

**Summary of EPA's Response and Findings
Related to the February 2014 Radioactive Release at the
Waste Isolation Pilot Plant**

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Summary of EPA's Response and Findings Related to the February 2014 Radioactive Release at the Waste Isolation Pilot Plant

Incident Background

In 1999 the U.S. Department of Energy (DOE) began waste disposal operations at the Waste Isolation Pilot Plant (WIPP) in New Mexico. The WIPP is a deep geologic repository for permanent disposal of transuranic radioactive waste, which is a byproduct of the nation's nuclear defense program. Transuranic waste consists of clothing, tools, rags, residues, debris, soil and other items contaminated with small amounts of plutonium and other long-lived, man-made radioactive elements.

On February 14, 2014, an underground continuous air monitor measured airborne radioactivity near the location where waste was being placed within the WIPP repository. The air exhaust switched to a filtered mode of operation to capture radioactive material before it could enter the environment. On the following day an aboveground exhaust air monitor on the WIPP site detected very low levels of airborne americium and plutonium venting to the environment. It is believed that a small amount of radioactivity leaked through the air exhaust-duct dampers, bypassing the filtration system.¹

On March 6, 2014, DOE sealed the dampers with high-density expanding foam insulation to ensure that all air exhausted from the underground passes through the filtration system. Only trace amounts of radioactivity, which are consistent with the efficiency of the filtration system, have been measured in the environment since low levels were found in the days immediately following the incident.

U.S. Environmental Protection Agency (EPA) Regulatory Authority

The WIPP Land Withdrawal Act (LWA) of 1992, which defined the operational and oversight framework for the WIPP, granted EPA the authority to ensure that the facility complies with EPA's environmental regulations for the management, storage, and disposal of transuranic waste, as well as other specified environmental laws and regulations. EPA certifies compliance with the disposal standards (Title 40 Code of Federal Regulations Parts 191 and 194 [40 CFR 191 and 194]), which protect public health and the environment from releases of radioactive material after the repository is closed. DOE is required to submit an application for re-certification every five years, at which time EPA evaluates the application and determines whether or not the WIPP remains in compliance with EPA's long-term disposal regulations. DOE submitted its third re-certification application in March 2014. EPA is considering how changes DOE may make in response to the February 2014 incidents will affect the review of this application.

EPA's waste management and storage standards (40 CFR 191, Subpart A) set limits on the amount of radiation the public can receive during the operation of the facility so that, in any one

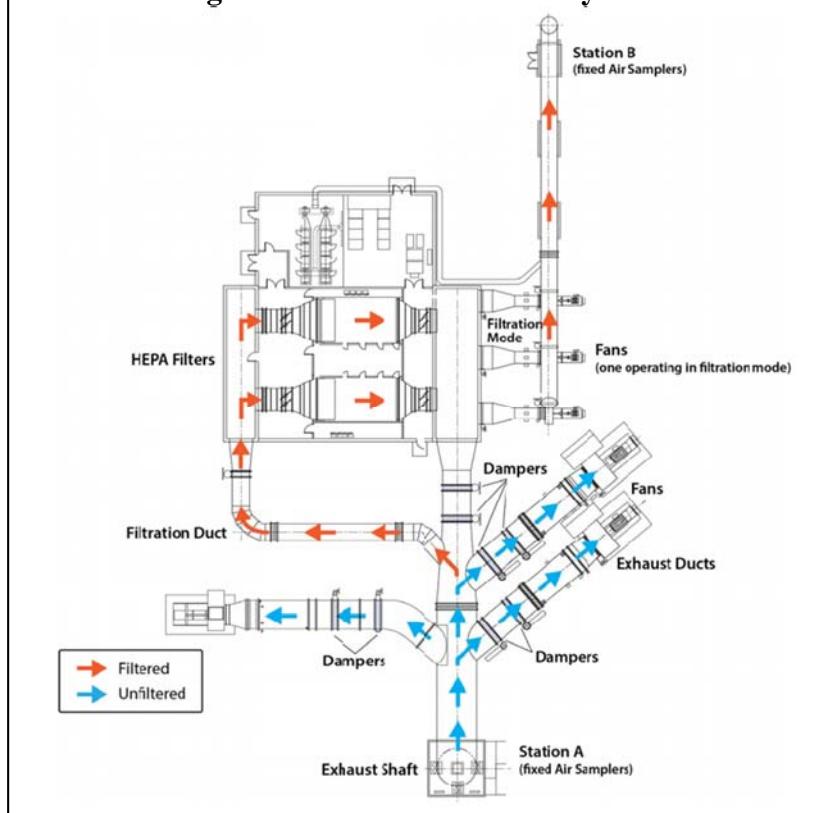
¹ Department of Energy. *Accident Investigation Report: Phase 1: Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014*. Washington, DC: 2014.

year, no member of the public may incur exposures greater than 25 millirem (mrem) to the whole body and 75 mrem to any critical organ. EPA oversees compliance with these standards by consistently conducting annual inspections and reviewing DOE's records and reports.

DOE and EPA also agreed—via a 1995 Memorandum of Understanding²—that the WIPP will comply with EPA standards established under the Clean Air Act that apply to DOE facilities but from which the WIPP and other similar disposal facilities would be exempt. The National Emission Standards for Hazardous Air Pollutants (NESHAPs) for DOE facilities (40 CFR Part 61, Subpart H) states that radiological emissions must not exceed an effective dose equivalent (EDE) of 10 mrem/year to any member of the public. Several of the activities described in this report address these compliance requirements.

DOE demonstrates compliance with EPA's public dose standards during the operational period of the facility by continuously sampling the effluent (exhaust) leaving the underground. This sampling has routinely been performed at the unfiltered exit to the air exhaust shaft (Station A), which is the primary release point, and at the waste handling building (Station C). The measured values are then fed into models approved by EPA to calculate doses to the public. Since the February 14 incident, sampling at the exhaust shaft has taken place at Station B, after the exhaust has passed through the high-efficiency filters. Air leaving the waste handling building has always been filtered. A graphic showing the WIPP exhaust system can be found in Figure 1.

Figure 1: WIPP Ventilation System



DOE also conducts environmental (ambient) air monitoring at locations within the WIPP facility and at selected off-site locations. This monitoring has not been used to demonstrate compliance with EPA's public dose standards; however, it provides confirmation of DOE's modeled results for the compliance locations. DOE reports the data from this ambient monitoring system to EPA.

² Department of Energy and Environmental Protection Agency. "Memorandum of Understanding Between the U.S. Environmental Protection Agency and the U.S. Department of Energy concerning the Clean Air Act Emission Standards for Radionuclides, 40 CFR Part 61 Including Subparts H, I, Q & T," 1995.

EPA does not exercise a formal emergency response function at the WIPP; however, EPA reviews DOE's procedures and drills to be confident that DOE will respond appropriately to emergency situations. This document summarizes activities conducted by EPA, consistent with its oversight role, to evaluate DOE's response to the February 2014 release and potential actions to prevent, mitigate or better characterize such incidents in the future.

EPA's Response

On March 26, 2014, EPA published *EPA Actions in Response to Release of Radioactive Material from the Waste Isolation Pilot Plant* (Action Plan),³ which presents EPA's activities in response to the February 2014 release at the WIPP. Subsequently, from April to June 2014, EPA completed the actions listed in its Action Plan: review of DOE's modeling, assessment of DOE's environmental monitoring system, completion of an initial on-site inspection and review of DOE's laboratory data. EPA also inspected DOE's inventory tracking system for wastes temporarily stored at the waste management facility in Texas, Waste Control Specialists (WCS), which is storing certain containers of transuranic waste while the WIPP facility remains closed.

Summary of Findings

As indicated above, DOE demonstrates compliance with EPA's standards by continuous sampling of the effluent leaving the underground. DOE did this successfully during the February 2014 release. In order to capture all of EPA's findings based on our activities between April and July 2014, EPA's report considers how DOE can better ensure compliance with EPA standards.

EPA's findings confirm that the exposure from the February 2014 release was well below EPA's Clean Air Act regulatory limit of 10 mrem annual dose and that the radiation release from the WIPP did not pose a public health or environmental hazard above ground. Therefore, these findings confirm that DOE was in compliance with EPA's standards. In addition, EPA finds that DOE's dose modeling and effluent monitoring for demonstrating regulatory compliance with public dose standards remain appropriate for that purpose; however, EPA's reviews and inspections showed that there are several areas where improvements would enhance DOE's ability to provide the best possible information to the public and its partner agencies during a release.

This report addresses only the activities included in the EPA Action Plan. DOE has made progress in evaluating the situation in the underground and in narrowing the hypothesis on the cause of the release, as well as assessing possible corrective actions and addressing the potential for future releases. The conclusions in this report do not incorporate these more recent DOE activities. EPA continues to monitor DOE's activities and remains prepared to assist as necessary.

EPA arrived at the following conclusions based on review of DOE's modeling and data, and the completion of the April 2014 site inspections:

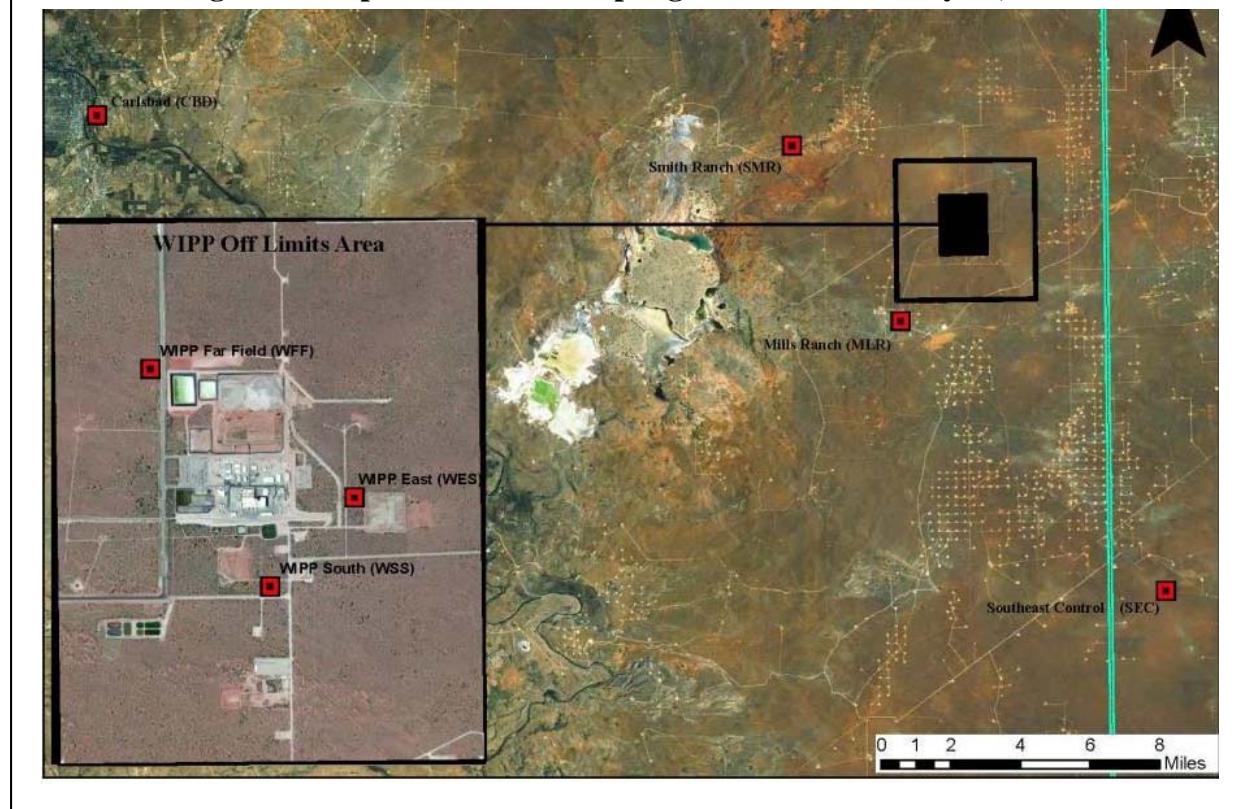
³ Environmental Protection Agency. *EPA Actions in Response to Release of Radioactive Material from the Waste Isolation Pilot Plant*. Washington, D.C.: 2014.

Review of DOE's Modeling

In the immediate aftermath of a radioactive release to the air, predictive modeling is an important tool for estimating the airborne plume's direction and concentration to assess potential doses to the public. DOE refers to this activity as consequence assessment. Shortly after the February 2014 release at the WIPP, DOE initiated consequence assessment to estimate the extent of the release.

Based on the source term measured by DOE in the several days after the event, the modeling indicated that the release was very low-level and was largely confined to the Land Withdrawal Boundary (LWB), thus limiting exposure to the public. Figure 2 shows a map of the WIPP site. The initial DOE-performed modeling was corroborated by DOE's subsequent compliance modeling that indicated the release would result in annual exposure less than 1 mrem to the nearest populations, which is well below EPA's NESHAP regulatory limit of 10 mrem annual dose. At the end of the year, DOE will perform additional annual dose modeling, taking into account all radioactive emissions over the course of the year, to demonstrate that the WIPP remains in compliance with EPA's standards.

Figure 2: Map of WIPP air sampling sites as of February 14, 2014



The Clean Air Act Assessment Package (CAP88-PC) is EPA's computer software system for calculating dose from annual releases of radionuclides to the air and is approved for demonstrating compliance with EPA's NESHAP requirements. DOE performed dose

calculations using CAP88-PC Version 3 to assess the location of the highest potential public dose at and outside of the WIPP fence line. As verification, EPA was able to re-produce DOE's results using the same CAP88-PC model and source information as DOE.

EPA also performed calculations with CAP88-PC Version 4, which uses updated age-specific breathing rates and updated dose conversion and utilization factors, and found the projected doses to be lower than the Version 3 results.⁴ Both DOE's and EPA's dose calculations resulted in an effective dose equivalent of less than 1 mrem/year, well below the regulatory limit of 10 mrem/year. EPA's review of DOE's CAP88-PC compliance modeling can be found in *Environmental Protection Agency's Confirmatory Dose Calculations of the Department of Energy's Use of CAP88-PC for the February 2014 Radiological Emission Release at the Waste Isolation Pilot Plant*.⁵

Subsequent environmental sampling and analysis of air, soil and sediment indicated that levels of radioactivity following the initial release were also very low, in line with the modeled concentrations and doses.⁶

Assessment of DOE's Ambient Air Monitoring System

EPA reviewed the design of DOE's ambient air monitoring network to assess whether the number and placement of air samplers were adequate for initial detection of the off-site radiation release.

At the time of the incident, DOE's network comprised seven ambient air samplers in the vicinity of the WIPP. The location of these samplers accounted for the predominant wind direction in the area and the location of known residents and population centers in this sparsely populated area. The sampling locations included a "control" point in the expected upwind direction from the WIPP. Placement of this air sampler provides a baseline background level against which to compare possible releases and a limited ability to detect radioactivity if winds shift from the expected predominant direction. Figure 2 includes the locations of DOE's ambient air samplers operating during the February 2014 release.

During the February 2014 release, the winds at the WIPP were blowing predominantly in the northwesterly direction and DOE's ambient air monitoring network in place on February 14 did detect and measure the off-site levels of radioactivity. The levels detected were consistent with those projected by modeling and did not pose a hazard to public health or the environment.

Since the incident, DOE has installed additional ambient air samplers to cover population centers in the region and to account for a wider range of wind or plume direction. Even with the

⁴ CAP88-PC Version 4 is undergoing testing and has not yet been released for regulatory compliance demonstrations.

⁵ Environmental Protection Agency. *Environmental Protection Agency's Confirmatory Dose Calculations of the Department of Energy's Use of CAP88-PC for the February 2014 Radiological Emission Release at the Waste Isolation Pilot Plant*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-32; August 2014]

⁶ Environmental Protection Agency. *Consequence Assessment Review Summary for the February 2014 Radiological Emission Release at the Waste Isolation Pilot Plant*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-33; August 2014]

additional samplers now in place, EPA believes that DOE's ambient air monitoring network—in terms of instrument capability as well as the number and location of stations—is not sufficient to reliably detect and quantify air releases that do not follow the predominant wind direction. In the event of such a release, particularly one significantly larger than the February 2014 release, it would be difficult for DOE to confirm its modeling results and provide the information necessary to address public concerns.

In a May 5, 2014 conference call between DOE and EPA, DOE stated its intention to conduct a full review and update of its ambient air monitoring system.⁷ Essential to that review will be clearly defining the goals, scope and data quality objectives of an updated ambient air monitoring system, because these directly affect the requirements for monitor sensitivity, location, operation and maintenance. These findings are detailed in EPA's *Subpart A Inspection Report in Response to the Incident of February 14, 2014*⁸ along with findings on other DOE monitoring activities, including underground radiation control/contamination monitoring and stack/release point monitoring. EPA will track DOE's ambient air network review and may provide additional feedback based on the progress and results of DOE's review.

On-site Inspection at the WIPP

EPA's April 2014 inspection focused on the actions taken by DOE and its prime WIPP contractor, Nuclear Waste Partnership (NWP), in response to the February 2014 release. EPA inspectors examined the WIPP's effluent and ambient air monitoring devices as well as methods used to estimate radiation doses to the public. EPA found that DOE's response and effluent air sampling provided enough information to quantify the release for compliance purposes; however, the inspection identified opportunities for DOE to improve sampling and analysis procedures. The details of the inspection and findings can be found in *Subpart A Inspection Report in Response to the Incident of February 14, 2014*.

EPA's team addressed the following questions during the April 2014 inspection:

Has DOE accurately characterized the source term and extent of the release?

EPA found that DOE's response and effluent air sampling procedures provided enough information to quantify the release for compliance purposes. After the WIPP facility switched to filtration mode, the effluent air samples taken at monitoring Station B—located in the exhaust duct, downstream of the HEPA filters—represented all air leaving the facility, including the small leakage that bypassed the filters.

EPA noted multiple deviations from typical air sampling operations, some according to written procedure and others due to operational decisions. In operating the ambient air sampling network, DOE followed procedures that call for certain changes to the routine sample collection protocol when an incident occurs or a release is suspected. Inspectors observed that these procedures led to less experienced personnel conducting air sampling, which affected the completeness of sample collection reports for the laboratory.

⁷ R. Patterson (U.S. Department of Energy, Carlsbad Field Office), personal communications, May 5, 2014

⁸ Environmental Protection Agency. *Subpart A Inspection Report in Response to the Incident of February 14, 2014*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B3-129; August 2014]

Similarly, EPA also observed decisions about the handling and analysis of air filters that were not consistent with site procedures. Under normal operations, effluent air filters analyzed for NESHAPs compliance would be composited and subjected to radiochemical analysis at the WIPP Laboratories. Many of the filters were analyzed individually, and at least one filter that would ordinarily have been subjected to radiological analysis for annual NESHAPs compliance was sent instead for chemical analysis at a different laboratory. It appears that some of these decisions were made for valid reasons, such as work backlogs or high sample radioactivity that WIPP Laboratories is not equipped to handle. These minor deviations in sample collection procedures should not affect the sample results; however, EPA is concerned that the decisions were made on an ad-hoc basis and not well documented.

Is the mine exhaust filtration system working as intended, and will it continue to do so?

The ventilation system performed adequately to contain the February 2014 release. The continuous air monitor located underground at the exhaust of the active waste panel functioned as designed: detecting the release, activating the alarm and switching the ventilation system to filtration mode. The final step in the changeover was performed manually, as called for in procedures, and in a timely manner so that no contaminated exhaust was released before the changeover to filtration was complete. The high-efficiency particulate air (HEPA) filtration of the mine exhaust prevented the majority of the contamination from reaching the environment; however, leakage around the dampers allowed a small amount of mine exhaust to bypass the HEPA filters and escape into the environment.⁹

Based on EPA's observations, the HEPA filters continue to work effectively with the additional sealing by DOE to prevent leakage. However, DOE's Accident Investigation Report identifies several deficiencies in the ventilation system that, had they been corrected prior to the accident, would have further minimized the release. Specifically, the investigation concluded that "the unfiltered above ground release identified in Phase 1 of the investigation was preventable. The ventilation system has [HEPA] filter bypass dampers that represent a pathway of unfiltered exhaust into the environment. These isolation dampers are not suitable as a containment boundary and reduce the overall efficiency of the HEPA filter system."¹⁰ The investigation found that this situation originated in DOE's assumption that "only relatively smaller releases in the [underground]...were judged to be credible." As a result, "the damper design was not required to meet requirements in the nuclear industry ventilation code." This view of the potential for releases also contributed to a maintenance environment in which "there was significant degradation in the material condition of several ventilation system components identified that were not being aggressively pursued."¹¹

As noted above, the HEPA filtration system continues to operate effectively, although it has been operating continuously for a longer period than was ever anticipated. Currently, DOE is actively

⁹ See Chapter 2. Department of Energy. *Accident Investigation Report: Phase 1: Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014*. Washington, DC: 2014.

¹⁰ See page ES-8. Department of Energy. *Accident Investigation Report: Phase 1: Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014*. Washington, DC: 2014.

¹¹ See page ES-2. Department of Energy. *Accident Investigation Report: Phase 1: Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014*. Washington, DC: 2014.

overseeing and maintaining the ventilation system so that it continues to function as the first line of defense against any possible releases during accident investigations. DOE would be alerted to any impending failure of the system by several warning signs and smaller failures that would allow the Department to shut down the system if needed.

Does DOE have appropriate monitoring and sampling devices on-site during underground reentry operations?

EPA inspectors found DOE's monitoring and sampling equipment to be in place and operating as described in DOE's plan for reentry to the underground.

Is DOE's array of on- and off-site air monitors in working order?

EPA inspected the effluent air samplers and all of DOE's environmental air samplers. The effluent air sampling equipment, which supports regulatory compliance, was in proper working order.

EPA identified several areas needing improvement related to DOE's ambient environmental air samplers, which provide confirmation of DOE's modeled results at the compliance locations. Specifically, several ambient air samplers were placed in locations where surrounding buildings limited airflow to the samplers or where nearby activities could impact sampling results. Additionally, DOE should review its equipment and maintenance practices to determine whether it is possible to improve the reliability and defensibility of the ambient monitoring network.

Does DOE continue to store and handle transuranic waste at the site safely and according to procedure?

Due to the underground contamination, EPA was unable to inspect the WIPP underground waste rooms that would be part of an annual inspection. EPA did inspect the Waste Handling Building (WHB) and found the site had not deviated from typical waste handling procedures.

EPA Air Sampling

During its April 2014 visit to the WIPP facility, EPA co-located four air samplers at three existing DOE sampler locations to independently corroborate DOE's reported results. All the results from EPA's air filter analyses were considered "non-detect" for the radionuclides of concern from this release: americium-241, plutonium-238 and plutonium-239/240. "Non-detect" means that no radioactivity was detected or measurable beyond the analytical uncertainty range.¹²

EPA completed a statistical analysis comparing EPA and DOE air filter results for the same collection period. There was no evidence of a systematic difference between the DOE and EPA activity concentration measurements. For both DOE and EPA data, the variation observed among the activity concentration measurements was consistent with the combined standard uncertainty estimates (CSU) included with the data. There was no evidence of positive concentrations for any of the monitored radionuclides. EPA's document, *Analysis of EPA and DOE WIPP Air*

¹² Environmental Protection Agency. *EPA's WIPP Air Sampling Data from April 2014*. Washington, D.C., 2014.

*Sampling Data,*¹³ includes both EPA's and DOE's detailed analytical results and the accompanying statistical analysis.

Laboratory Data Review

EPA performed verification and validation of americium and plutonium analysis data from DOE's WIPP Laboratory. The data came from air particulate samples collected during February and March 2014 at various locations around the WIPP. EPA followed the WIPP Laboratory's own internal standard operating procedure for data verification and validation, and reviewed the operations previously performed by lab personnel. EPA also reviewed the lab's calculations and attempted to reproduce calculated analysis results for a few of the sample batches. The verification identified exceptions, defined as deviations from stated requirements or expectations. EPA's review of the calculations also identified flaws in how results are calculated; however, the calculation flaws should have minimal impact on the usability of the data. In summary, although the review identified some areas needing improvement in the laboratory's data reduction and reporting process, the data reviewed appeared to be adequate for this incident. Details related to the verification and validation review can be found in the *Verification and Validation of WIPP Data Packages.*¹⁴

Inspection at Waste Control Specialists

On April 9, 2014, EPA's WIPP waste characterization team visited Waste Control Specialists in Andrews, Texas to determine whether DOE was meeting EPA's waste inventory tracking requirements. During the WCS visit, EPA observed unloading and storage operations, interviewed WCS and DOE contractor staff and evaluated objective evidence for technical adequacy. EPA determined that the system of controls in place adequately tracks waste containers in storage and appropriately maintains waste inventory records.¹⁵

Areas Needing Improvement

The February 2014 incident at the WIPP demonstrated the importance of responding to the increased public demand for information following a release. EPA identified several areas needing improvement:

Update the Ambient Environmental Monitoring Network: DOE needs to improve the design, positioning, maintenance and overall capability of its ambient environmental air monitoring network.

DOE's ambient air monitoring has not been used to demonstrate compliance with EPA's dose standards; however, it provides confirmation of DOE's modeled results at the compliance

¹³ Environmental Protection Agency. *Analysis of EPA and DOE WIPP Air Sampling Data*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-30; July 2014]

¹⁴ Environmental Protection Agency. *Verification and Validation of WIPP Data Packages*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-30; July 2014]

¹⁵ Environmental Protection Agency. *EPA's Review of DOE's Inventory Tracking for TRU Wastes at Waste Control Specialists*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-A4-187; April 2014]

locations. As evident in response to the February 2014 release, environmental monitoring takes on a more important role after a release. It not only supplements and supports conclusions of compliance with regulatory limits, but environmental monitoring bolsters incident response and helps address public concern by providing timely data.

In reviewing the ambient monitoring network, DOE needs to update the network to account for the additional uses and demands for ambient air monitoring during a release. DOE may make changes to the existing design of the repository—such as installation of a new air exhaust shaft¹⁶—in response to the incident. If these changes affect the magnitude, release point, or direction of potential releases in the future, DOE will need to ensure the network addresses such changes. DOE should use a data quality objective process to define the type, quality and quantity of data needed to reach accurate and defensible conclusions.

As noted in EPA's *Subpart A Inspection Report in Response to the Incident of February 14, 2014*, DOE should evaluate the positioning of air samplers to ensure unrestricted airflow to the sampler, allowing representative sample collection.

This incident illustrated the importance of confirmatory environmental sampling during such an event, and EPA recognizes that DOE has expanded the network considerably since the February incident. However, DOE needs to revisit the maintenance plans, quality assurance and control procedures and reliability of its ambient air samplers. DOE should increase the reliability of its sampling results by implementing a more formal maintenance and calibration system for its sampling equipment and by considering an upgrade to digital systems that provide more data on air flow rates and equipment failures.

Strengthen Emergency Response Protocols: DOE should better integrate routine and incident procedures at WIPP to enhance preparedness of field and laboratory staff to respond to releases. The inspection report notes instances in which following existing protocols may have hampered the response. Regular emergency response exercises or drills may prove useful in keeping staff well informed of and practiced in new procedures and protocols.

DOE's standard operating procedures should include notification to the federal government's National Response Center in the case of a suspected or confirmed release. The National Response Center is the sole federal point of contact for reporting all hazardous substance releases and it has established protocols for notifying federal agencies.

DOE needs to conduct contingency planning to address the possibility of multiple failures in the containment system, and identify the best methods for containing releases in the WIPP underground.

Ensure the Highest Quality Laboratory Results: DOE needs to implement stricter sample collection, sample tracking, and documentation procedures to provide the highest quality, most accurate and defensible data possible at all times. While the February 2014 release did not pose a public health threat, EPA's WIPP inspection and the verification and validation laboratory data

¹⁶ DOE has stated that "A new ventilation system is being designed for WIPP's long term operation," which could include a new exhaust shaft in a different location. See <http://www.wipp.energy.gov/wipprecovery/faq.html>

review both highlight areas where DOE's change in protocol or flaws in laboratory calculations could come under scrutiny in the future.

Conclusions

Based on EPA's observations, the February 2014 release did not pose a public health or environmental hazard. EPA found that DOE's existing procedures were generally followed and that both the modeling and monitoring systems were adequate to detect and characterize the February 2014 release. From the modeling, monitoring and air filter analyses, DOE and EPA consistently calculated public doses to be less than 1 mrem/year, which is well below the 10 mrem/year regulatory limit, therefore DOE remains in compliance with EPA's standards.

While not necessary for regulatory compliance, EPA identified improvements in three different areas that will help DOE provide the best information possible to the public and to responders during an emergency.

- ✓ Update the Ambient Environmental Monitoring Network: DOE needs to improve the design, positioning, maintenance and overall capability of its ambient environmental air monitoring network.
- ✓ Strengthen Emergency Response Protocols: DOE should better integrate routine and incident procedures to enhance preparedness of field and laboratory staff to respond to releases.
- ✓ Ensure the Highest Quality Laboratory Results: DOE needs to implement stricter sample collection, sample tracking and documentation procedures to provide the highest quality, most defensible data possible at all times.

DOE's Accident Investigation Board and the Defense Nuclear Facilities Safety Board continue to investigate DOE's response to the release and identify areas needing improvement related to and beyond the findings in this report. EPA will continue to follow DOE's WIPP monitoring system assessment and provide feedback where appropriate. EPA continues to monitor the situation at the WIPP and will actively engage DOE in discussions regarding the resumption of operations at the WIPP.

Reference List

Department of Energy and Environmental Protection Agency. "Memorandum of Understanding Between the U.S. EPA and the U.S. DOE Concerning the Clean Air Act Emission Standards for Radionuclides 40 CFR § 61, Including Subparts H, I, Q & T." Signed by Mary D. Nichols, EPA Assistant Administrator for Air and Radiation: September 29, 1994. Signed by Tara O'Toole, DOE Assistant Secretary for Environment, Safety, and Health, April 5, 1995.
http://www.epa.gov/radiation/docs/neshaps/epa_doe_caa_mou.pdf.

Department of Energy. *Accident Investigation Report: Phase 1: Radiological Release Event at the Waste Isolation Pilot Plant on February 14, 2014*. Washington, DC: 2014.
http://energy.gov/sites/prod/files/2014/04/f15/Final%20WIPP%20Rad%20Release%20Phase%201%2004%2022%202014_0.pdf

Environmental Protection Agency. *Guidance for the Implementation of EPA's Standards for Management and Storage of Transuranic Waste (40 CFR Part 191, Subpart A) at the Waste Isolation Pilot Plant (WIPP)*. EPA-402-R-97-001. Washington, DC: 1977.

Environmental Protection Agency. "40 CFR Part 191, Subpart A, Environmental Standards for Management and Storage." 58 *Federal Register* 66398 (20 December 1993).

Environmental Protection Agency. "40 CFR Part 194, Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations: Final Rule." 61 *Federal Register* 5224 (9 February 1996).

Environmental Protection Agency. "40 CFR Part 61, Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities." 67 *Federal Register* 57166 (9 September 2002).

Environmental Protection Agency. *Analysis of EPA and DOE WIPP Air Sampling Data*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-30; July 2014]
<http://www.epa.gov/radiation/docs/wipp/analysis-epa-doe-wipp-air-sampling-data.pdf>

Environmental Protection Agency. *Consequence Assessment Review Summary for the February 2014 Radiological Emission Release at the Waste Isolation Pilot Plant*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-33; August 2014]
<http://www.epa.gov/radiation/docs/wipp/consequence-assessment-review.pdf>

Environmental Protection Agency. *Environmental Protection Agency's Confirmatory Dose Calculations of the Department of Energy's Use of CAP88-PC for the February 2014 Radiological Emission Release at the Waste Isolation Pilot Plant*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-32; August 2014]
<http://www.epa.gov/radiation/docs/wipp/confirmatory-dose-calculations.pdf>

Environmental Protection Agency. *EPA Actions in Response to Release of Radioactive Material from the Waste Isolation Pilot Plant*. Washington, D.C.: 2014.

http://www.epa.gov/radiation/docs/wipp/2014_radevent/wipp_epaactions_2014release.pdf

Environmental Protection Agency. *EPA's Review of DOE's Inventory Tracking for TRU Wastes at Waste Control Specialists*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-A4-187; April 2014] <http://www.epa.gov/radiation/docs/wipp/april9-WCSVisitReport-FinalJune14.pdf>

Environmental Protection Agency. *EPA's WIPP Air Sampling Data from April 2014*. Washington, D.C., 2014.

Environmental Protection Agency. *Subpart A Inspection Report in Response to the Incident of February 14, 2014*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B3-129; August 2014] **[INSERT URL]**

Environmental Protection Agency. *Verification and Validation of WIPP Data Packages*. Washington, D.C., 2014. [EPA Air Docket A-98-49, Item II-B1-30; July 2014]

<http://www.epa.gov/radiation/docs/wipp/verification-validation-wipp-data-packages.pdf>