

WIPP Regulatory Compliance – Keeping the Gate Open – 10435

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ABSTRACT

Keeping the gate open at the Waste Isolation Pilot Plant (WIPP) facility requires an integrated regulatory overview of ongoing operations and proposed activities, each of which can impact a complex array of programmatic requirements from the regulatory agencies. Major accomplishments in three main regulatory program areas - Compliance Certification for the U.S. Environmental Protection Agency (EPA), Hazardous Waste Facility Permit Compliance for the New Mexico Environment Department (NMED) Hazardous Waste Bureau, and the approval of transportation packages by the U.S. Nuclear Regulatory Commission (NRC) for waste shipments between waste generator sites to the WIPP facility will be discussed in this paper and poster session. Regulatory compliance accomplishments in and across these three program areas have resulted in process improvements both at the WIPP facility and at transuranic (TRU) waste generator sites throughout the U.S. Department of Energy (DOE) complex.

INTRODUCTION

The WIPP mission is to safely dispose of TRU radioactive waste generated during the production of nuclear weapons and other activities related to the national defense of the United States. The WIPP facility is the nation's only underground repository for the permanent disposal of defense-generated TRU and TRU-mixed waste. Transuranic waste is defined as waste that is contaminated with alpha-emitting radionuclides that are heavier than uranium (that is, their atomic numbers are greater than that of uranium) and that have half-lives longer than 20 years at concentrations greater than 100 nanocuries (3,700 becquerels) per gram of waste. Key radionuclides found in TRU waste include americium-241 and several isotopes of plutonium (plutonium-238, plutonium-239, plutonium-240, and plutonium-241). Transuranic-mixed waste is TRU waste that is also a hazardous waste as defined by the New Mexico Hazardous Waste Act [1]. Transuranic wastes are generated in the DOE complex by: (1) nuclear weapons development and manufacturing, (2) plutonium recovery, stabilization, and management, (3) research and development, (4) environmental restoration, and decontamination and decommissioning, (5) waste management, and (6) testing at facilities under contract to the federal government.

The WIPP Project was authorized by the Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980 [2]. This legislation mandated that the

DOE provide a research and development facility to demonstrate the safe disposal of radioactive waste resulting from national defense activities and programs. In January 1981, the DOE announced its decision to proceed with phased development of the WIPP facility, located in Eddy County in southeastern New Mexico, 26 miles (42 Km) east of the city of Carlsbad. The decision called for the facility to be built to accommodate 6.2 million cubic feet (168,500 cubic meters (m^3)) of contact-handled TRU waste and 0.25 million cubic feet (7,080 m^3) of remote-handled TRU waste. The term "contact-handled transuranic waste" means transuranic waste with a waste container surface dose rate not greater than 200 millirem (2 mSv) per hour. The term "remote-handled transuranic waste" means transuranic waste with a container surface dose rate of 200 millirem (2 mSv) per hour or greater. After completing a Site and Preliminary Design Validation Phase, the construction of the WIPP facility began in 1983. In 1992, Congress passed the WIPP Land Withdrawal Act [3], transferring jurisdiction of 16 sections (41 Km^2) of land from the Department of the Interior to the DOE for authorized activities associated with the WIPP Project.

Geologically, the WIPP repository (figure 1) is located in the Delaware Basin and consists of an underground facility in a thick bedded salt formation of Permian age some 2,150 feet (656 m) below the land surface. The facility consists of eight panels for waste disposal, each of which has 7 rooms. In the future the Permittees may also request disposal of containers of TRU mixed waste in access tunnels leading from the shafts to the panels.

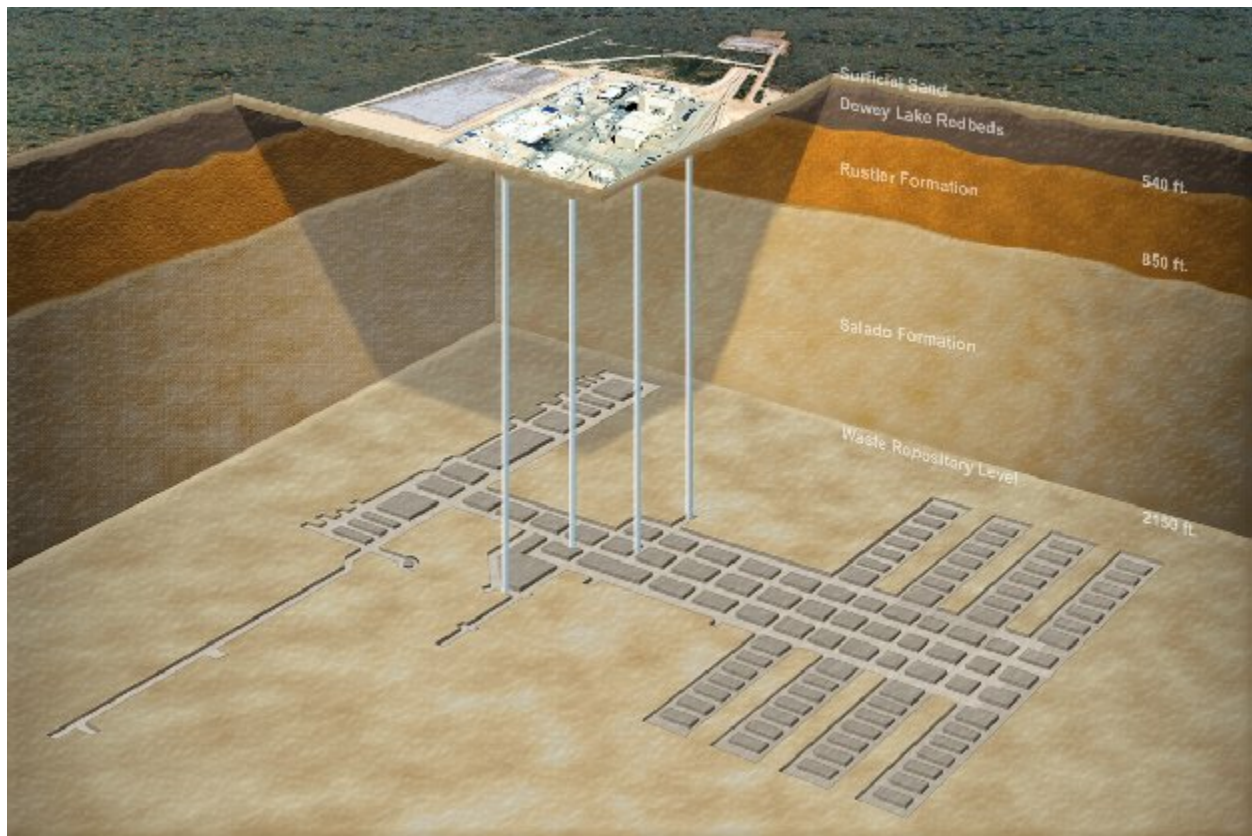


Fig. 1 - The WIPP Facility

The first shipment of contact-handled TRU waste was received at the WIPP facility on March 26, 1999, and the first shipment of remote-handled TRU waste was received on January 23, 2007. In fiscal year 2009, 6,137 m³ of waste was disposed of at the facility, including 6,076 m³ of contact-handled TRU waste and 61 m³ of remote-handled TRU waste. From the first receipt of waste in March 1999 through the end of fiscal year 2009, a total of 62,912 m³ of waste has been disposed of at the WIPP facility. This volume represents about 36% of the total capacity of the WIPP facility.

REGULATORY FRAMEWORK

The WIPP facility is required by law to comply with numerous environmental laws and regulations promulgated pursuant to federal and state statutes, DOE orders, and Executive Orders. The Land Withdrawal Act establishes responsibilities for management of the facility and includes specific regulatory conditions and standards for its operation. The Land Withdrawal Act limits the waste sent to the WIPP facility to defense-related TRU waste and specifically prohibits the disposal of high-level radioactive waste and spent nuclear fuel. It also requires the DOE to report to the EPA on a biennial basis, its compliance status with numerous environmental regulations.

In the Land Withdrawal Act, EPA was given specific regulatory authority to promulgate criteria related to the certification of the DOE's compliance with disposal standards for radioactive waste and to certify the DOE compliance with those standards. The EPA's focus is on the long-term performance of the WIPP disposal system, as embodied through 40 Code of Federal Regulations 191 Subparts B and C [4], 40 Code of Federal Regulations Part 194 [5], and the EPA's certification and recertification decisions. EPA oversight also encompasses activities that impact long-term performance such as waste characterization at the generator sites, panel closure design, and TRU waste inventory.

Much of the waste that is disposed of at the WIPP facility is mixed waste, meaning that it contains both hazardous and radioactive components. Therefore, the facility must comply with the requirements of the Resource Conservation and Recovery Act (RCRA) [6] to dispose of mixed waste. The EPA delegated authority under the Resource Conservation and Recovery Act to the New Mexico Environment Department (NMED), which enforces provisions of the law in the state of New Mexico through regulations promulgated pursuant to the New Mexico Hazardous Waste Act [1]. NMED is focused on protection of human health and the environment during the operational period, when waste is being transported to and managed at the WIPP facility prior to closure.

EPA retains authority over the disposal of polychlorinated biphenyls at the WIPP facility. EPA Region 6 has regulatory authority over these substances, based on the Toxic Substances Control Act, 40 CFR Part 761 [7].

The Land Withdrawal Act also required the U.S. Nuclear Regulatory Commission (NRC) to approve all packages used to transport TRU waste to or from the WIPP facility. The NRC uses a hypothetical accident condition to evaluate the ability of a Type B shipping package to contain

radioactive materials and to protect emergency response personnel during an accident. The NRC's requirements for the analysis of hypothetical accident conditions are contained in 10 Code of Federal Regulations Part 71. Transportation containers must also pass Department of Transportation (DOT) Type 7A specifications for drop testing. Contacted handled and remote handled TRU waste are shipped by truck to the WIPP facility in containers that meet DOE standards placed inside of NRC approved packages.

The primary focus of this paper will be on regulatory challenges and successes with the EPA and the NMED. Because the NRC regulatory scheme focuses on transportation activities, any discussions of their involvement will be limited to RH TRU waste and the proposed lead shielded container. Notwithstanding, the WIPP facility is also regulated by other federal and state regulators. For example, the NMED Groundwater Bureau implements regulations to protect groundwater and the DOE has purview over nuclear safety activities.

In response to the requirements from EPA and NMED, DOE has implemented a comprehensive Environmental Management System to provide the framework for conducting facility operations in an environmentally safe and sound manner, and to establish a holistic approach for dealing with environmental regulations. The DOE environmental programs provide safeguards for the environment, the workplace, and the community while maintaining the flexibility to efficiently conduct operations to meet its mission. To meet the environmental commitments set forth in the Environmental Policy Statement, documented objectives and targets are established each fiscal year as part of the budget planning process. These objectives and targets establish the expectations for environmental performance during each fiscal year. In 2009, the Environmental Management System underwent a rigorous review process and earned an ISO 14001 [8] registration for the second time. The achievement provides enhanced credibility to the status of the WIPP Project as a world-class facility and organization.

EPA UNIQUE REGULATORY AUTHORITY

The EPA has had a regulatory role for radioactive waste disposal since 1992, when it was delegated responsibility for evaluating and certifying that the WIPP disposal system will comply with the EPA's environmental performance standards. To carry out this responsibility, the EPA issued final regulatory standards for waste containment and individual protection after disposal (40 Code of Federal Regulations 191) [4]. Then, to determine whether the facility would continue to meet these containment standards, the EPA formulated a set of WIPP disposal system-specific compliance certification criteria (40 Code of Federal Regulations 194) [5].

In late 1996, the DOE submitted the Compliance Certification Application for the WIPP facility to the EPA. This document, consisting of more than 80,000 pages, contained the results of decades of research, review, and public comment. The Compliance Certification Application [9] demonstrated how the geological, hydrological, physical, chemical, and environmental characteristics of the site, along with engineered features of the facility, would safely contain radioactive waste for the 10,000-year regulatory time period. The EPA evaluated the information in the Compliance Certification Application, and certified on May 18, 1998, that the repository system would meet the standards. The EPA's certification of the repository, followed by the

Secretary of Energy's decision to proceed with waste disposal, led to the beginning of waste disposal operations on March 26, 1999.

The Land Withdrawal Act also requires the DOE to submit documentation of the facility's continued compliance with the disposal standards to the EPA not later than five years after initial receipt of TRU waste for disposal at the repository, and every five years thereafter until the decommissioning of the facility is completed. This periodic documentation of continued compliance is referred to as "recertification." According to 40 Code of Federal Regulations § 194.15 [5], recertification applications must include any information that is new or different from information contained in the most recent certification application. Therefore, the DOE must review any new information that relates to the WIPP disposal system certification basis and include the new information in each Compliance Recertification Application.

The DOE has completed one recertification cycle. The first Compliance Recertification Application (CRA-2004) [10] was submitted to EPA on March 26, 2004. After a thorough review of the CRA-2004, EPA recertified the facility's compliance on March 29, 2006.

The second five-year recertification cycle ended on March 26, 2009 and the second recertification, CRA-2009 [11], was submitted to EPA on March 24, 2009 in accordance with the provisions of the Land Withdrawal Act. The central message of the CRA-2009 is that no changes have taken place since CRA-2004 that will compromise compliance with the radioactive waste disposal standards. Continuing scientific studies and analyses conducted in support of the 2009 recertification demonstrate that the WIPP disposal system continues to be in compliance with the applicable radioactive waste disposal standards. The CRA-2009 is currently undergoing EPA review.

The EPA also requires the DOE to provide information on any change in conditions or activities pertaining to the disposal system on an annual basis. This requirement is identified in 40 Code of Federal Regulations §194.4(b)(4) [5]. The DOE meets this requirement by providing a report of applicable changes each November.

Planned changes must also be reported to EPA prior to implementation by the DOE. Several significant planned changes either have been put into place at the facility or are currently in the process of being proposed to improve operational efficiencies, better protect the environment, or provide added value to the taxpayers. For example, DOE submitted a planned change request in April 2006 to decrease the amount of emplaced magnesium oxide (MgO) from 1.67 to 1.2 times the quantity of the organic carbon in the cellulose, rubber and plastic materials in the disposed waste. EPA agreed that a reduction of the MgO ratio from 1.67 to 1.20 would still provide a sound engineered barrier for the waste and approved the planned change request in February 2008. The positive effects of making this change became immediately apparent. Since the change has been put into effect, it is estimated that hundreds of thousands of dollars have been saved in material costs and emplacement costs, and over 10,000 ft³ (~300 m³) of floor space opened for waste disposal per disposal panel rather than emplacement of MgO.

NMED REGULATORY AUTHORITY

The application for the Hazardous Waste Facility Permit for the WIPP facility consists of Part A and Part B. Part A is a standard form that identifies the types and quantities of waste intended to be disposed of at the site. Part B of the permit application presents an extensive set of requirements describing how the facility will operate to meet the requirements of the New Mexico Hazardous Waste Act. Part B includes waste characterization information on the hazardous wastes to be handled at the facility, a description of procedures for handling hazardous wastes, security procedures and equipment, and closure and post-closure plans, including groundwater monitoring. As it evaluated the DOE's first application for a hazardous waste permit, the New Mexico Environment Department issued two draft permits, one in May 1998 and the other in November 1998. After considering public comments, it issued a final hazardous waste permit on October 27, 1999 [11] and that permit became effective November 26, 1999.

A standard hazardous waste permit in New Mexico is issued for a fixed term not to exceed 10 years. Several permit renewals will therefore be necessary during the projected 25-year operation of the repository. The first 10-year renewal application was submitted to the NMED on May 28, 2009 and is currently under review.

Since the issuance of the permit in 1999, approximately 100 permit modifications to increase efficiency, provide operational flexibility, modernize, and reduce costs of the characterization, management, storage, and disposal of defense-related TRU mixed-waste have been submitted to the New Mexico Environment Department for approval. Two examples, a No Further Action petition and a change to dispose of remote-handled TRU waste, are provided here.

No Further Action Petition. In 2002, a No Further Action petition was prepared to address 15 Solid Waste Management Units and eight Areas of Concern listed in Module VII of the permit. This petition provided information demonstrating that each management unit and area of concern met at least one of the criteria which would indicate no need for further corrective action as defined by the NMED. The petition addressed the current permit requirements for a facility investigation for these units and areas and summarized the results of all of the previous investigations of these units/areas performed at the facility. The investigation found that the 15 management units and eight areas of concern identified in the permit were associated with: (1) natural resource exploration activities prior to the development of the facility, (2) early mineral assessment and geological studies to support the development of the facility, or (3) facility construction. Approval of the petition by the NMED allowed the Permittees to request a Class 3 permit modification to exit the investigation and remediation process, and to remove these units/areas from the Permit. This approval resulted in the reduction of quarterly reporting requirements and eliminating a few thousand dollars in annual fees.

OVERLAPING REGULATORY AUTHORITIES FOR EPA, NMED AND NRC

Remote-Handled TRU Waste

The Land Withdrawal Act allows for the disposal of remote-handled TRU waste at the WIPP facility. However, the Hazardous Waste Facility Permit, as issued in 1999, contained specific prohibitions on the management, storage, or disposal of remote-handled TRU wastes at the WIPP facility. In 2005, the facility submitted a Class 3 permit modification request to remove the permit prohibition on the handling and disposal of remote-handled waste. In that modification, the facility proposed language changes throughout the permit to allow for the management, storage, and disposal of remote-handled TRU mixed wastes. The approval of the permit modification to allow for remote-handled TRU waste to come to the facility was an important step in achieving the DOE mandate to clean up and permanently dispose of the nation's defense-generated TRU waste in a safe manner.

The acceptance of remote-handled TRU waste also involved interaction with EPA and NRC. A planned change request was submitted to EPA in December 2002, requesting approval for DOE to dispose of remote handled waste. EPA also must approve the characterization activities for remote-handled waste at each generator site before the waste can be shipped to the WIPP facility. EPA issued its approval in March 2004.

Finally NRC had to approve the 72B transport cask for transporting remote-handled waste before any shipments could take plate. This approval included extensive review of design specifications and rigorous testing.

Disposal of Polychlorinated Biphenyls

The disposal of polychlorinated biphenyls are regulated by the Toxic Substances Control Act under 40 CFR Part 761 [7]. In 2002, the DOE requested EPA Region 6 approval for the disposal of TRU and TRU mixed wastes containing polychlorinated biphenyls. The EPA approved the application in May of 2003, allowing for disposal of this waste at the facility for a period of five years. The approval was based upon the facility having an approved hazardous waste facility permit and upon being granted certain exclusions for a chemical landfill. The DOE requested that EPA re-authorize disposal of polychlorinated biphenyls for the facility in March of 2007, and EPA approved the request for reauthorization in March of 2008, allowing the continued disposal of this waste type at the WIPP facility through April of 2013.

The Hazardous Waste Facility Permit as issued in 1999 also contained specific prohibitions on the management, storage, or disposal of polychlorinated-biphenyl-contaminated TRU wastes. In 2003, a Class 2 permit modification request was submitted to NMED seeking to revise the permit to remove the prohibition on the receipt and disposal of polychlorinated-biphenyl-contaminated TRU wastes at the WIPP facility. This permit change was important to the National TRU program because there were no other disposal options for this PCB contaminated TRU waste in the DOE complex. The permit modification request was approved on September 11, 2003.

Shielded Containers

The DOE submitted a planned change request to the EPA in November of 2007, for authorization to use shielded containers for the management and emplacement of some remote-handled TRU waste as CH TRU waste. The shielded container design (figure 2) has 1-inch (2.54 cm) thick lead shielding sandwiched between a double-walled steel shell with a 3-inch (7.5 cm) thick lid and 3-inch (7.5 cm) thick base. This container is sufficient to shield, a portion of the RH TRU waste inventory down to a dose rate of less than 200 millirem/hour (mSv/hr). The shielded containers will be emplaced side-by-side with contact-handled TRU waste, on the floor of the repository, but these waste streams will remain designated as remote-handled TRU waste in the facility's WIPP Waste Inventory System. The use of the shielded containers will enable DOE to significantly increase the efficiency of transportation and disposal operations for remote-handled TRU waste.

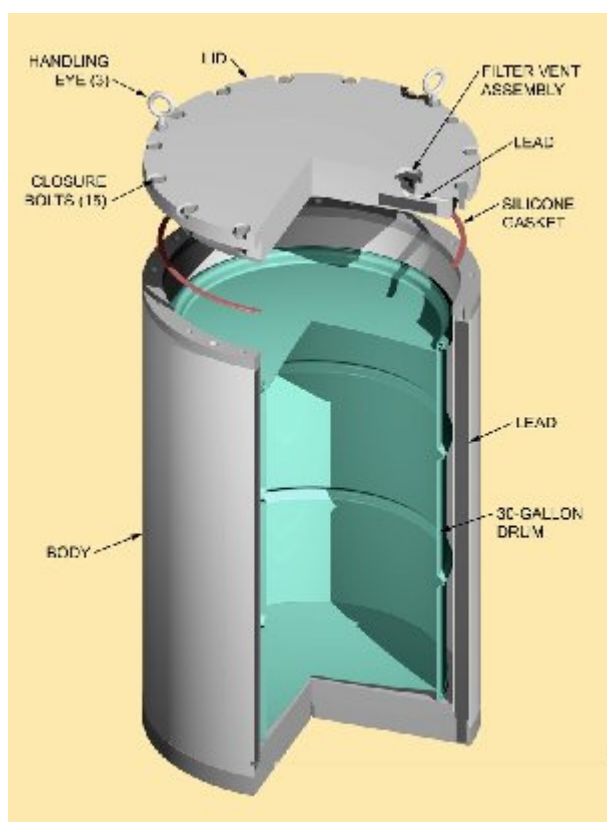


Fig. 2 Cut-away view of the shielded container

EPA has requested additional information regarding the safety evaluation for facility operations during emplacement of shielded containers in the repository. DOE has provided this information and the planned change request will be further evaluated by EPA after it reaches its decision on the CRA-2009.

In parallel with the EPA's analysis of the shield container planned change request, NMED is currently considering the 10-year renewal application for the WIPP Hazardous Waste Facility Permit. The DOE is currently working with the NMED to agree to a schedule which prioritizes

the NMEDs review of the 10-year renewal application and the future submission of a permit modification request for disposing of RH TRU waste using the lead-shielded container.

The design of the lead-shielded container has passed drop testing for Department of Transportation Type 7A specifications and for the U.S. Nuclear Regulatory Commission Type B specifications for shipping in the HalfPACT transportation package. These results ensure that the shielded container is safe for transportation and handling and will prevent releases under the most severe accident conditions. It is also important to note that the EPA required the NRC approval for shipping the shielded container before they approve the use of the shielded container.

Panel Closure System

The purpose of the Panel Closure System is to protect human health and the environment, during operations prior to closure of the facility. In the context of the facility waste panels, the potential hazards come from the escape of volatile gases into the ventilation air and ultimately into the environment. The approved panel closure system, known as "Option D," requires emplacing a 12-foot (3.6 m) thick explosion isolation wall and a 25-foot (7.6 m) thick monolith composed of a salt-saturated concrete. In early 2001, DOE began a redesign of the panel closure system to simplify construction and to reduce cost. A project has been initiated to determine the appropriate design for the panel closure and to submit a new planned change request for the design to the regulatory agencies in the 2010-2011 time frame, after EPA completes its decision on CRA-2009 and a permit modification request to the NMED after the permit is renewed

CONCLUSIONS

The WIPP mission is to safely dispose of TRU radioactive waste generated during the production of nuclear weapons and other activities related to the national defense of the United States. Fulfilling this mission requires an integrated regulatory overview of operations and proposed changes, each of which can impact a complex array of programmatic requirements from multiple regulatory agencies. Major activities in three main regulatory program areas - Compliance Certification for EPA, Hazardous Waste Facility Permit Compliance for NMED, and the approval of transportation packaging by NRC, provide specific examples of the integrated approach to compliance used at the WIPP Project. The regulatory compliance accomplishments in and across these three program areas have resulted in process improvements both at the WIPP facility and at TRU waste generator sites throughout the United States.

REFERENCES

1. NMSA 1978. §74-4-1. New Mexico Hazardous Waste Act. New Mexico Statutes Annotated 1978. State of New Mexico, Santa Fe, NM.
2. Nuclear Energy Authorization Act of 1980 (Pub. L. 96-164; 93 Stat. 1259, 1265).

3. Land Withdrawal Act (Pub. L. 102-579, 106 stat. 4777, as amended by Pub. L. 104-201, 110 stat. 2422).
4. 40 CFR Part 191. “Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes.” *Code of Federal Regulations*. Office of the Federal Register, National Archives and Records Administration, Washington, D.C.
5. 40 CFR Part 194. “Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant’s Compliance With the 40 CFR Part 191 Disposal Regulations.” *Code of Federal Regulations*. Office of the Federal Register, National Archives and Records Administration, Washington, D.C.
6. 42 U.S.C. §§6901, et seq. Resource Conservation and Recovery Act. *United States Code*. U.S. Government Printing Office, Washington, D.C.
7. 40 CFR Part 761. “Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.” *Code of Federal Regulations*. Office of the Federal Register, National Archives and Records Administration, Washington, D.C.
8. ISO 14001. *Environmental Management Systems – Specification with Guidance for Use*. 2004. International Organizations for Standardization, Geneva, Switzerland.
9. DOE/CAO 1996-2184. *Waste Isolation Pilot Plant Compliance Certification Application*. U.S. Department of Energy, Carlsbad, NM.
10. DOE/WIPP-04-3231. *Title 40 CFR Part 191 Subparts B and C Compliance Recertification Application 2004*. Waste Isolation Pilot Plant, Carlsbad, NM
11. DOE/WIPP-09-3424. 2009. *Compliance Recertification Application*. Waste Isolation Pilot Plant, Carlsbad, NM.
12. NM4890139088-TSDF. 1999. Waste Isolation Pilot Plant Hazardous Waste Facility Permit. New Mexico Environment Department, Santa Fe, NM.