Operating Experience Summary

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Inside This Issue

Truck Fire Underground at the Waste Isolation Pilot Plant 1

On February 5, 2014, at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, a 29-year-old salt haul truck caught fire in the underground mine. It is believed that the fire started when hydraulic fluid and/or diesel fuel contacted the truck's hot catalytic converter and ignited. The fire consumed the truck engine compartment and two front tires which resulted in significant smoke and soot and necessitated evacuation of the mine. Six of the 86 workers who evacuated the mine were transported to Carlsbad Medical Center for treatment of smoke inhalation, and 7 other employees were treated onsite. (ORPS Report EM-CBFO--NWP-WIPP-2014-0001; Accident Investigation Board Final Report released March 2014.)

Background – Facility and Regulatory

In December of 1979, Public Law 96-164 authorized the Department of Energy (DOE) to provide a research and development facility to demonstrate the safe, permanent disposal of Transuranic (TRU) wastes generated from national defense activities. That facility became the WIPP facility (Figure 1-1), a geologic repository mined within a bedded salt formation. The 120-acre mined area (the "underground") is 2,150 feet beneath the ground surface, and TRU waste activities are confined to the southern portion.

WIPP is a Hazard Category 2 facility and is subject to requirements of DOE Order (O) 420.1C, *Facility Safety*. The DOE Carlsbad Field Office (CBFO) is responsible for the oversight of the WIPP management and operations (M&O) contract and the National TRU Program. In addition, CBFO has taken on the role of the international center for the study of waste management, which enables WIPP to be used to support basic scientific research underground. In April 2012, DOE awarded the M&O contract to Nuclear Waste Partnership, LLC (NWP), a partnership between URS Energy and Construction, Inc.; the Babcock & Wilcox Company; and Areva, Inc. Because URS and Weston Solutions, Inc. comprised URS, management did not undergo a substantial change when NWP took over the contract in the fall of 2012.

The WIPP facility operates in the 4 regulatory spheres described below.

- DOE has authority over the general operation of the facility—including radiological operations—prior to closure.

Figure 1-1. Waste Isolation Pilot Plant (WIPP)

- The Environmental Protection Agency (EPA) certifies compliance with the long-term radiological performance of the repository over a 10,000-year compliance period after closure.
- The State of New Mexico Environment Department, through EPA delegation of the Resource Conservation and Recovery Act (RCRA), issued a Hazardous Waste Facility Permit for the disposal of the hazardous waste component of the TRU waste.
- The Mine Safety and Health Administration (MSHA) is required, in accordance with the WIPP Land Withdrawal Act, to perform four inspections per year at WIPP.

Operations

The principal waste operations performed at WIPP involve (1) mining of underground rooms to provide space for waste emplacement and (2) receipt and disposal/storage of TRU waste. Salt is mined out of the ground to create the large rooms is loaded onto salt haul trucks and hauled to the loading pocket at the salt handling shaft, where it is dumped and then taken to the surface via the salt hoist (Figure 1-2). It was during one of these unloading operations that the truck caught fire, leading to the evacuation of the underground.

The Event

The salt haul truck operator had unloaded salt from the truck when he noticed an orange glow between the engine and the dump sections of the truck. The photograph of the burned truck was taken after the emergency event was terminated and is shown in Figure 1-3. The driver first attempted to extinguish the fire with a portable fire extinguisher stored on the truck. When that was ineffective, he activated the fire suppression system on the truck, which emitted a large puff of either smoke or suppressant, but did not extinguish the fire. He then used a nearby mine phone to notify Maintenance of the fire. The

Figure 1-2. Mined salt is dumped at the loading pocket

operator's supervisor and two nearby workers in the underground service office overheard the discussion over the mine phone (which can be heard throughout the underground) and went to assist.

Another underground worker called the Central Monitoring Room (CMR) to report the fire and smoke and recommend evacuation; two others were attempting to push a nearby 300-pound fire extinguisher to the fire when their carbon monoxide monitors alarmed and the smoke worsened. The CMR Operator (CMRO) activated the emergency evacuation alarm for approximately 2 seconds, made a public address (PA) announcement that there was a fire in the underground, and ordered workers to evacuate. However, the CMRO did not give a location of the fire and only directed workers to the waste hoist. The alarm and instructions could not be heard and/or understood throughout the underground, and the CMRO did not activate the emergency strobe lighting until he was reminded to do so by the bottom lander for the waste hoist.

Figure 1-3. Truck after the fire

The fire, which burned the engine compartment and consumed the front tires, created a significant amount of smoke and soot. The Facility Shift Manager (FSM) on duty instructed the CMRO to change the ventilation to filtration mode, believing it would reduce both fire and smoke, but it had the opposite effect. Air flow changes as well as the smoke contributed to the confusion.

Workers throughout the underground attempted to evacuate in response to the alarm and PA announcement, but encountered difficulties such as heavy smoke, strobes not on or broken, smoke in areas expected to have "good" air, and obscured evacuation reflectors. Some workers had to improvise routes to the waste hoist, at times cutting holes through ventilation curtains. There were a number of near-collisions between personnel and electric carts, not all personnel donned their self-rescuers at the first indication of the fire, and some had difficulty opening and/or donning self-rescuers or Self-Contained Self-Rescuers (SCSR).

The first evacuation of workers via the waste hoist was made at about 1100 hours. At that time, the CMRO notified the MSHA of the event and the State Mine Inspector and activated the Mine Rescue Team (MRT). Within the next half hour, all 86 underground workers were successfully evacuated via the waste hoist. Six workers were examined and taken to the Carlsbad Medical Center with possible smoke inhalation; seven additional workers were examined onsite, but required no medical attention. In accordance with its Memorandum of Understanding with DOE, MSHA arrived to provide support. By evening, the MRT had entered the underground to perform air monitoring and noted that the fire was out. The layout of the underground is depicted in Figure 1-4.

Discussion

The Accident Investigation Board (Board) reviewed the emergency response, including (1) the Emergency Management Program, including fire response and event classification, training/qualification/drills, and medical response; (2) the salt haul truck maintenance program and other maintenance issues; (3) the fire protection program, including fire hazard analysis and combustible material storage; (4) safety equipment, including truck fire suppression system, emergency breathing equipment, and underground communications; (5) supervision and oversight of work; and (6) safety programs such as Integrated Safety Management, Conduct of Operations, and Human Performance, including error precursors and nuclear culture versus mine culture.

Emergency Response Implementation

During the event, the evacuation alarm was not actuated for a full 5 seconds, and the evacuation strobe lights were not turned on as required by procedure. In addition, the CMRO did not provide the location of the fire or direct workers to suspend all underground operations, and the PA announcement was not completely understandable. The salt haul truck operator noti-

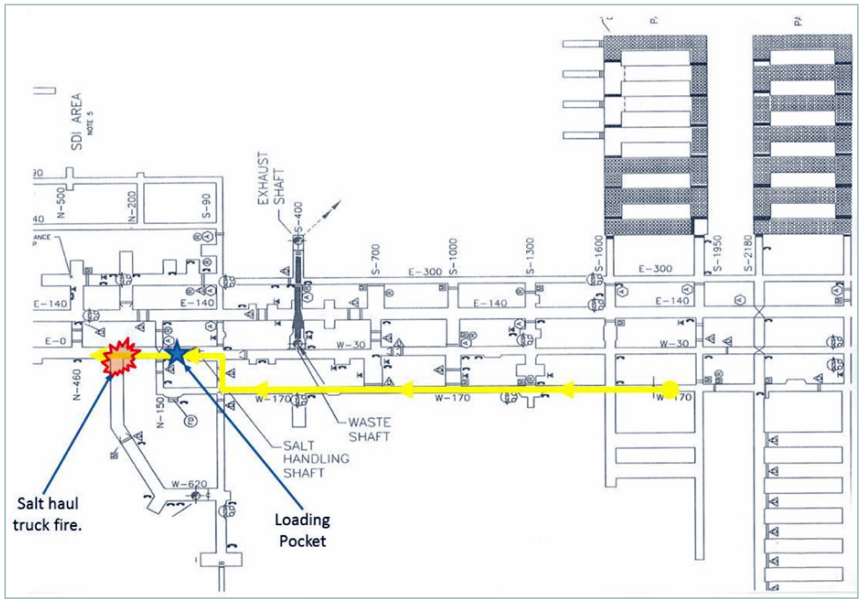

Figure 1-4. Map of the underground showing location of the truck fire

fied the Maintenance Department and his supervisor of the fire instead of notifying the CMRO, as required by procedure. The unannounced shift of ventilation to filtration mode, not described in procedures, resulted in an unexpected condition for workers as they attempted to evacuate and contributed to higher local concentrations of smoke and carbon monoxide in the drifts. Workers familiar with ventilation mode changes could tell by movement of louvers and reduction of airflow in the evacuation paths that ventilation had been changed, and many interviewed said that the change only increased their anxiety. The Board determined that there was a lack of effective drills and training. Specifically, Facility Operations training week had been discontinued, not all FSMs had received incident command training, drills did not include donning of self-rescuers and SCSRs, and the operator who responded to the fire had not received hands-on training on the use of a portable fire extinguisher. The Board also determined that poor housekeeping in the underground not only contributed to combustible loading concerns, but also added to the confusion and impeded evacuation paths. Red and green reflectors that indicated where to proceed were not effective because they were not consistently located; some were obscured under mesh fencing, and others were hidden behind stored materials.

Additionally, the WIPP Emergency Operating Center was determined to be ineffective as an Incident Command System due to weaknesses in its tactical and strategic role, inconsistency with DOE O 151.1C, *Comprehensive Emergency Management System*, and the failure to make required notifications and declarations during both the fire and radiological events.

Maintenance Program

Routine maintenance for the salt haul truck is not included in the facility procedures. Poor maintenance can affect engine performance, resulting in higher than normal operating temperatures. The Board determined that there is a significant difference between the preventive maintenance prescribed in the service manuals and what is actually performed. In addition, a decision was made to discontinue the truck wash station without sound engineering judgment because of difficulty in disposing of wash water. The contractor opted instead to use compressed air to clean vehicles, which inhibited maintenance personnel's ability to find and fix leaks and other problems. This resulted in a buildup of combustibles. The Board also discovered that, although the salt haul truck was built to use a fire-resistant fluid in the hydraulic oil system, standard hydraulic fluid was used. Poor maintenance was visible elsewhere; for example, there was a 3-foot puddle of hydraulic fluid under the truck shown in Figure 1-5 (the same model and year as the truck that caught fire).

Bulkhead doors must be operable for shifting ventilation/filtration modes, but more than one had been chained open for

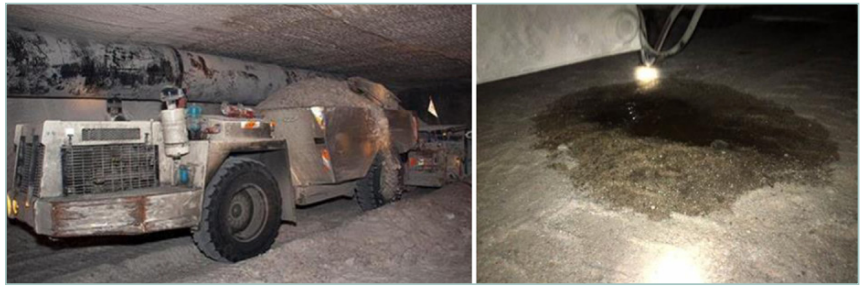

Figure 1-5. EIMCO Haul Truck 74-U-006A (similar to burned truck) and hydraulic fluid leak

some time and could not be remotely operated from the CMR's office. Twelve of the 40 mine phones tested were inoperable, 33 emergency lights in the Waste Handling Building had been inoperable for as long as 2 years, and many items considered "critical equipment," such as exhaust fans, had been out of service or on a reduced status for more than 6 months. It was not clear to the Board if the contractor had a method to prioritize maintenance activities in regard to critical equipment or if there was a method other than instituting a fire watch.

Fire Protection Program

Fire hazard analyses (FHA) are used to understand fire hazards, reduce risk, and determine mitigation options. The Board found several issues in its review of the fire hazard analysis, including that the FHA did not address the possibility that the vehicle fire suppression system would not perform as intended or how the omission of automatic fire suppression systems from the underground vehicles met the requirement of DOE O 420.1C. The Documented Safety Analysis identifies the fire suppression systems for the waste-handling vehicles as Safety Class, but the FHA does not indicate how these systems are protected, which is dangerous because the Safety Class fire systems on the waste haulers are not designed to meet single-point failure criteria.

Baseline Needs Assessments (BNA) had been performed, but recommendations dating back to 2010 had not been resolved or implemented. For example, the BNA closed out a recommendation concerning the paging system, stating that a new one had been installed in August 2013. However, the old amplifiers were still in place, indicating that the recommendation had been closed without verification. In addition, the Board stated: *The WIPP facility needs to embrace its dual nature of being a mine as well as a Hazard Category 2 Facility with two requirement sets, MSHA and Order 420.1C. NWP needs to perform a line-by-line review of 420.1C and MSHA requirements to ensure that both sets are fulfilled and that any differences are identified and reconciled.*

Underground combustible material storage and good housekeeping are components of any good fire protection program, but external reviews have identified long-standing deficiencies in this area at WIPP. Not only large equipment, but also materials exceeding the 5-megawatt combustible limit are stored on both sides of the drifts. In addition to exceeding combustible loading limits, this condition impedes rapid egress and obscures reflectors. Figure 1-6 shows combustible loading in the drifts and an obscured reflector.

Figure 1-6. Combustible loading in the drifts and an obscured reflector

Salt Haul Truck Fire Suppression System

A vehicle fire suppression system is designed to suppress a fire and reduce fire size and heat, but not necessarily extinguish all flames. A manual system discharges only when the operator pulls the pin, pushes the actuator, and turns off the engine to remove heat from the engine. In contrast, an automatic system both detects and shuts down the vehicle. The automatic system on the salt truck was changed to a manual one in October 2003 because it had false starts due to the harsh environment; however, the impact of switching from an automatic system to manual activation was not fully analyzed. Had the original automatic system still been installed, it would have detected the fire and actuated extinguishing chemicals before the fire escalated.

Safety Equipment – Self-Rescuers

The W-65 self-rescuer is designed to protect the wearer from carbon monoxide and to support the user for 60 minutes for emergency egress or to get to a cache of SCSRs. The Board determined that workers used both the W-65s and SCSRs during evacuation from the underground. Six employees did not use the W-65 (three used an SCSR and three used nothing), but 55 employees (90 percent of the 61 employees) performed as they were trained to and donned their W-65s. Twenty-one SCSRs did not open properly and could not be used, but 13 were successfully opened and used. The Board noted that training on the W-65 and SCSR does not simulate donning in an emergency, the annual refresher is a video only, and there is no mechanism to evaluate user competency.

NWP Contractor Assurance System – Supervision and Oversight of Work

The Board reviewed the NWP Contractor Assurance System (CAS) implementation and found a number of deficiencies: inoperable emergency lights; non-functional mine phones; criteria from the owner's manual not included in the pre-operational checklist; and some critical safety equipment impaired or out-of-service for more than 7 months. In addition, surveillances and oversight were more focused on waste-handling and certification activities than on maintenance and safe mine operation, and lessons learned from previous underground vehicle fires were not applied.

NWP Management Assessment Program

The Board determined that, overall, NWP expends considerable resources performing oversight activities, mostly focused on water management and quality assurance to ensure that permit requirements are met; but progress toward effectively implementing work planning and control, emergency management, issues management, and fire protection programs is inadequate. NWP has not fully developed a CAS that provides assurance that work is performed compliantly, risks are managed, and control systems are effective and efficient.

Safety Programs

NWP's Integrated Safety Management System (ISMS) program has not been verified by DOE. The verification was originally scheduled for May 2013, but has been rescheduled twice. The Board highlighted deficiencies within each of the five Core Functions and the applicable guiding principles, and determined that NWP and CBFO did not effectively establish a work environment where the requirements for nuclear safety, mine safety, and occupational safety are integrated and understood by their employees.

Conduct of Operations

The Board reviewed the Conduct of Operations (ConOps) program and identified weaknesses in implementation. For example, the maintenance procedure does not include manufacturer requirements, employees did not fully understand the status of impaired safety-related equipment, and the truck operator did not receive hands-on training on the use of por-

table fire extinguishers. The Board determined that NWP approached ConOps from different perspectives, not fully understanding that the entire WIPP facility is a Hazard Category 2 facility. Interviews with workers indicated that to them "operations" related only to waste handling activities and this reduced the level of rigor applied to operations that were unrelated to handling TRU waste.

Human Performance Improvement and Error Precursors

The Board analyzed error precursors to identify specific conditions that may have provoked error and led to the accident and found 21 error precursors in several areas. These are discussed in detail in the accident investigation report, but included a working environment where personnel encountered numerous unexpected conditions that affected an effective, timely evacuation. In addition, the Board identified issues related to individual capabilities, including the areas of proficiency, first-time use, and lack of knowledge for specific tasks. Several people had difficulty donning self-rescuers and SCSRs because drills and exercises did not prepare them for the accident scenario, and the FSM on duty lacked the requisite knowledge to fully understand the potential impact of his decision to change ventilation modes.

Causes

Direct cause is the immediate event or condition(s) that caused the accident. The Board identified the direct cause of this accident to be contact between flammable fluids (either hydraulic fluid or diesel fuel) and hot surfaces (most likely the catalytic converter) on the salt haul truck.

Root cause is the causal factor(s) that, if corrected, would prevent recurrence of the same or similar accidents. The Board identified the root cause of this accident to be NWP's failure to adequately recognize and mitigate the hazards related to a fire in the underground. NWP did not recognize and remove combustibles through inspections, perform periodic preventive maintenance such as cleaning, and deactivated the automatic onboard fire suppression systems without considering the implications.

Contributing causes are the events or conditions that collectively, with other causes, increased the likelihood or severity of an accident, but that individually did not cause the accident. The Board determined that contributing causes in this event included those related to the cause of the fire as well as the subsequent response. The Board identified 10 contributing causes, including those most pertinent to this article listed below.

- A nuclear versus mine culture exists where there are significant differences in the maintenance of waste-handling versus non-waste-handling equipment.
- Operator training and qualification were inadequate to ensure proper response to a vehicle fire.
- DOE-CBFO was ineffective in implementing line management oversight programs and processes that would have identified weaknesses associated with the event.
- Repeat deficiencies identified by DOE and external agencies such as the Defense Nuclear Facilities Safety Board were allowed to remain unresolved for extended periods.
- Conduct of Operations implementation was not commensurate with the rigor and discipline necessary to safely operate a Hazard Category 2 Facility (such as requirements flow down, procedure compliance, expert-based decision-making).

Conclusions and Judgments of Need

The Board derived 22 Conclusions (CON) from the investigation's analytical results and identified 35 Judgments of Need (JON), the managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recur-

rence. The JONs are linked to the causes and form the basis for the Corrective Action Plans that line management must develop. A partial list of the Conclusions and JONs most pertinent to this article is shown below, and they are discussed in detail in the Final Report.

Recommendations

In summary, the Board determined that the WIPP facility must embrace its dual nature as a mine and a Hazard Category 2 Facility and must follow both sets of distinct requirements.

Conclusion	Related Judgment of Need
CON 1: The FSM and CMRO did not fully follow the procedures for response to a fire in the underground attributed to the complexity of the alarm and communication system, lack of effective drills and training, and additional burdens on the FSM due to the lack of a structured Incident Command System (ICS).	**JON 1:** NWP needs to evaluate and correct deficiencies regarding controls for communicating emergencies to the underground, including the configuration and adequacy of equipment. **JON 2:** NWP needs to evaluate FSM and CMRO procedures and capabilities to manage a broad range of emergency response events through a comprehensive drill and requalification program.
CON 5: NWP and CBFO failed to ensure that training and drills effectively exercised all elements of emergency response to include practical demonstration of competence, e.g., donning of self-rescuers and SCSRs, underground personnel response to a fire, use of portable fire extinguishers, EOC roles, classification and categorization, notifications and reporting, and allowance of unescorted access for over 500 personnel, etc.	**JON 10:** NWP and CBFO need to develop and implement a training program that includes hands-on training in the use of personal safety equipment. **JON 11:** Implement an improved, integrated drill and exercise program that includes all elements of the ICS, including…drills and exercises; donning of SCSRs; and evacuation. **JON 12:** Evaluate and improve their criteria for granting unescorted access to the underground.

Conclusion	Related Judgment of Need
CON 12: NWP and CBFO failed to take appropriate action to correct combustible loading issues identified in previous reviews. **CON 13:** NWP and CBFO have allowed housekeeping to degrade and other conditions to persist that potentially impede egress.	**JON 21:** NWP and CBFO need to review the combustible control program, complete corrective actions to demonstrate compliance, and address unresolved issues from prior reviews. **JON 22:** NWP and CBFO need to address housekeeping deficiencies to ensure unobstructed egress and clear visibility….
CON 17: DOE HQ failed to ensure that CBFO was held accountable for correcting repeatedly identified issues involving fire protection, maintenance, emergency management, work planning and control, and oversight.	**JON 27:** DOE HQ ensure that repeatedly identified issues related to safety management are confirmed closed and validated…. **JON 28:** Enhance oversight to ensure site implementation of emergency management policy and requirements is consistent and effective.

Conclusion	Related Judgment of Need
CON 18: DOE HQ failed to ensure CBFO was provided with qualified technical resources to oversee operation of a Hazard Category 2 Facility in a mine.	**JON 29:** DOE HQ develop and implement a process to ensure technical expertise is available. **JON 30:** Assist CBFO with leveraging expertise from MSHA. **JON 31:** Re-evaluate resources to ensure safe operations of a Hazard Category 2 Facility.

Conclusion	Related Judgment of Need
CON 22: NWP and CBFO management allowed a culture to exist where there are differences in the way waste-handling equipment and non-waste-handling equipment are maintained and operated.	**JON 35:** NWP and CBFO management need to examine and correct the culture that exists regarding the maintenance and operation of non-waste-handling equipment.

The Board's entire report can be accessed at http://energy.gov/ehss/downloads/accident-investigation-february-5-2014-underground-salt-haul-truck-fire-waste.

Note: As a result of concerns over maintenance spotlighted during this Accident Investigation, on April 6, 2014, the DOE Office of Environmental Management (EM) directed that each site perform an extent-of-condition review of deferred maintenance. The sites were to assess whether they had applied sufficient resources to system and equipment maintenance, maintained up-to-date configuration control, and made necessary upgrades to support system infrastructure. Sites were to report their findings within 60 days. According to the memo, reviews should "...consider and assess corrective and preventive maintenance backlogs, the nature and age of operator work-arounds and operator compensatory actions, and other factors associated with safety-related systems."

KEYWORDS: WIPP, Waste Isolation Pilot Plant, salt haul truck, fire, smoke inhalation, underground, salt mine, self-contained self-rescuer, SCSR, Self-Contained Self-Rescuers

ISM CORE FUNCTIONS: Define the Scope of Work, Analyze the Hazards, Develop and Implement Hazard Controls, Perform Work within Controls, Provide Feedback and Improvement

"We may have a problem..." 2

The following article, prepared by Y-12 National Security Complex, provides a historical summary of an unplanned shutdown event of Y-12 nuclear facilities in 1994. Criticality Safety infractions were found during a Defense Nuclear Facilities Safety Board tour which led to Y-12 in shutdown mode. The event emphasized how Criticality Safety procedures must be understood and adhered to strictly. The lessons learned from this historical event are still practical today.

By Paul Wasilko — Thursday, September 22, 1994, started out like any other day. With the end of the Cold War in the early 1990s and the end of underground testing in 1992, Y-12's mission changed again—this time to dismantlement, refurbishment, and storage. The University of Tennessee had a young quarterback named Peyton Manning and was coming off a 31–0 home loss to Florida.

At 2 p.m., managers were called to the Administration Building for a special meeting. When I arrived, I met the Disassembly and Special Materials manager. He looked at me and said, "We may have a problem." Having spent the bulk of my career in the Assembly Division, my mind started thinking of all the things that could have happened to cause the plant manager to call us together.

What We Learned

During a Defense Nuclear Facilities Safety Board (DNFSB) tour in Beta-2E that morning, the staff identified an infraction of a criticality safety approval for storage of fissile material. Supervisors and senior managers on the tour failed to take appropriate control of the area, move at least 15 feet away, or request an evaluation by Criticality Safety per procedure.

Specifically, pallets were found with DT-103 30-gallon containers stacked on top of DT-101 80-gallon containers (Figure 2-1). The Criticality Safety Approval (CSA) for this storage operation had recently been revised to allow other 30-gallon containers for stacking, but not the DT-103 container. A second infraction was for intermingling DT-100 and DT-100A 55-gallon containers (Figure 2-2). These containers were identical (with the exception that the DT-100 containers were painted black), but intermingling was not authorized in the approved CSA.

Action Taken

All production fissile operations were curtailed to facilitate walkdown of all CSAs to look for similar conditions. Over the next 5 days, 1,344 other CSA noncompliances were identified; 74 percent were administrative, involving no loss of criticality safety controls. Twenty-six percent involved loss of a control, but double contingency was not violated. The bulk of the non-

Figure 2-1. DT-101 container (left) and DT-103 container (right)

Figure 2-2. DT-100 container (black) and DT-100A containers (unpainted)

compliances involved an operation not in accordance with the CSA, array floor markings and spacing, unauthorized non-fissile material storage in arrays, mixed stacking, and units on array lines.

For example, the CSAs called for storage arrays to be "24 inches by 24 inches" and designated with red and yellow marking tape. When walked down and measured, numerous arrays were found to be "23½ inches by 24¾ inches" or the pieces of the red and yellow tape were worn and missing. Some units were found in the arrays touching the yellow or red tape or slightly outside the array. Imminent nuclear criticality safety conditions? Probably not—most were administrative— but it was an indication that we were not following our own procedures. It was certainly a Conduct of Operations (ConOps) issue that demanded immediate attention.

What Followed

As a result of the incident, Y-12 nuclear facilities were placed in an unplanned shutdown status because of the large number of CSA noncompliances and ConOps implementation problems. The DNFSB issued recommendation 94-4, *Deficiencies in Criticality Safety at the Y-12 Plant*. What started out as a CSA issue in one building led to the unthinkable: Y-12 was in shutdown mode.

A Type C Investigation concluded the root cause was, "Management's failure to place the appropriate priority on the identification of nuclear criticality safety deficiencies." Level IV criticality safety infractions were accepted and used as trending information with emphasis only on failures that could likely lead to a nuclear criticality. The investigation also identified a lack of understanding of the roles and responsibilities of the CSA approval system. In the case of the Beta-2E incidents, CSAs generated and approved for the Disassembly & Special Material organization were in conflict with other storage CSAs prepared by Weapons Material Management. Training on the CSA revisions was less than adequate. Finally, the report noted a reliance on other organizations for identifying and resolving problems.

Restart

One year and $14 million later, the Receipt, Shipment and Storage (RSS) function was restarted after significant CSA and technical procedure revisions were followed by technical training. New operations manager, shift manager, shift administrative assistant, and shift technical advisor positions were added to strengthen our conduct of operations. We learned about Readiness Assessments and Operational Readiness Reviews to verify that needed changes were in place before restarting other nuclear operations. Following the RSS resumption, resources were moved to Depleted Uranium and Disassembly and Storage Operations that were restarted in September 1995 and March 1996. Initial Enriched Uranium Operations (EUO) metal working operations (casting, rolling, and forming) and some accountability processes restarted in June 1998. EUO Wet Chemistry was not restarted until March 2003. The final EUO process, Oxide Conversion, was not restarted until February 2005—more than 10 years after September 1994.

Lessons Learned

From a safety culture point of view, what were the lessons learned? Could it happen again? From a work processes standpoint where work is executed by procedure, Criticality Safety evaluations and technical safety requirements constitute a license for operation; they must be understood and adhered to strictly. Effective decision making requires that decisions that support nuclear safety be systematic, rigorous, and thorough, and Criticality Safety procedures provide guidance that certain actions must be taken in the event concerns are raised. Each employee must recognize and accept this responsibility. All of us must recognize that Criticality Safety engineers are the only ones authorized to interpret requirements.

Remember: It's not a lesson learned until the lesson is learned.

Continuous LEARNING

IT'S NOT A LESSON LEARNED UNTIL THE LESSON IS LEARNED...

September 1994: The Defense Nuclear Facilities Safety Board identified a criticality safety approval (CSA) infraction

- Supervision failed to take appropriate administrative control and contact the Criticality Safety Department
- Follow-up included completing a plant-wide assessment identifying 1,344 CSA nonconformances
- Identified problems with roles and responsibilities, lack of oversight, and a reliance on others to identify and correct problems
- Resulted in a curtailment of nuclear operations that lasted for almost 10 years
- Resulted in DNFSB Recommendation 94-4, Deficiencies in Nuclear Criticality Safety at the Oak Ridge Y-12 Plant

Fig. 1.1. A DT-101 container (left) and a DT-103 container (right).

Y12 safety culture

The Office of Environment, Health, Safety and Security (AU), Office of Analysis publishes the *Operating Experience Summary* to promote safety throughout the Department of Energy (DOE) Complex by encouraging the exchange of lessons-learned information among DOE facilities.

To issue the Summary in a timely manner, AU relies on preliminary information such as daily operations reports, notification reports, and conversations with cognizant facility or DOE field office staff. If you have additional pertinent information or identify inaccurate statements in the Summary, please bring this to the attention of Ms. Ashley Ruocco, (301) 903-7010, or e-mail address ashley.ruocco@hq.doe.gov, so we may issue a correction. We would like to hear from you regarding how we can make our products better and more useful. Please forward any comments to Ms. Ruocco at the e-mail address above.