly, for corrective maintenance work performed by the Ground Control and Mining Groups, the work control processes are similar to the WTS maintenance work control process, although these groups are not bound to follow the maintenance work control process. In addition, the

process for performing corrective maintenance by these groups is also not documented in WTS procedures. As a result of the "skill-of-the-craft-like" process and the modified corrective maintenance process not being formalized, some hazards are not sufficiently identified or analyzed.

For example, no work control process, such as the "skill-of-the-craft-like" or JSA process, was applied to work activities in the underground fabrication shop. Therefore, the hazards associated with underground fabrication and shop work were not recognized. Hazards associated with welding, grinding, cutting, and shearing of metals were not identified or analyzed. As a result, the hazard controls (e.g., personal protective equipment, training, and shop worker's qualification program) are not defined or documented (discussed further under Core Function #3). Industrial Hygiene has not been adequately involved in the evaluation of the welding fume hazard, because the work activities and hazards have not been defined or documented.

Likewise, the recent LHD work activity that resulted in the tipping over of an LHD, and a subsequent occurrence report, was not described in a JSA or work package. (An LHD machine is a low silhouette, wheeled bucket loader specially designed for use in mines.) The LHD tipping accident, which occurred during the week prior to the OA team's arrival on site, resulted from unanalyzed site work conditions and the failure to recognize the potential tipping hazard. Although the LHD operator was trained and qualified, training and qualification programs, without a work activity-specific hazard analysis, are not always sufficient to identify or analyze current or changing hazards in the workplace. Because the mucking operation being performed at the time of the accident was not addressed in a work package or JSA, an opportunity to analyze the hazard and implement the controls was missed. One corrective action for this near-miss occurrence, as identified by WTS, is the development of JSAs for similar individual items of equipment. However, a formal framework for the JSA program is needed.

DOE Policy 450.4, *Safety Management System Policy*, and the WTS Quality Assurance Program Document (QAPD) require that work will be performed under established and documented processes and procedures. There is no work control process that envelopes, describes, or controls some of the work activities, such as the JSA process, the "skill-of-the-craft-like" process, and some corrective maintenance work packages, which are conducted by underground operations. Although not a violation of MSHA regulations, the lack of a formal work control process for some underground operations (e.g., ground control and fabrication) is not consistent with the work control process expectations for a Category II nuclear facility, such as WIPP.

Finding #1: The work control process for some underground operations (e.g., ground control and fabrication) is not sufficiently documented to ensure that all hazards are adequately identified, analyzed, and documented.

In the environmental hazards analysis arena, most hazards are effectively identified and analyzed. However, the ongoing hazard characterization to determine the potential environmental impacts to shallow ground water in the Dewey Lake Redbeds Formation from recently discovered perched groundwater in the Santa Rosa Formation has not been incorporated into the site environmental plans and reporting mechanisms. The elevated levels of total dissolved solids and chlorides are not a regulatory violation and do not currently present a hazard to the environment or the public because the nearest protected groundwater is approximately 3,000 feet away. However, DOE Order 5400.1, *General Environmental Protection Program,* and DOE Order 231.1, *Environment, Safety, and Health Reporting,* require that the environment at and near DOE facilities be monitored to ensure the safety and health of the public and the environment. WTS has indicated that the environmental monitoring plan will be modified, and the 2001 Annual Site Environmental Report will reflect this shallow groundwater monitoring. In addition, a patch of discolored soil near the compressor building (Building 485) has not been analyzed for

environmental hazards associated with oil. Although expected to be small, the potential environmental impact of this legacy discharge needs to be evaluated.

The OA team observed a few other exceptions in an otherwise effective hazards assessment program.

- Some hazards were missed from the hazard assessment worksheet prepared to support the work of a WTS subcontractor that is responsible for removal of sewage from portable toilets. In addition, material safety data sheets for two chemicals used for this activity were not readily available in the work area (underground) as required by Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910.1200). Furthermore, the chemical, and bloodborne pathogen hazard potentials were not identified, although training on such hazards had been provided to workers.

- Hazards associated with the lack of underground lighting and ergonomic or lifting hazards are not on the JHA checklist and have not been consistently addressed. Although MSHA regulations indicate that a miner's cap light is sufficient for most underground work activities, there are some activities, such as remote underground electrical and mechanical maintenance, that may require an evaluation by Industrial Hygiene to ensure that the lighting is sufficient to perform the work. Likewise, there are a number of work activities that involve either heavy lifting (e.g., underground cable movement) or repetitive motion. Without including illumination, ergonomic, or lifting hazards in the standard JHA checklist, the opportunity to evaluate these potential hazards may be missed.

- Visitor training and indoctrination programs do not fully address a few hazards (e.g., heat stress and unique environmental hazards, such as poisonous plants and animals) that are likely to be encountered by unescorted visitors to the WIPP site. The GET-300 course is provided for visitors that need short-term (i.e., 30 days) unescorted access to the above ground areas of WIPP. The accompanying video adequately addresses such general employee training topics as the primary work and mission at WIPP, security topics, basic vehicle safety rules, postings, basic radiation topics, and site alarms. However, although GET-300 is designed to provide unescorted access, the video is presented from the perspective that visitors are escorted at all times, and some safety information needed by unescorted visitors is not presented. For example, the video states that visitors should notify their escort if they feel ill or are hurt, but the video does not mention the site-specific phone number to report emergencies. According to the WTS Training Manager, a pamphlet containing the emergency number should be handed out during the training; however, no pamphlet was handed out during the two separate GET-300 training sessions presented to the OA team.

- Although radiological hazards at WIPP are well characterized and analyzed, handheld alpha contamination monitoring equipment in use at WIPP appears to lack the sensitivity to detect minimum alpha surface contamination levels as specified in draft WIPP procedures (WP 12-HP1100). Although the technical basis and limits of sensitivity for handheld alpha survey equipment have been documented, the Waste Operations health physics group, which conducts surveys and provides instrument calibration to known source standards, does not provide or record the minimum detectable activity or sensitivity for field measurements for these instruments. Handheld alpha contamination monitoring instruments in use at WIPP are marginally able to detect 300 disintegrations per minute (dpm) per 100 square centimeters (cm^2) of alpha contamination when scanning surfaces under proper use conditions, but are unlikely to detect the 100 dpm/100cm^2 total alpha surface contamination limit required in the draft procedure. The discrepancy in the technical basis is most likely attributed to a failure to correct for the effective area of the detector probe, which resulted in an overestimation of detector sensitivity by a factor of two, and the limitations of the survey equipment.

Summary. Hazards at the WIPP site are adequately identified, analyzed, and categorized. At the project, program, and facility level, several examples of hazard analyses programs were noteworthy, particularly in the areas of worker exposure assessments and the analysis of diesel particulate matter for underground operations. At the activity level, hazards associated with operations activities are fully analyzed and documented in technical procedures. The hazards for most surface and mine maintenance tasks are recognized and effectively analyzed.

The lack of a well-documented work control process for some underground operations has resulted in hazards at the underground fabrication shop not being identified, analyzed, or documented and may have contributed to the recent LHD tipping accident. Although the work control process is not well defined in the underground fabrication and ground control areas, the WTS organization generally identified and analyzed most hazards, typically through training and/or JSAs and work packages. Other deficiencies in hazard analyses include some potential environmental concerns that were not sufficiently analyzed or documented, insufficient documentation of expectations for the skill-of-the-craft program, and a few hazards missed in subcontract documents, WIPP visitor training, and hazard analysis templates used by work planners and line managers.

Although some weaknesses are evident, the hazard analysis processes are effective for the majority of the work activities performed at WIPP. Further, WTS, with CBFO support, has proactively implemented some hazard analysis processes that are more stringent than the current minimum requirements (e.g., exposure assessments).

E.2.3 Core Function #3 - Develop and Implement Hazard Controls

Safety standards and requirements are identified and agreed upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

WIPP institutional-level controls in the WIPP technical specifications are effectively implemented to ensure the safety basis described in the SAR is maintained. The technical specifications establish appropriate administrative controls for such institutional programs as maintenance, configuration control, and conduct of operations, as well as such equipment administrative controls as requirements for waste hoist performance.

Most operational activities at WIPP are routine and are controlled by established procedures and other documents, such as round sheets. Facility operations, waste handling, and environmental management procedures are technically accurate, concise, and generally well written. The procedures provide the appropriate level of instruction for the appropriate personnel and adequately address the actions necessary to safely operate and monitor equipment or perform required activities. For example, operator round sheets are comprehensive, including minimum and maximum acceptable values, and cover required equipment checks. The round sheets are arranged such that the operators can easily complete the rounds in chronological order along an efficient route. Equipment logs are extensively used to document completion of pre-operational checks, changes in equipment status, and equipment deficiencies. In another example, the technical basis and specific requirements for underground ventilation are well documented in the WIPP mine ventilation plan. Controlled copies of applicable procedures are maintained as operator aids at operating stations throughout the facility. The extensive use of controlled procedures at all operating stations (e.g., air compressor rooms, control rooms and panels, power panels, waste handling areas, and heavy equipment cabs) is noteworthy because it provides current information for immediate operator use at the needed location.

Maintenance activities at WIPP were generally performed in accordance with established controls. Most work controls were adequately identified in work packages developed in accordance with the

maintenance process management control procedure and the maintenance operations instruction manual. The procedure and manual both addressed the use of and creation of corrective, preventive, and modification work packages. The skill-of-the-craft process, however, is not addressed in the manual and is minimally addressed in the procedure. As a result, the skill-of-the-craft program is insufficiently documented to ensure that management expectations are defined and consistently followed (see Core Function #2).

WIPP has developed adequate controls to effectively manage hazardous waste. For example, hazardous waste satellite accumulation areas are posted with signs that provide a list of the regulatory requirements, the owner of the area, and emergency contact numbers. The signs clearly marked the areas as containing hazardous waste.

In general, radiological controls are acceptable at WIPP. For example, radiological controls for Contact Handled Waste Processing activities are contained in a general radiological work permit (RWP). Many activities are bounded by the RWP, and the controls are well tailored to the activities.

WIPP conducts radiological effluent monitoring of release points consistent with 40 CFR 61 National Emission Standards for Hazardous Air Pollutants (NESHAPS) requirements. Sample collection procedures are sufficient to ensure that appropriate samples are collected as required. The frequency of sample collection is based on collection efficiency, sample dust loading, and co-sampling requirements of stakeholders. Established operational checks and routine maintenance of the sample collection stations are adequate to ensure the stations remain operable.

Although effective controls for most hazards were developed and implemented, the OA team identified a few cases where some hazard controls for underground work activities were deficient or did not completely implement applicable requirements.

- **Hazard controls for the underground fabrication shop are inadequate in several areas**. For example, several equipment items in the shop had equipment inspection tags that had expired. In addition, there are no training or qualification requirements for work performed within the shop, with the exception of welding. There is no list of qualified operators, nor any process that establishes and ensures that training requirements are adequate prior to operating the equipment. Some shop operators have not received training on the shop equipment that they are authorized to use. Welders have not received training on the placement and use of the local exhaust during welding activities. Because there are no hazard analyses for the shop equipment (i.e., cutting, grinding, shearing, and sanding equipment), hazard controls for shop operations other than welding are not identified or documented. Welding controls are addressed only through training and/or qualifications. Welding activities have not been adequately evaluated by Industrial Hygiene to ensure that the hazard controls are adequate for all types of welding and weld materials that are expected to be in use. (See Core Function #2 for discussion of associated hazard analyses deficiencies.)

- **Underground Utility Services and Facility Operations do not have appropriate procedures addressing response to such abnormal events as discovery of high carbon monoxide concentrations, flammable vapor concentrations, or deficient oxygen concentrations**. WTS has a requirement from DOE Order 5480.19, C*onduct of Operations for DOE Facilities,* that procedures are developed for all anticipated operations, evolutions, tests, and abnormal or emergency situations. Contrary to this requirement, underground Utility Services monitors for high carbon monoxide concentrations, flammable vapor concentrations, or deficient oxygen concentrations during established rounds, but relies on worker training and qualifications to provide the directions for response to these types of events. Although Facility Operations has a procedure to address a hazardous material release, the procedure does not have clear entry conditions for underground

monitoring of hazardous gas/vapor concentrations and does not address discovery of oxygen deficiencies in unexpected places, such as the underground rooms or drifts.

Although generally adequate, a few isolated deficiencies were noted with some radiological and hazardous materials controls.

- **No control mechanism equivalent to the general RWP for waste processing activities in the Contact Handled Waste Bay exists for individuals who are required to be escorted**. Personnel on general tours may be permitted to enter the radioactive materials areas and buffer areas with an escort and might come in close proximity to waste materials. For individuals requiring an escort, no mechanism is used to convey information on potential radiological hazards and controls. Furthermore, as-low-as-reasonably-achievable (ALARA) tracking of doses for these individuals or dose reconstruction following positive thermo-luminescent dosimeter results would be difficult.

- **Radiological survey reports conducted for TRUPACTs (TRU package transporters), transport vehicles, and some routine area surveys did not contain minimum detectable activity (MDA) levels for removable contamination and fixed alpha and beta-gamma activity**. Some listed sample results were below the MDA of the analytical technique utilized. These surveys are not in keeping with good health physics data reporting practices and could limit the ability to trend contamination build up or low-level tracking if extended to other surveys. WTS is currently revising the radiological surveys procedure to address this concern.

- **The radiological incident response program procedure does not meet the DOE standards for action levels for incident sampling (special bioassay) in accordance with the applicable DOE standard (DOE STD-1121-98)**. Some work place conditions (indicators) that could lead to 100 millirem (mrem) committed effective dose equivalent (CEDE), such as the unplanned spread of contamination above 1500 dpm on accessible surfaces or significant contamination found on personal protective equipment (PPE), are not included. WTS is currently revising the contamination control procedure to provide additional indicators; however, the current draft document still omits some indicators referenced in the DOE standard. Additionally, where suspected intakes of plutonium are identified, the program does not require internal dosimetry personnel to get and utilize, if possible, the most sensitive follow-up bioassay methods to confirm the intake and quantify any resulting doses. As a result, some actual intakes with resulting doses in the 10 to 100 mrem range may go undetected. Future bioassay samples taken in response to additional events with the same individual may be difficult to interpret as a result of radioactivity from a previously reported no dose/no intake assigned event, particularly if a more sensitive bioassay procedure, such as fecal sampling, is conducted during the subsequent event.

- **Controls in the less-than-90-days hazardous waste storage area have not been modified to reflect changing conditions**. The area was not originally set up to handle the number of drums of potentially hazardous liquid collected from the bottom of the exhaust shaft. As a result, drums must be stored on pallets with built-in secondary containment. These pallets collect rainwater that must be emptied after a determination is made that a drum did not leak. An accident involving a dropped drum could result in the drum contents running out of the waste storage area on to the ground if the drum falls off the pallet or the pallet containment is partially full of rainwater. Markings to show pallet spacing were not present in the storage area; a best management practice used at other hazardous waste storage areas to ensure regulatory aisle spacing is maintained.

A few isolated deficiencies were also identified with WTS manuals and procedures:

- **The Industrial Hygiene and Industrial Safety program manuals do not fully identify or implement the applicable standards and requirements identification documents associated with some Industrial Hygiene and Industrial Safety requirements**. The WIPP Industrial Hygiene program manual does not reference or incorporate the MSHA requirements for underground lighting; it references only the underground lighting requirements for construction work as defined in 29 CFR 1926.56. However, a memorandum of agreement between DOE and MSHA indicates that, for underground work, the MSHA requirements (including underground lighting) take precedence. In another example, the Industrial Hygiene program manual does not sufficiently explain the application of OSHA 29 CFR 1910.120 Hazardous Waste Operations (HAZWOPER) at the WIPP site. Although Section 4.0 of the Industrial Hygiene program manual identified the HAZWOPER requirements, neither the implementation of those requirements or roles and responsibilities for implementation are identified. Because a number of similar external safety and health regulations at the WIPP site are overlapping or conflicting (e.g., MSHA, OSHA Construction, OSHA General Industry, and RCRA), the Industrial Hygiene and Industrial Safety program manuals should provide the mechanism for clarification on interpreting and applying these requirements at WIPP.

- **A few controlled procedures were not current, located in the correct manual, or readily available to the operators** . In a few cases, procedures being used were the wrong revision or contained earlier revision cover sheets, with the correct revision behind the outdated cover sheets. In another example, several controlled procedure manuals contained a procedure no longer listed in the procedure index. Controlled copies of the waste handling operator event response emergency procedure were not maintained underground. Following notification of this OA observation, facility management reported that controlled copies of this procedure had been placed in the underground handbooks.

Summary. Controls are established and implemented for recognized hazards at WIPP. Processes for the development and implementation of procedures are well established. Controls for maintenance work are effective and are adequately maintained for most jobs through the use of work packages. Other administrative controls are thorough and consistent with the hazard identified. Radiological control and environmental management programs are generally effective. However, a few controls, such as some operations procedures, controls in the underground fabrication shop, visitor radiological controls, radiological and bioassay sampling, and waste accumulation area containment have some deficiencies. Corrective actions are underway for several of the identified deficiencies.

E.2.4 Core Function #4 – Perform Work Within Controls

Readiness is confirmed and work is performed safely.

The OA team observed facility operations, mining activities, and maintenance on above and underground equipment. With few exceptions, work was safely performed in both above and underground locations by highly skilled and experienced workers and supervisors using established controls and appropriate PPE based on job hazards. As examples:

- Waste handling operations conducted underground and in the Contact Handled Waste Bay rigorously followed waste handling procedural steps and the WIPP conduct of operations procedure. Workers were knowledgeable of their duties and hold points (e.g., radiological surveys and data recording).

- Corrective and preventative maintenance and modifications work was performed by mine maintenance and underground operations groups in accordance with the hazard controls defined in work packages.

- Hoisting and rigging activities were conducted in accordance with procedures, and the required PPE, including hard hats and steel toe shoes, was worn. Individuals kept appropriate distance from suspended loads, and operators followed good equipment and area watch practices during unloading activities.

- Controls were followed during transport of the waste in the Contact Handled Waste Bay and from the waste shaft to the emplacement location, including stopping traffic during waste movement and using spotters for movement of transport and forklifts.

- Salt and waste hoist operations were performed safely and within established controls.

- Underground ventilation systems were rigorously maintained by underground Utility Services to ensure that work activities receive the appropriate airflow. Underground Utility Services workers performed ventilation measurements based on the equipment operating in the drift to ensure the minimum flow requirements as documented in the mine ventilation plan.

WIPP operations activities were effectively performed in accordance with rigorous conduct of operations requirements. Operators generally performed rounds, duties, central monitoring system activities, waste handling activities, hoist operations, underground utility services, miscellaneous equipment checks, and document reviews in accordance with requirements delineated in procedures, round sheets, and the conduct of operations procedure. Operations activities were performed safely, with many safety-conscious aspects and only a few deficiencies. Examples of operators performing effectively include:

- Facility Operations shift turnovers were conducted in accordance with conduct of operations procedure requirements. The off-going facility shift manager conducted the shift turnover meeting and covered facility status in sufficient detail to ensure the oncoming shift was aware of current and planned conditions. Abnormal equipment conditions were appropriately documented, and action requests were initiated when required.

- Operators demonstrated good conduct of operations practices and a strong commitment to safety. Procedure checklists and equipment logs were appropriately completed. In one example, during a pre-operational check, an operator found a defective position indicator on a lifting rig for the waste drums and took conservative action to resolve the finding.

- Following the discovery of equipment problems during waste emplacement, operators ensured that the waste being handled was placed in a safe condition and suspended further downloading of waste until the equipment was replaced and tested.

Only one shortcoming was identified in the conduct of operations. Specifically, operators deviated from a procedure without the appropriate temporary changes to the procedure. A TRUPACT container inner containment lid was intentionally moved to a position different than that required by procedure to stage a demonstration for a visitor. This movement (replacing the lid instead of moving it to the storage rack as required by procedure) was directed by supervision and was not challenged by the workers.

In general, Waste Operations activities were conducted within established radiological control requirements and conducted in accordance with the general RWP requirements. However, some deficiencies were observed concerning performance of radiological monitoring activities:

- Radiological control technician (RCT) handling of radiological assessment filter samples and wipe samples during Contact Handled Waste Processing activities in the Contact Handled Waste Bay did not demonstrate good contamination control techniques (e.g., infrequent and ineffective surveys of gloves or hands, handling sample planchet carriers for a low background counting system without changing gloves, and not managing the sample loading/preparation area as potentially contaminated pending analysis results).

- During underground waste emplacement operations, a portable air sampler was found to have no flow indicated on the flow meter. The OA inspector reported this to the RCT providing coverage to the operations, who took immediate action to re-establish flow to the sample collection head and adjusted the flow to the required level.

- One radioactive sealed source had been signed out and subsequently returned without being signed back in. Upon further investigation, the source was found to be in the appropriate storage location.

- Some escorts were unaware of their responsibility to read and complete the Escort Responsibilities attachment contained in a WIPP procedure (WP 12-DS3326), as well as the requirement to furnish this form to dosimetry.

- Work conducted under two general RWPs (Numbers 02-013 and 02-008) require personnel to perform hand frisk before and after removing surgeons gloves prior to leaving the radioactive material area. Based on OA observations and interviews, the time spent by workers performing static measurements or scanning frisk of hands is variable and typically the hands are only scanned for a few seconds. Given the marginal detection sensitivity and the long static time required to increase sensitivity for the instruments utilized, it is unrealistic to expect workers to conduct adequate surveys to detect alpha contamination.

Waste management aspects of WIPP surface operations were effectively performed. TRUPACTs were carefully checked to confirm that drums match the information on the WIPP Waste Information System. Drums that contained hazardous waste in addition to TRU waste were properly marked. TRU waste placement underground was performed as required by procedures. Waste placement was closely tracked and the data recorded for entry into the database. Additional observations included the following:

- The contamination cleanup for the TRU waste box from Rocky Flats had been successfully completed. Because this work activity was the first time a derived waste was created at WIPP, several dry runs were made, the derived waste procedure was modified based on these dry runs, and a special team of waste handlers was selected to conduct the actual work.

- There have been two shipments to WIPP that did not contain the drums specified in the WIPP Waste Information System. These shipments both came from the same DOE site, therefore, the National TRU Waste Program sent a team to that site to work with them to correct the problem in April 2002 and, since that visit, WIPP has not received an incorrect shipment.

The WIPP less-than-90-day-storage area meets regulatory requirements for aisle spacing, control of hazardous waste containers, safety equipment, labels, and signs. In addition, satellite accumulation areas are being operated as required by regulatory requirements for keeping containers closed and under the

control of the operator. Containers were in excellent condition and properly labeled. However, two satellite accumulation areas contained full containers of barium chromate waste, some of which had been in storage for over a year; one satellite accumulation area contained 12 full, two-liter containers, and another area contained a full 50-liter carboy. The regulatory limit is 55 gallons per waste stream; therefore the total volume in these satellite accumulation areas was below the regulatory limit. Although not a regulatory issue, holding full hazardous waste containers in a satellite accumulation area increases the environmental risk in the work area and is not in accordance with the site procedure for waste management, which requires full containers be moved to the less-than-90-day storage area.

Other waste management aspects of concern include:

- Controls for radioactive waste generation at WIPP have not been fully implemented for storage and disposal in accordance with the requirements of DOE Order 435.1, *Radioactive Waste Management.* The WIPP radiochemistry laboratory has nine 55-gallon drums of low-level radioactive waste stored outside within a radiological controlled area. Six of the drums are inside enclosures, but three drums are exposed to the elements and have rusted lids. These drums have been there at least two years. Provisions of DOE Order 435.1 require that containers be stored in a manner that does not degrade the integrity of the drum. WIPP personnel subsequently repacked the three drums.

- Although the sewage lagoons were in good shape and were operated by state certified operators, there is scum build-up in one end of a settling pond and in the weir that controls the pond level. This scum can create odors and is a breeding area for insects. Also, as required by New Mexico Environmental Department Discharge Plan-831, the discharge volume must be reported in a Quarterly Discharge Monitoring Report; however, the flow meter has been out of service since November 26, 2001. The state has been told a work order is in place for repair and calibration of the meter. In the interim, the site has been reporting the total amount of domestic water used to demonstrate that the prescribed limit of flow to the lagoons has not been exceeded.

Workers were aware of their stop-work responsibilities and authorities and indicated they would not hesitate to stop work if they observed or were asked to perform questionable or unsafe work activities. During this inspection, work was appropriately stopped or not allowed to proceed when a potential safety concern was raised. The workers displayed a safety-conscious attitude and did not indicate concerns about intimidation or production pressures from management or supervisors that would inhibit them from exercising their stop-work authority.

Summary. With few exceptions, WIPP facility operations, mining activities, and maintenance (surface and underground) activities are being performed with a high regard for safety. The excellent safety record at WIPP is a testament to the safe work culture. Most of the surface and underground activities are safely performed by skilled and experienced workers who take pride in their work. Stop-work authority and responsibility is well understood by supervisors and workers and the attitude that safety comes first was evident. In most cases, managers, supervisors, and workers are vigilant, questioning, and detailed in their review and performance of work activities and associated documentation. Although a few deficiencies were identified, WIPP management immediately corrected identified deficiencies where feasible and is aggressively working to correct the other deficiencies.

E.3 CONCLUSIONS

The implementation of the core functions of safety management at WIPP is effective in most cases and some aspects are noteworthy. Activities that involve radiological materials (e.g., handling containers and storage) are performed according to detailed procedures that specifically identify the applicable hazards

and required controls. Similarly, work packages are effective in identifying the hazards and controls for most activities. The WIPP workforce is well trained and demonstrated a safety-conscious approach to their work activities. WTS management is actively involved in safety and demonstrated a proactive and aggressive approach to correcting identified deficiencies. These factors have contributed to the excellent safety record at WIPP and the overall good performance in implementing the core functions observed on this OA inspection.

Although work control processes are generally effective, a few deficiencies were identified in hazards analysis and control processes. Some underground work control and hazard analysis processes are not well defined (ground control and fabrication), although most hazards were identified and controlled through extensive worker training programs, or to a lesser extent through JSAs or other hazard analysis. A few hazards were not fully analyzed, and some controls were not consistently implemented in areas of industrial safety and hygiene, radiological monitoring, and environmental reporting, indicating a need for continued management attention and further refinement of WTS processes.

Overall, although some aspects need further refinement, CBFO and WTS have ensured that the core functions of ISM are effectively implemented at WIPP. CBFO and WIPP have a good understanding of the deficiencies and have taken or initiated timely corrective actions for most of them.

E.4 RATINGS

The ratings of the first four core functions reflect the status of the reviewed elements of ISM programs elements within WIPP.

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

E.5 OPPORTUNITIES FOR IMPROVEMENT

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

1. **Develop a WTS skill-of-the-craft procedure, or expand existing WTS maintenance procedures.** Ensure the following items are addressed**:**

   - Definition, use, and limitations for skill-of-the-craft work activities (e.g., low-hazard and routine work only)
   - Application of a graded approach to hazard analysis with respect to skill-of-the-craft work
   - Integration of skill-of-the-craft work activities into various work control processes
   - Requirements for pre-job briefings and a walkdown of the work site

- Development, review, and approval of skill-of-the-craft books and hazard analyses
- Training, qualification, and proficiency requirements for skill-of-the-craft programs
- Involvement of workers and ES&H in skill-of-the-craft program development
- Processes for review, approval, and communication of skill-of-the-craft work documents to workers
- Mechanisms for evaluating and revising skill-of-the-craft work documents, if the work scope and/ or hazards are not clearly identified or are beyond the work scope.

2. **Develop, document, and implement a work control and hazard analysis process for those underground work activities that are currently not described in WTS site procedures**. Specific actions to consider include:

   - Develop and document processes for "skill-of-the-craft-like" work activities, currently used by Mining Fabrication and Ground Control workers (see the skill-of-the-craft opportunities for improvement previously cited in this section).
   - Develop JSAs for hazards associated with underground fabrication work activities and equipment operations.
   - Develop and document work control and hazard analysis processes for underground corrective maintenance work performed by ground control and mining groups.

3. **Revise and update hazard analyses training, work planning, and technical basis documents.** Ensure that the following items are addressed**:**

   - Visitor training programs address all hazards that may be encountered by visitors to the WIPP site.
   - Job hazard checklists address underground lighting, ergonomic hazards, and other potential hazards identified in the Industrial Hygiene and Industrial Safety manuals.
   - Radiological procedures define the limitations of handheld alpha contamination monitoring equipment.
   - The WTS Industrial Hygiene and Safety program manuals address all applicable requirements procedures are adequate and appropriate to implement the relevant requirements.
   - Revise radiological survey reports and procedures to require documentation of the MDA levels for removable contamination and fixed alpha and beta-gamma activity. Calculate and provide scanning MDA values for surveys where this technique is employed.

4. **Enhance program documentation to address missing or deficient controls for abnormal response conditions.** Specific actions to consider include:

- Improve the response capability for response to unknown conditions in the underground, such as discovery of high carbon monoxide concentrations, flammable vapor concentrations, or deficient oxygen concentrations.

- Review all non-waste handling underground activities to determine potential abnormal situations. Include review of operator round sheets and equipment logbooks to determine potential indicators of adverse conditions.

- Develop new or revise existing response procedures to ensure that all potential abnormal events are addressed by procedures, as required by the site's implementation of DOE Order 5480.19.

5. **Provide additional workplace indicators or incident response triggers for special bioassays for certain contamination events as potential indicators of 100 mrem potential exposure.** Specific actions to consider include:

   - Develop indicators that address significant levels of contamination detected on protective clothing or the unplanned spread of contamination on accessible surfaces.

   - Conduct a review of current WTS bioassay and incident response procedures for consistency with the expectations and techniques outlined and discussed in DOE Standard, *Internal Dosimetry* (DOE-STD-1121-98, December 1999), and DOE Standard, *Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities* (DOE-STD-1128-98, June 1998).

   - Revise special bioassay procedures to require internal dosimetry to get and utilize, if possible, the most sensitive follow-up bioassay method in order to confirm suspected intakes and quantify any resulting doses.

6. **Conduct additional review of the field use and sensitivity of handheld alpha and beta-gamma survey equipment currently in use at WIPP, and implement actions to increase sensitivity**. Specific actions to consider include:

   - Revise the WIPP Radiological Control Position Papers Numbers 98-01 and 98-02 for Minimum Alpha Sensitivity for the Eberline AC-3-8 Probe and the Minimum Beta/Gamma Sensitivity for the Eberline HP-260 Probe, respectively, to consider active probe area as compared to the $100cm^2$ required survey area.

   - Provide additional guidance (i.e., signs which state the minimum survey time, survey technique and scan rate) to assist workers in their performance of these surveys.

   - Consider the application of more sensitive survey instrumentation, which would increase the site's ability to detect potential contamination.

   - Consider the addition of automated hand counting equipment at the radioactive materials area boundary to decrease reliance on human factors in the conduct of surveys.

7. **Utilize a control mechanism equivalent to the general RWP for waste processing activities in the Contact Handled Waste Bay for individuals who are not otherwise covered by waste processing RWPs, (e.g., general tours or inspections of waste activities, maintenance) but who could come in close proximity to waste materials**. Specific actions to consider include:

- Develop an RWP-like mechanism to convey information on potential radiological hazards and controls for general tours and other such activities.

- Develop a process to assist in ALARA tracking of doses for these individuals or dose reconstruction following positive thermo-luminescent dosimeter results for general tours and other such activities.

8. **Integrate the investigation of groundwater entering the exhaust shaft into the sitewide groundwater monitoring and reporting program, and expand the investigation to include monitoring the environmental aspects associated with elevated levels of total dissolved solids and chlorides.** Specific actions to consider include:

    - Incorporate the exhaust shaft investigation into the WIPP environmental monitoring plan *(DOE/WIPP 99-2194)* and other site documents related to groundwater monitoring activities.

    - Summarize and report on the investigation and monitoring results in the annual site environmental reports.

    - Evaluate the need for additional monitoring wells and a monitoring strategy to determine the extent, movement, constituents, and environmental aspects of the shallow groundwater.

9. **Evaluate the need for increased or modified controls at the less-than-90-day hazardous waste storage area and at the sewage treatment plant and revisions to the guidance on operating satellite accumulation areas**. Specific actions to consider include:

    - Provide marked areas for storing pallets in the less-than-90-day storage area to ensure regulatory aisle spacing is maintained.

    - Evaluate installation of a bermed area in the less-than-90-day storage area so that potentially hazardous liquid waste from the exhaust shaft would be contained in the event of a dropped or ruptured drum.

    - Consider installing a roof over the area to prevent entry of rainwater inside the berm.

    - Evaluate the need for the sewage plant flow meter versus using the site's raw water usage to officially determine the amount being discharged to the plant.

    - Revise the satellite accumulation areas guidance procedure and training to clarify the amount of waste that can be accumulated per regulatory requirements, while keeping the amount of hazardous waste located in a work area to a minimum.

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