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WASTE ISOLATION PILOT PLANT BIENNIAL ENVIRONMENTAL COMPLIANCE REPORT

UNITED STATES DEPARTMENT OF ENERGY
WASTE ISOLATION PILOT PLANT

CARLSBAD FIELD OFFICE
CARLSBAD, NEW MEXICO

REVISION 0

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

ACO	Administrative Compliance Order
AEA	*Atomic Energy Act*
AO	administrative order
AOC	area of concern
AQB	Air Quality Bureau
BECR	Biennial Environmental Compliance Report (this document)
BLM	Bureau of Land Management
BTU	British thermal unit
C of C	Certificate of Compliance
CAA	*Clean Air Act*
CAAA	*Clean Air Act Amendments of 1990*
CAP88	Clean Air Act Assessment Package-1988
CBFO	U.S. Department of Energy Carlsbad Field Office
CCA	Compliance Certification Application
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFC	chlorofluorocarbon
CFO	BLM Carlsbad Field Office
CFR	Code of Federal Regulations
CH	contact-handled
CMR	Central Monitoring Room
COA	Conditions of Approval
CRA	Compliance Recertification Application
CX	categorical exclusion
CY	calendar year (when used with a specific year)
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DP	discharge permit
DSA	Documented Safety Analysis
EA	environmental assessment
EDE	effective dose equivalent
EIS	environmental impact statement
EMS	environmental management system
EPA	U.S. Environmental Protection Agency
EPCRA	*Emergency Planning and Community Right-to-Know Act*
ESA	*Endangered Species Act*
FAS	fixed air sampler
Fed. Reg.	*Federal Register*
FEIS	final environmental impact statement
FIFRA	*Federal Insecticide, Fungicide, and Rodenticide Act*
FLPMA	*Federal Land Policy and Management Act*
FONSI	finding of no significant impact

gpd	gallons per day
GWPA	*Ground Water Protection Act*
HalfPACT	half package transporter
HAP	hazardous air pollutant
HCIA	*Hazardous Chemicals Information Act*
HMTA	*Hazardous Materials Transportation Act*
HSWA	*Hazardous and Solid Waste Amendments*
HWA	*Hazardous Waste Act*
HWDU	hazardous waste disposal unit
ISO	International Organization for Standardization
kg	kilogram(s)
LANL	Los Alamos National Laboratory
LEPC	Local Emergency Planning Committee
LDR(s)	land disposal restriction(s)
LMP	Land Management Plan
LWA	*Land Withdrawal Act*
MEI	maximally exposed individual
mg/L	milligram(s) per lite**r**
MOC	Management and Operating Contractor
MOU	Memorandum of Understanding
mrem	millirem
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NMAC	New Mexico Administrative Code
NMDG&F	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NO_3	nitric oxide
NOI	notice of intent
NOV	notice of violation
NRC	U.S. Nuclear Regulatory Commission
NSPS	New Source Performance Standards
NWP	Nuclear Waste Partnership LLC
NWPA	*Nuclear Waste Policy Act*
OCV	outer containment vessel
ODS	ozone-depleting substance
PA	public address
PAAA	*Price-Anderson Amendments Act of 1988*
PCB	polychlorinated biphenyl
Permit	Hazardous Waste Facility Permit

PNOV	preliminary notice of violation
PSD	prevention of significant deterioration
Pub. L.	Public Law
QA	quality assurance
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
RCRA	*Resource Conservation and Recovery Act*
RH	remote-handled
ROD	record of decision
RQ	reportable quantity
SA	supplemental analysis
SAA	satellite accumulation area
SAR	safety analysis report
SARA	*Superfund Amendments and Reauthorization Act of 1986*
SDS	Safety Data Sheet
SDWA	*Safe Drinking Water Act*
SEIS	supplemental environmental impact statement
SERC	State Emergency Response Commission
SHPO	State Historic Preservation Officer (or Office)
SSA	salt storage area
SC	Salt Cell
SWDA	*Solid Waste Disposal Act*
SWMR	Solid Waste Management Regulations
TDS	total dissolved solids
TE	transportation engineer
TKN	total Kjeldahl nitrogen
tpy	tons per year
TPQ	threshold planning quantity
TRANSCOM	Transportation Tracking and Communication System
TRAMPAC	Transuranic Waste Authorized Methods for Payload Control
TRU	transuranic
TRUPACT	transuranic package transporter
TSCA	*Toxic Substances Control Act*
TSDF	treatment, storage, and disposal facility
TSR	technical safety requirement
U.S.	United States
U.S.C.	*United States Code*
USFWS	U.S. Fish and Wildlife Service
USQ	unreviewed safety question
UST	underground storage tank
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant

WQSP	water quality sampling program

1.0 INTRODUCTION

The Biennial Environmental Compliance Report (BECR) documents U.S. Department of Energy (DOE) compliance with environmental regulations applicable to the Waste Isolation Pilot Plant (WIPP), a facility designed and authorized for the safe disposal of mixed transuranic (TRU) radioactive waste. TRU waste is radioactive waste that contains alpha-emitting radionuclides of atomic number greater than 92, with half-lives longer than 20 years, and which are present in concentrations greater than 100 nanocuries per gram of waste.

This BECR meets the requirements of the *Waste Isolation Pilot Plant Land Withdrawal Act* (LWA) (Public Law (Pub. L.) 102-579, as amended by Pub. L. 104-201, Subtitle F, *Waste Isolation Pilot Plant Land Withdrawal Act, Amendments* of 1996). This report is generated every two years, on even numbered years, and is due by October 30th to the U.S. Environmental Protection Agency (EPA). Specifically, this BECR documents the DOE's compliance at the WIPP with environmental regulations and permits issued pursuant to the following:

- Title 40 *Code of Federal Regulations* (CFR) Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, Subpart A, Environmental Standards for Management and Storage
- *Clean Air Act* (CAA) (42 *United States Code* (U.S.C.) § 7401, et seq.)
- *Solid Waste Disposal Act* (SWDA) (42 U.S.C. §§ 6901-6992, et seq.)
- *Safe Drinking Water Act* (SDWA) (42 U.S.C. § 300f, et seq.)
- *Toxic Substances Control Act* (TSCA) (15 U.S.C. § 2601, et seq.)
- *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (42 U.S.C. § 9601, et seq.)
- *New Mexico Hazardous Waste Act* (HWA) (§§ 74-4-1 through 74-4-14 New Mexico Statutes Annotated (NMSA)) 1978
- Other applicable federal laws pertaining to public health and safety or the environment
- Regulations promulgated, and permit requirements, under the laws listed within this section

On January 28, 2015, the DOE's Carlsbad Field Office (CBFO) responded to an EPA letter stating that the approach to the 2014 BECR did not provide sufficient information regarding the fire event and radiological event of February 2014 for the EPA to determine whether the WIPP was in compliance with the laws identified in Section 9 of the WIPP LWA (EPA, 2014a; DOE, 2015b). In response, the DOE provided supplemental information to assist the EPA in its review of the 2014 BECR. The supplement to the 2014 BECR included additional pertinent information for the time period April 1, 2014, through January 30, 2015 (DOE, 2015b; DOE, 2015c). For the purpose of consistency with the LWA reporting periods, this BECR addresses the reporting period of April 1, 2014, through March 31, 2016, and includes information from the supplement to the 2014 BECR, with the exception of annual radiation doses. Annual radiation doses must

be calculated for each calendar year to satisfy the DOE's reporting requirements; this BECR includes annual radiation doses to the public for calendar year (CY) 2014 and CY 2015.

1.1 Organization of the Report

Sections in this BECR correlate to federal or state laws, or in the absence of a law, regulatory programs that are relevant to the WIPP. Federal laws are addressed first, followed by New Mexico state laws. Each section summarizes the law and related implementing regulations and applicability to the WIPP. Requirements are noted in tables. Italicized text may be a direct quote from the regulation cited or, in cases where the requirements are lengthy, a summary. Italicized text is followed by an explanation of how the WIPP is compliant.

Local laws or ordinances that apply to the WIPP are limited to those under the authority of the Eddy County Commission, Eddy County, New Mexico. County ordinances are not environmental in scope and are not included in the report.

For the WIPP Hazardous Waste Facility Permit (Permit), the DOE and Nuclear Waste Partnership LLC (NWP) are collectively referred to as the Permittees. For other permits, such as DP-831, the DOE is the Permittee.

1.2 Compliance Management at the WIPP

The Permittees are committed to conducting operations at the WIPP in compliance with applicable regulations and permit conditions, and to protecting public health and the environment.

The WIPP environmental management system (EMS) provides the framework for ensuring compliance with environmental requirements. The WIPP EMS is certified under the International Organization for Standardization (ISO) 14001 and, as such, is based on the Plan-Do-Check-Act cycle. Compliance management is incorporated throughout the four phases of the cycle as described below.

Plan

- Potential environmental impacts and permit or regulatory requirements are identified and addressed when planning for proposed projects or changes in equipment, operations, and procedures.
- Changes in existing regulations and new regulations are evaluated for applicability to operations.
- Objectives and targets are set annually to improve environmental performance.

Do

- Compliance is incorporated into daily work activities through implementation of programs, plans, and procedures, including a rigorous Conduct of Operations program.
- An in-depth training and qualification program is in place to ensure competence of WIPP employees.

- Expectations for compliance are clearly communicated to employees and contractors.

Check

- Ongoing checks of compliance and protection of public health and the environment are performed via the *Waste Isolation Pilot Plant Environmental Monitoring Plan* (DOE/WIPP-99-2194) (DOE, 2015e), the CBFO *Contractor Oversight Plan* (DOE, 2012a), and the NWP Quality Assurance Program (QAP).

- The *Waste Isolation Pilot Plant Environmental Monitoring Plan* (DOE/WIPP-99-2194) (DOE, 2015e) directs the programs that monitor for radiological and non-radiological impacts and compliance with land management requirements.

- As part of the CBFO *Contractor Oversight Plan* (DOE, 2012a) and *Nuclear Waste Partnership LLC Quality Assurance Program Description* (NWP QAPD) (NWPc), assessments, surveillances, and audits of the WIPP compliance status are performed by the CBFO and NWP. Both documents describe a comprehensive system to assess compliance with applicable environmental laws, regulations, and procedural requirements and determine the adequacy, implementation, and effectiveness of the WIPP compliance programs.

- Rigorous processes are employed to implement corrective actions and verify effectiveness.

- Certification to the ISO 14001 management system standard is maintained. This requires routine audits of the EMS to ensure it continues to meet the standard.

Act

- Annual reviews of the EMS, environmental performance, and compliance status are performed by senior management.

- Enhancements to the EMS are directed from management review.

1.3 Events for Reporting Period

The WIPP remains in stand-down for this BECR reporting period as a result of two incidents in February 2014, a salt-haul truck fire in the underground and an accidental radionuclide release from Panel 7 Room 7, but continues to make progress towards resumption, anticipated at the end of CY 2016. In response to the salt-haul truck fire on February 5, 2014, the Deputy Assistant Secretary for Safety, Security, and Quality Programs, in the DOE's Office of

Environmental Management, appointed an Accident Investigation Board (AIB) to investigate the accident based on the Accident Investigation Criteria 2.d.1 of DOE Order 225.1B, *Accident Investigations*. The AIB began its investigation on February 10, 2014, completed the investigation on March 8, 2014, and submitted its findings to the Deputy Assistant Secretary for Safety, Security, and Quality Programs, DOE Office of Environmental Management on March 11, 2014. On March 14, 2014, this AIB Report was transmitted to NWP.

In response to the February 14, 2014, radiological incident, the Deputy Assistant Secretary for Safety, Security, and Quality Programs, in the DOE's Office of Environmental Management, appointed a second AIB to investigate the release in accordance with DOE Order 225.1B, *Accident Investigations*. The AIB began its investigation on March 3, 2014, completed Phase 1 of the investigation on March 28, 2014, and submitted its report to the Deputy Assistant Secretary for Safety, Security, and Quality Programs, DOE Office of Environmental Management, on April 1, 2014. The Phase 1 report covers the AIB conclusions relative to the release of TRU radionuclides from the underground to the environment. On April 24, 2014, the AIB Report was published and made available to NWP. On May 19, 2014, the Deputy Assistant Secretary for Safety, Security, and Quality Programs, in the DOE's Office of Environmental Management, appointed a Phase 2 AIB to complete the radiological release investigation and determine the cause of the TRU waste container(s) failure in accordance with DOE Order 225.1B, *Accident Investigations*. The AIB completed the investigation and submitted Phase 2 final report to the appointing official on March 31, 2015. The Phase 2 report, issued April 15, 2015, was performed once limited access to the underground was re-established and focused on how the radiological material was released. Based upon the evidence gathered and analyzed during the investigation, the Board concluded that the release from the container(s) was preventable. If LANL had adequately developed and implemented repackaging and treatment procedures that incorporated suitable hazard controls and included a rigorous review and approval process, the release would have been preventable.

The AIB determined that the root causes of the fire event and radiological event included the degradation of key safety management programs and safety culture. The AIB also identified four contributing causes related to the effectiveness of the Nuclear Safety Program. CBFO and NWP corrective action plans address the Judgments of Need related to the root and contributing causes (DOE, 2015i; NWP, 2015). In general, implementation of the corrective actions will ensure that an integrated Nuclear Safety Program is developed that meets regulatory requirements, including DOE Orders. It [implementation] will ensure that hazards are analyzed and that facilities are designed and constructed with safety controls in place to ensure protection of workers, the public, and the environment. The corrective actions will improve CBFO oversight such that program improvements are appropriate and remain adequate and effective. Throughout this reporting period, the CBFO and NWP remained in compliance with these requirements and have instituted operational controls that ensure safety to human health and the environment. More details are provided throughout this report.

1.4 Compliance Issues for Reporting Period

As of this reporting period, the WIPP had received two administrative orders (AO2 and AO3) and one Administrative Compliance Order (ACO) from the New Mexico Environment Department (NMED). In addition, the NWP was cited with one preliminary notice of violation (PNOV) from the DOE Office of Enforcement (HSS-40), which subsequently became a notice of violation (NOV). The WIPP has maintained compliance with the three administrative orders issued in 2014; AO1 was discussed in the 2014 BECR. Further discussion regarding the administrative orders, the ACO, and the PNOV/NOV are included within this BECR.

The NMED AO1 (NMED, 2014a) designated requirements for monitoring and reporting to the NMED the status of recovery from the two events. AO1 remains in effect as of the end of this reporting period. It required weekly reporting on aboveground compliance and permitted surface-related requirements. The AO2 (NMED, 2014b), issued on May 12, 2014, was issued to address, in part, Permit-required activities that could not be performed due to restricted access to the portions of the underground where inspections and monitoring are necessary. The reporting period was also changed from weekly to biweekly, with a requirement for information supplemental to that required by AO1. AO3, issued May 20, 2014, exclusively addressed the new requirement for a *WIPP Nitrate Salt Bearing Waste Container Isolation Plan*. This plan was to contain a detailed proposal for expedited closure of underground hazardous waste storage unit Panel 6 and Room 7, Panel 7, where suspect LANL waste containing nitrate salts mixed with organic absorbent was emplaced, including schedules for those closures. Directives from the Secretary of the NMED on August 29, 2014, December 9, 2014, and February 26, 2016, revised the reporting periods from weekly to bi-weekly, bi-weekly to monthly with the due date being the last day of the subsequent month for activities conducted during the previous month, and monthly to quarterly for reports directed by AO1, AO2, and AO3. The AO3 implementation was modified on October 7, 2014, from daily to twice-weekly technical calls and submissions. The weekly, bi-weekly, monthly, and quarterly reports are available from the WIPP Information Repository at: http://www.wipp.energy.gov/library/Information_Repository.htm. Further discussion regarding AO2 and AO3 is provided in Section 25.2.3, Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC).

The NMED issued ACO HWB-14-21 on December 6, 2014, for violations of the HWA, the Hazardous Waste Management Regulation and the HWFP, as summarized in the HWA violation description table below (NMED, 2014e).

HWA Violation Description

Violation	Permit Condition	Title
1	1.7.1	Duty to Comply
2	1.7.6	Duty to Mitigate
3	2.1 (2 violations)	Design and Operation of Facility
4	1.7.13.3 1.7.13.2	Written Notice Description of Occurrence
5	2.8 2.8.2 F-1e	Personnel Training Personnel Training Requirements Training for Emergency Response
6	2.10.1 2.10.1.1	Required Equipment Internal Communications
7	2.10.2 E-1a	Testing and Maintenance of Equipment General Inspection Requirements
8	2.12.1 D-3 D-4a(1)	Implementation of [Contingency] Plan Implementation Initial Emergency Response and Alerting the RCRA Emergency Coordinator
9	2.1	Design and Operation of Facility

Violation	Permit Condition	Title
	2.11	Hazard Prevention
10	1.7.13.1.ii	Oral Reporting
	1.7.13.2	Description of Occurrence
11	2.12.1	Implementation of [Contingency] Plan
	D-3	Implementation
	D-4a(1)	Initial Emergency Response and Alerting the RCRA Emergency Coordinator
12	Attachment B	Part A Application
	2.9	General Requirement for Handling Ignitable, Corrosive, Reactive, or Incompatible Wastes
	2.3.1	Waste Analysis Plan
	2.3.3	Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC)
	2.3.3.7	Ignitable, Corrosive, and Reactive Wastes
	2.3.4	Permitted TRU Mixed Waste
	3.2.1.3	Hazardous Waste Numbers
	C-1b	Waste Summary Category Groups and Hazardous Waste Accepted at the WIPP Facility
	C-1c	Waste Prohibited at the WIPP Facility
13	2.9	General Requirements for Handling Ignitable, Corrosive, Reactive, or Incompatible Wastes
	2.3.1	Waste Analysis Plan
	2.3.3	Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC)
	2.3.3.4	Chemical Incompatibility
	C-1c	Waste Prohibited at the WIPP Facility
14	C-5a(2)	Examination of the Waste Stream Profile Form and Container Data Checks

The ACO provided a schedule for compliance that required the Permittees, within 60 days after the ACO became final, to:

- Submit to NMED a written report describing actions taken to prevent recurrence of violations.
- Submit to NMED a summary of potential modifications to procedural and non-procedural documents necessary to prevent recurrence of violations.
- Submit to NMED the interface agreements between CCP and the generator sites to ensure that the appropriate organizations and subject matter experts communicate effectively and timely regarding changes in waste management procedures, waste generation, waste treatment, waste packaging, waste repackaging, waste remediation, waste stream delineation, and waste characterization procedures.

On April 30, 2015, the NMED entered into General Principles of Agreement for the purpose of settling claims as stated in the ACO and any future related claims (NMED, 2015). The General Principles of Agreement provided a binding framework for the Parties to follow while pursuing a detailed settlement agreement and stipulated final order incorporating settlement of alleged violations and corrective actions. In summary, terms of the agreement applicable to the WIPP included:

- $34 million to fund necessary repairs to New Mexico roads used for the transport of TRU waste to the WIPP near the city of Carlsbad.
- Funding of independent, external triennial review of regulatory compliance operations at the WIPP.
- Funding of enhanced training and local emergency responders capabilities in and around Carlsbad, NM, as well as an offsite operations center near the WIPP.

On January 22, 2016, the NMED issued the Settlement Agreement and Stipulated Final Order (NMED, 2016a) for the purpose of resolving ACO HWB-14-21. The NMED, DOE, and NWP agreed to settle violations through corrective actions (presented as Attachment A of the Settlement Agreement and Stipulated Final Order), monthly NMED appraisal of corrective action progress, and submittal of evidence of completion within 60 calendar days of the effective date of the Settlement Agreement (unless an alternative date is approved by NMED). Expectation for implementation and execution of supplemental environmental projects described in the General Principles of Agreement (e.g., New Mexico road repairs, triennial reviews of regulatory compliance and funding of enhanced training and local emergency responder capabilities) were documented in the Settlement Agreement and Stipulated Final Order.

On February 18, 2016, the NWP was cited with one PNOV from the DOE Office of Enforcement (HSS-40). The letter from HSS-40 states:

“This letter refers to the Department of Energy’s (DOE) investigation into the facts and circumstances associated with two events that occurred in February 2014 at the Waste Isolation Pilot Plant (WIPP): (1) a fire in a salt haul truck in the underground, and (2) a radiological release. The Office of Enterprise Assessments’ Office of Enforcement provided the results of the investigation to Nuclear Waste Partnership, LLC (NWP) in an investigation report dated May 8, 2015. An enforcement conference was convened on June 16, 2015, with you and members of your staff to discuss the report’s findings and NWP’s response. A summary of the enforcement conference and list of attendees is enclosed.

The violations associated with the WIPP salt haul truck fire and radiological release are serious, and DOE considers these events to be of the highest safety significance. Both events were a near miss with respect to serious injury or fatality. These events revealed deficiencies in (1) the development and implementation of written plans and assessments, (2) fire prevention and preventive maintenance, (3) the emergency response program, (4) recordkeeping, (5) information requirements, (6) quality improvement, (7) work processes associated with the event response, (8) radiation protection design and associated work processes, (9) program establishment and administration, (10) training, and (11) work processes associated with waste characterization and acceptance. DOE is extremely concerned that, prior to these events, the above deficiencies remained undetected and uncorrected by your contractor assurance program, and that they stemmed in large part from your failure to conduct operations with the rigor and standard of performance expected of a nuclear facility.

Based on an evaluation of the evidence in this matter, including information presented at the enforcement conference, DOE concludes that NWP violated worker safety and health requirements contained in 10 C.F.R. Part 851, *Worker Safety and Health Program*, and nuclear safety requirements contained in 10 C.F.R. § 820.11, *Information Requirements*; 10 C.F.R. Part 830, *Nuclear Safety Management*; and 10 C.F.R. Part 835, *Occupational Radiation Protection*. Accordingly, DOE hereby issues the enclosed Preliminary Notice of Violation (PNOV), which cites four Severity Level I violations and seven Severity Level II violations.

The DOE Carlsbad Field Office (CBFO) reduced NWP's contract fee in the amount of $356,438 as a result of the salt haul truck fire, including associated worker safety and health deficiencies. CBFO reduced the fee by an additional $561,266 after the radiological release event, including associated nuclear safety deficiencies and the cumulative impact of both events. Therefore, in accordance with 10 C.F.R. § 851.5 (c), DOE proposes no civil penalties for the worker safety and health violations cited in this PNOV. For the violations of the nuclear safety requirements enforceable under 10 C.F.R. Part 820, *Procedural Rules for DOE Nuclear Activities*, DOE has elected to exercise enforcement discretion in recognition of the contract fee reductions that CBFO has already imposed on NWP and proposes no civil penalties.

Pursuant to 10 C.F.R. § 851.42, *Preliminary Notice of Violation*, and 10 C.F.R. § 820.24, *Preliminary Notice of Violation*, you are obligated to submit a written reply within 30 calendar days of receipt of the enclosed PNOV and to follow the instructions specified in the PNOV when preparing your response. If you fail to submit a reply within the 30 calendar days, then in accordance with 10 C.F.R. § 851.42(d), you relinquish any right to appeal any worker safety and health violation cited in the PNOV, and the PNOV will constitute a final order. In addition, if you fail to submit a reply within the 30 calendar days, then in accordance with 10 C.F.R. § 820.33, *Default order*, subsection (a), DOE may pursue a Default Order for any nuclear safety violation cited in the PNOV.

After reviewing your reply to the PNOV and any proposed additional corrective actions entered into DOE's Noncompliance Tracking System, DOE will determine whether any further activity is necessary to ensure compliance with DOE nuclear safety and worker safety and health requirements. DOE will continue to monitor the completion of corrective actions until this matter is fully resolved."

No civil penalties for worker safety and health violations were cited in the PNOV (DOE, 2016e). The PNOV, as described in letter number WEA-2016-01, became an NOV.

1.5 Background of the Waste Isolation Pilot Plant

The WIPP was authorized by the *Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980* (Pub. L. 96-164; 93 Stat. 1259, 1265). This legislation mandated that the DOE provide a research and development facility to demonstrate the safe disposal of radioactive waste resulting from U.S. defense activities and programs.

In January 1981, the DOE announced the decision to proceed with a phased development of the WIPP, to be located in Eddy County in southeastern New Mexico, 26 miles east of the city of Carlsbad. The decision called for the facility to be built to accommodate 6.2 million cubic feet of contact-handled (CH) TRU waste and 0.25 million cubic feet of remote-handled (RH) TRU

waste. The LWA subsequently limited the total WIPP capacity to 6.2 million cubic feet of TRU waste.

After completion of the site-and-preliminary-design-validation phase, the construction phase at the WIPP began in 1983. Surface and underground facilities to support waste handling and disposal operations have been constructed. The largest surface building is the Waste Handling Building (WHB), which includes areas for the receipt, inspection, storage, and transfer of waste to the underground. The WIPP underground consists of four shafts, the waste disposal area, an area for equipment and maintenance, an experimental area, and connecting tunnels 2,150 feet below the land surface in a 2,000-foot-thick bedded salt formation.

Originally, the construction phase was to be followed by the pilot-plant phase. Following the preparation of DOE/EIS-0026-FS, *Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant* (SEIS-I) (DOE, 1990a) in 1990, the DOE decided the construction phase would follow the test phase, during which tests with TRU waste were to be conducted in the WIPP underground. On October 21, 1993, the DOE announced the decision not to conduct the TRU waste tests underground, but instead to conduct enhanced laboratory tests.

DOE/EIS-0026-S-2, *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (SEIS-II) (DOE, 1997a) was issued in September 1997. The SEIS-II analyzed the environmental impacts of disposal phase operations at the WIPP, in light of additional information and circumstances that had changed since 1990, and assessed alternatives for disposing of TRU waste at the WIPP.

Requirements for 40 CFR Part 191, Subparts B and C were addressed in the *40 CFR Part 191 Compliance Certification Application for the Waste Isolation Pilot Plant* (CCA) (DOE, 1996a) submitted to the EPA in 1996. The EPA certified DOE compliance in 1998.

The Record of Decision (ROD) for the SEIS-II (*Record of Decision for the Department of Energy's Waste Isolation Pilot Plant Disposal Phase*, 63 Federal Register (Fed. Reg.) 3623-3629) was issued January 23, 1998 (DOE, 1998). The selected alternative from the SEIS-II analysis was to dispose of defense-related TRU waste meeting the requirements in the WIPP waste acceptance criteria (WAC), and to transport waste to the WIPP by truck, with a future option of transportation by rail.

The receipt and disposal of the first TRU waste shipment in March 1999 initiated the disposal phase that continued until February 5, 2014, when the underground salt-haul truck fire occurred. Receipt of waste shipments was suspended at that time and remains suspended as a consequence of the February 14, 2014, radiological event that resulted in contamination of the WIPP underground.

The disposal phase will be followed by closure, which includes the decontamination and decommissioning phase for support structures.

2.0 RESOURCE CONSERVATION AND RECOVERY ACT AND SOLID WASTE DISPOSAL ACT

2.1 Summary of the Law

The *Resource Conservation and Recovery Act* (RCRA), enacted in 1976, is a statute designed to provide "cradle-to-grave" control of hazardous waste. This is achieved by designating

management requirements on generators and transporters of hazardous wastes, and the owners and operators of TSDFs.

In 1965, Congress enacted the SWDA (42 U.S.C. § 3251, et seq.). This Act addressed solid waste disposal and gave the states the responsibility for developing solid waste management plans. In 1970, Congress passed the RCRA to provide the EPA with funding for resource recovery programs. The RCRA amended the SWDA and incorporated the intent of the *Resource Recovery Act of 1970*. The *Hazardous and Solid Waste Amendments of 1984* (HSWA) (42 U.S.C. § 6924[b][4]) reauthorized the RCRA, expanded the scope significantly, and altered many provisions. The *Federal Facilities Compliance Act of 1992* (Pub. L. 102-386) amended the RCRA, requiring federal agencies to comply with substantive and procedural requirements of federal, state, and local solid and hazardous waste laws. The term "RCRA" is used throughout this document to refer to the reauthorized law as amended.

There are two major objectives of the RCRA. The first is to promote the protection of human health and the environment and to conserve material and energy resources. This objective is accomplished by ensuring that hazardous waste management practices are conducted in a manner that protects human health and the environment, minimizing the generation of hazardous waste, prohibiting open dumping on the land, and requiring existing open dumps to be converted to facilities that pose no danger to the environment or human health. The second RCRA objective sets national policy to reduce or eliminate the generation of hazardous waste as expeditiously as possible and to ensure that hazardous waste generated is treated, stored, or disposed of in a manner that minimizes the threat to human health and the environment.

The EPA implements the RCRA primarily through 40 CFR Parts 260 through 282. Regulations in 40 CFR Parts 260 through 279 consist of requirements and standards pertaining to hazardous waste generation, management and disposal, including hazardous waste underground storage tanks (USTs), while 40 CFR Parts 280 through 282 pertain to the management of USTs containing petroleum products or hazardous chemicals.

Congress intended for the RCRA to be implemented by the states. Consequently, the EPA has defined a process through which states may apply for and receive authorization to administer the RCRA. New Mexico received authorization for the base RCRA program in January 1985, and for the mixed waste program in July 1990. The EPA granted authorization for the corrective action component of the HSWA program to the state of New Mexico in a notice that appeared in the Federal Register on October 17, 1995 (effective date: January 2, 1996). The New Mexico HWA (§§ 74-4-1 through 74-4-14 NMSA 1978) statute governs hazardous waste management activities in New Mexico. New Mexico implements the hazardous waste program by way of 20.4.1 New Mexico Administrative Code (NMAC) through 20.4.3 NMAC. By virtue of this authorization, New Mexico has primary responsibility for permitting, implementation, and enforcement of most aspects of the RCRA. The DOE was granted the WIPP Permit by the NMED in 1999 (NMED, 1999). The WIPP Permit was renewed in 2010 (NMED, 2010a). The requirements and compliance status for each requirement of the HWA are presented in Section 25.0.

The HSWA provides for regulations to be promulgated by the EPA that in turn become effective and enforceable. The EPA then enforces regulations to administer the RCRA regulations, until the state subsequently adopts and is authorized to administer the new regulation. During this reporting period, there have been no new or changed regulations authorized under the HSWA that are pending adoption by the state of New Mexico.

Subchapter IX of the RCRA governs the management of USTs. This portion of the RCRA and the regulations specified under 40 CFR Parts 280 and 281 (20.5 NMAC) address USTs containing petroleum products or hazardous chemicals. Requirements for UST management pertain to tank design, construction, installation, and operation, as well as notification and corrective action requirements in the event of a release and actions required for out-of-service USTs. New Mexico has been authorized by the EPA to regulate USTs. The New Mexico UST requirements and compliance status for each requirement are presented in Section 25.0.

Congress has addressed the applicability of the RCRA to the WIPP on five separate occasions:

- In 1984, as part of the HSWA, Congress exempted the WIPP from a provision that prohibited disposal of some hazardous waste in salt beds.

- In 1996, Congress amended the LWA and exempted waste designated by the Secretary of Energy for disposal at the WIPP from these land disposal restrictions (LDRs).

- In response to the inclusion of the RCRA Financial Assurance Requirements in the October 1999 WIPP Permit by the NMED, Section 201 of the *Military Construction and Appropriations Act of 2001* (Pub. L. 106-246) prohibited the use of federal monies to post a bond fulfilling the financial assurance requirements relating to closure or post-closure care and monitoring of the WIPP. The provision further stated that financial responsibility requirement in a permit or license for the WIPP on the date of enactment of Section 201 may not be enforced against the United States or its contractors or subcontractors at the WIPP.

- In 2003 and 2004, respectively, Congress clarified the applicability of the RCRA to general waste analysis requirements for waste disposed of at the WIPP in the following Acts:

  - Section 311 of the *Energy and Water Development Appropriations Act of 2004* (Pub. L. 108-137), enacted on December 1, 2003

  - Section 310 of the *Consolidated Appropriations Act of 2005* (Pub. L. 108-447), enacted on December 8, 2004

2.2 Status of Compliance with the Regulatory Requirements

Cleanup of the contamination event and facility upgrades are ongoing as part of the WIPP resumption process. The underground ventilation remains in filtration mode through this reporting period. Shipments of waste to the WIPP remain suspended and the underground is inaccessible to normal waste handling-related activities.

The WIPP remains compliant with the three administrative orders issued in 2014 (NMED, 2014a, 2014b, 2014c). The ACO, issued on December 6, 2016, was resolved January 22, 2016, through the Settlement Agreement and Stipulated Order (NMED, 2016a). The evidence of completion was submitted to the NMED on March 18, 2016, and consisted of the required documentation prescribed in Attachment A of the Settlement Agreement and Stipulated Final Order, including four work plans. These work plans include anticipated dates of completion that were beyond the 60 calendar day deadline. The Permittees submit monthly progress reports to the NMED on the corrective actions found in these work plans. The administrative orders are described further in Section 25.0.

The Permittees have implemented a WIPP Recovery Plan to provide a safe and environmentally-sound approach for bringing the WIPP back to a fully operational state (DOE, 2014i). The conditions required to safely resume waste emplacement operations include ensuring safety concerns are addressed in response to the February 2014 events to create an environment of robust safety awareness that complies with applicable requirements and protects the worker, public, and environment. The mine will be systematically returned to safe operations and increased protection of workers with resumption of critical mine safety and maintenance operations. Safety management programs will be strengthened. Actions will be taken to prevent fires at the WIPP, effectively respond to a fire should one occur, and safely manage a fire emergency. Ventilation will be increased for underground activities using interim and supplemental measures. This will enable the resumption of waste emplacement operations starting with the waste derived from re-entry and recovery activities, followed by on-site stored TRU waste, and low-rate emplacement of waste from generator sites. Finally, a new underground ventilation system will be constructed to enable simultaneous mining and waste emplacement, and a subsequent return to normal operations.

Table 1 provides general information on the RCRA requirements and the EPA regulations implementing those requirements.

Table 1: Status of Compliance with the Regulatory Requirements of the *Resource Conservation and Recovery Act* and *Solid Waste Disposal Act*

Regulatory Requirement	WIPP Compliance
1. Compliance with the RCRA	Most of the requirements specified in the RCRA are covered in more detail in the implementing regulations. The exception is RCRA § 3016 (42 U.S.C. § 6937, et seq), which requires each federal agency to provide a biennial inventory of each TSDF, as follows: *Each federal agency shall compile, publish, and submit to the EPA Administrator (and the State, if its hazardous waste program has been authorized by the EPA) an inventory of each site which the agency owns or operates at which hazardous waste is stored, treated, or disposed of at any time. The inventory shall be submitted every two years beginning January 31, 1986.* In January 2010, the EPA ruled that the RCRA §3016 report must be submitted only if there have been significant changes at the WIPP. The DOE CBFO submitted a RCRA §3016 report to DOE Headquarters in January 2016 (RES, 2016).
2. Compliance with the Land Disposal Restrictions, 20.4.1.800 NMAC (40 CFR Part 268)	The LWA, as amended, exempts waste designated by the Secretary of Energy for disposal at the WIPP from the treatment standards of the RCRA. By virtue of this exclusion, the DOE is not required to demonstrate compliance with the LDRs of 40 CFR Part 268 for TRU mixed waste designated by the Secretary of Energy for disposal at the WIPP. For hazardous and mixed waste generated at the WIPP, which is shipped off site to hazardous and mixed waste TSDFs, LDR notifications have been made in accordance with requirements during this reporting period.
3. Compliance with Biennial Hazardous Waste Reporting, 40 CFR 262, 264, 265, 267, and 270	The RCRA requires that large quantity generators and TSDFs submit a biennial hazardous waste report for hazardous waste received and/or generated. The WIPP both receives hazardous waste and is a large quantity generator. The 2015 Biennial Hazardous Waste Report was submitted to the NMED Hazardous Waste Bureau in February 2016 (DOE, 2016a).

3.0 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

3.1 Summary of the Law

The CERCLA, or Superfund Act, and the *Superfund Amendments and Reauthorization Act of 1986* (SARA) establish a comprehensive federal strategy for responding to, and establishing liability for releases of, hazardous substances from a facility to the environment. Because the WIPP is not a CERCLA remediation site and is not expected to become one, most of the requirements of this Act do not apply. The *Emergency Planning and Community Right-to-Know Act* (EPCRA) (40 CFR Parts 350 through 399) was enacted as a stand-alone portion under SARA, Title III. It is described in further detail in Section 4.0.

Spills of reportable quantities (RQs) of hazardous substances must be reported to the National Response Center under the provisions of 42 U.S.C. § 9603, *Notification Requirements Respecting Released Substances*, and the implementing regulations in 40 CFR Part 302, Designation, Reportable Quantities, and Notification. The Permittees are responsible for reporting and managing the release of hazardous substances at the WIPP as defined in 42 U.S.C. § 9601, Definitions, in quantities equal to or greater than the RQs outlined in 42 U.S.C. § 9602, *Designation of Additional Hazardous Substances and Establishment of Reportable Released Quantities*; Regulations, and specified in 40 CFR Part 302. In the event of a release of a hazardous substance to the environment in an amount that meets or exceeds the RQ, a notification as defined in 40 CFR § 302.3 will be made to the National Response Center and other appropriate agencies by Permittee personnel as required by 42 U.S.C. § 9603. Title 42 U.S.C. § 9620(c), *Federal Agency Hazardous Waste Compliance Docket*, establishes a docket that provides information regarding federal facilities that manage hazardous waste or from which hazardous substances may be or have been released. This information is to be submitted to the EPA by federal agencies under 42 U.S.C. § 9603 or under RCRA § 3016 of the Solid Waste Disposal, Title II – Solid Waste Disposal, Subtitle A- General Provisions (42 U.S.C. §§ 6901-6992). Facilities listed under the docket must prepare a preliminary assessment and submit it to the EPA in accordance with the CERCLA.

Under 40 CFR Part 300, National Oil and Hazardous Substances Pollution Contingency Plan, the organizational structures and procedures are provided for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The *National Oil and Hazardous Substances Pollution Contingency Plan* is required by the CERCLA Part 105, as well as 33 U.S.C. § 1321(d), as amended by the *Oil Pollution Act of 1990* (Pub. L. 101-380)).

3.2 Status of Compliance with the Regulatory Requirements

Table 2 provides general information on CERCLA requirements and the EPA regulations implementing those requirements.

Table 2: Status of Compliance with the Regulatory Requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act*

Regulatory Requirement	WIPP Compliance
1. Designation of Hazardous Substances, 40 CFR § 302.4	*The elements and compounds and hazardous wastes appearing in Table 302.4 are designated as hazardous substances under Section 102(a) of the Act. A solid waste, as defined in 40 CFR § 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR § 261.4(b), is a hazardous substance … if it exhibits any of the characteristics identified in 40 CFR §§ 261.20 through 261.24.* Listed and characteristic hazardous wastes generated by the WIPP have been identified. A waste stream profile is maintained for each identified site-generated waste stream. The WIPP Waste Data System contains the listed and characteristic hazardous waste numbers, and radionuclide concentrations for waste received from off-site generators for disposal at the WIPP. For materials and substances other than wastes, WIPP personnel maintain a system containing Safety Data Sheets (SDSs) or Material Safety Data Sheets (MSDSs). The SDSs or MSDSs contain information necessary to identify compounds included in Table 302.4.
2. Determination of Reportable Quantities, 40 CFR § 302.5	*The quantity listed in the column "Final RQ" for each substance in Table 302.4 or in Appendix B to Table 302.4 is the RQ for that substance.* Reportable quantities listed in Table 302.4 and Appendix B of 40 CFR § 302.4 are used to determine if releases of pure materials or hazardous substances in mixtures are reportable.
3. Notification Requirements, 40 CFR § 302.6(a)	*Any person in charge of a vessel or an offshore or an onshore facility shall, as soon as he or she has knowledge of any release … of a hazardous substance … in a quantity equal to or exceeding the reportable quantity … in any 24-hour period, immediately notify the National Response Center (1-800-424-8802 or 1-202-267-2675).* There were no notifications of hazardous substances that exceeded an RQ at the WIPP during this reporting period.
4. Releases of Mixtures or Solutions, 40 CFR § 302.6(b)(1)(i) and (ii)	*If the quantity of the hazardous constituent(s) of the mixture or solution is known, notification is required where an RQ or more of any hazardous constituent is released; If the quantity of one or more of the hazardous constituents of the mixture or solution is unknown, notification is required where the total amount of the mixture or solution released equals or exceeds the RQ for the hazardous constituent with the lowest RQ.* The reportable releases of hazardous constituents in mixtures are determined and reported as required in 40 CFR §§ 302.5 and 302.6(a). During this reporting period, there were no releases of mixtures or solutions that exceeded the RQs for any hazardous constituents.

Table 2: Status of Compliance with the Regulatory Requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act*

Regulatory Requirement	WIPP Compliance
5. Notification of Releases of Radionuclides, 40 CFR § 302.6(b)(2)	*Radionuclides are subject to this section's notification requirements only in the following circumstances:* - *If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.* - *If the identity of each radionuclide in a released mixture or solution is known but the quantity released (in curies) of one or more of the radionuclides is unknown, the only such releases subject to this notification requirements are those in which the total quantity (in curies) of the mixture or solution released is equal to or greater than the lowest RQ of any individual radionuclide in the mixture or solution.* - *If the identity of one or more radionuclides in a released mixture or solution is unknown (or if the identity of a radionuclide released by itself is unknown), the only such releases subject to this section's notification requirements are those in which the total quantity (in curies) released is equal to or greater than either one curie or the lowest RQ of any known individual radionuclide in the mixture or solution, whichever is lower.* There were no releases of radionuclides in excess of RQs during this reporting period. See Section 6.0 for further discussion.
6. Notification of the Release of Heavy Metals, 40 CFR § 302.6(d)	*Except for releases of radionuclides, notification of the release of an RQ of solid particles of antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, or zinc is not required if the mean diameter of the particles released is larger than 100 micrometers (μm).* There were no releases of an RQ of solid particles of heavy metals from the WIPP during this reporting period.

4.0 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

4.1 Summary of the Law

Title III of the SARA, otherwise known as the EPCRA (42 U.S.C. § 11001, et seq.), authorizes a nationwide program of emergency planning as protection against accidents involving hazardous chemicals and extremely hazardous substances. The Act requires a comprehensive body of information about hazardous substances to be submitted to various state and local groups. Under Subtitle A, Emergency Planning and Notification, facilities are required to make various notifications to the State Emergency Response Commission (SERC) and the Local Emergency Planning Committee (LEPC).

These include notification of applicability under EPCRA, designation of a facility Emergency Coordinator, and notification of extremely hazardous substance releases to the environment.

Subtitle B, Reporting Requirements, requires the submittal of information such as inventories of specific hazardous chemicals used or stored within a facility to the SERC, LEPC, and the fire department that have jurisdiction over the facility. The following sections within Subtitle B outline specific reporting requirements: (1) Section 311, Material Safety Data Sheets, directs the submission of an MSDS (or SDS) for each hazardous chemical present or a list of hazardous chemicals present that require an MSDS (or SDS); (2) Section 312, Emergency and Hazardous Chemical Inventory Forms, directs the annual submission of an inventory of hazardous chemicals present during the preceding year; and (3) Section 313, Toxic Chemical Release Forms, outlines requirements for facilities to submit a toxic chemical release report to the EPA and the resident state if toxic chemicals are used at that facility in excess of established threshold amounts.

The regulations under 40 CFR Part 355, Emergency Planning and Notification, establish the list of extremely hazardous substances, the threshold planning quantities (TPQs), and facility notification responsibilities necessary for the development and implementation of state and local emergency response plans.

The regulations under 40 CFR Part 370, Hazardous Chemical Reporting: Community Right-to-Know, establish reporting requirements that provide the public with vital information on the hazardous chemicals in their communities, with the intent of ensuring enhanced community awareness of chemical hazards and facilitating the development of state and local emergency response plans.

In order to inform the public and surrounding communities of releases of toxic chemicals, 40 CFR Part 372, Toxic Chemical Release Reporting: Community Right-to-Know establishes requirements for the submission of information relating to the release of toxic chemicals under Section 313. On February 16, 2001, the EPA lowered the reporting threshold for lead and lead compounds to 100 pounds. Lead contained in stainless steel, brass, and bronze alloys is excluded from this reporting threshold. The lowered threshold applied to reporting in CY 2001 and later.

4.2 Status of Compliance with the Regulatory Requirements

Table 3 provides general information relating to EPCRA requirements and the EPA regulations implementing those requirements.

Table 3: Status of Compliance with the Regulatory Requirements of the Emergency Planning and Community Right-To-Know Act

Regulatory Requirement	WIPP Compliance
1. Emergency Planning, 40 CFR § 355.10(a)	*The requirements of this section apply to a facility where any extremely hazardous substance [as defined in 40 CFR Part 355] equal to or greater than its TPQ is present.* The WIPP facility is subject to the emergency planning requirements due to the use of sulfuric acid in lead acid batteries. Lead acid batteries are used in the underground and the surface in electric carts, electric forklifts, other vehicles, and uninterruptible power systems.
2. Emergency Planning, 40 CFR § 355.20(a)	*The owner or operator of a facility subject to this section shall provide notification to the Commission that it is a facility subject to the emergency planning requirements of this part.* In 1987, the DOE made the one-time notification to the SERC that the WIPP is subject to emergency planning requirements.
3. Emergency Planning, 40 CFR § 355.20(b)	*The facility shall designate a facility representative who will participate in the local emergency planning process as a facility emergency response coordinator.* The Permittees have representatives on the LEPC, which was formed in 1994. The LEPC meets once a month. The Permittees are responsible for the emergency response and preparedness programs at the WIPP.
4. Emergency Planning, 40 CFR § 355.20(c)	*The owner or operator of a facility will inform the LEPC of changes occurring at the facility that may be relevant to emergency planning.* The DOE provides information to the LEPC regarding changes at the facility that may be relevant to emergency planning. Three members of the WIPP Emergency Management and Security Department are listed as Regional LEPC members and have attended scheduled meetings since April 1, 2014. A new, dedicated Emergency Operations Center was established at the Skeen-Whitlock Building, and LEPC leads from Eddy and Lea Counties were informed that the center is operational and available to support regional partners.
5. Emergency Release Notification, 40 CFR § 355.42	*The owner or operator of a facility shall immediately notify the community emergency coordinator for the LEPC of any area that is likely to be affected by the release and the SERC of any state likely to be affected by the release.* On April 11, 2014, the CBFO and the NWP implemented the RCRA Contingency Plan. The LEPC and SERC were notified as directed by the procedure that governs implementing this plan. The Emergency Management and Security Department has established a new emergency notification process with regional partners to provide stakeholders with timely Operational Emergency notifications from the WIPP.

Table 3: Status of Compliance with the Regulatory Requirements of the Emergency Planning and Community Right-To-Know Act

Regulatory Requirement	WIPP Compliance
6. Hazardous Chemical Reporting: Community Right-To-Know, Reporting Requirements (Material Safety Data Sheet Reporting), 40 CFR § 370.30 through § 370.33	*The owner or operator of a facility shall submit an MSDS for each hazardous chemical present at the facility according to the minimum threshold schedule to the committee, the commission, and the fire department with jurisdiction over the facility. In lieu of the submission of an MSDS, the owner or operator may submit a list of hazardous chemicals for which an MSDS is required.* The list of hazardous chemicals is updated when new chemicals in excess of the TPQ, or 10,000 pounds, or additional hazard information for existing chemicals are received at the WIPP. The last updated list of hazardous chemicals present at the WIPP in amounts that exceed the TPQs was submitted on August 23, 1999 (Westinghouse Electric Corporation, Waste Isolation Division, 1999). This list also included the common name of the chemical and the hazardous components. There were no changes during this reporting period that required updating the list of hazardous chemicals.
7. Hazardous Chemical Reporting: Community Right-To-Know, Reporting Requirements (Inventory Reporting), 40 CFR § 370.40	*The owner or operator of a facility … shall submit an inventory form to the commission, the committee, and the fire department with jurisdiction over the facility. The inventory form on hazardous chemicals present at the facility during the preceding calendar year … shall be submitted on or before March 1 of each year.* In February 2016, the DOE submitted the latest (CY 2015) *Tier II Emergency and Hazardous Chemical Inventory Report* (DOE, 2016b) to the SERC, the LEPC, and the fire departments that maintain memorandums of understanding (MOUs) with the DOE regarding the WIPP. The report for CY 2014 was submitted in February 2015 (DOE, 2015f).
8. Reporting Requirements and Schedule for Reporting, 40 CFR § 372.30	*For each toxic chemical known by the owner or operator to be manufactured, processed, or otherwise used in excess of an applicable threshold quantity at its covered facility for a calendar year, the owner or operator must submit to the EPA and to the state a completed EPA Form R. The Form R must be submitted by July 1 of the following calendar year.* The Toxic Chemical Release Inventory Form R Reports for the WIPP were submitted to the EPA and the New Mexico Department of Homeland Security & Emergency Management . The reports for CY 2014 were submitted in June 2015 (DOE, 2015p). The reports for CY 2015 were submitted in June 2016 (DOE, 2016h).

5.0 ATOMIC ENERGY ACT AND THE ENVIRONMENTAL PROTECTION AGENCY

5.1 Summary of the Law

The *Atomic Energy Act of 1954* (AEA), as amended (42 U.S.C. § 2011, et seq.), initiated a national program for research, development, and use of atomic energy for both national defense and domestic civilian purposes.

The authority of the EPA to establish generally applicable standards for the protection of the public and the environment from radiation is derived from the AEA, as amended; Reorganization Plan No. 3 of 1970; the *Nuclear Waste Policy Act of 1982* (NWPA), as amended (Pub. L. 97-425); and the LWA (Pub. L. 102-579, as amended). The protection standards found in

40 CFR Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes, apply to both spent nuclear fuel and high-level radioactive waste as defined by the NWPA, and to TRU waste, which contains more than 100 nanocuries per gram of waste of alpha-emitting TRU isotopes with half-lives greater than 20 years. The standards of 40 CFR Part 191 consist of three subparts: Subpart A, Environmental Standards for Management and Storage; Subpart B, Environmental Standards for Disposal; and Subpart C, Environmental Standards for Groundwater Protection.

Subpart A, Environmental Standards for Management and Storage, sets the operational requirements limiting annual doses to members of the public from management and storage operations at disposal facilities operated by the DOE and not regulated by either the U.S. Nuclear Regulatory Commission (NRC) or by agreement states. The annual dose equivalent to any member of the public in the general environment may not exceed 25 millirem (mrem) to the whole body and 75 mrem to any critical organ.

The EPA audits DOE compliance with Subpart A of 40 CFR Part 191. Since these standards were promulgated by the EPA, they are discussed in this section rather than in Section 13.0. Because Subpart A contains environmental performance standards, implementation details are left to the responsible agency. In January 1997, the EPA issued EPA 402-R-97-001, *Guidance For The Implementation Of EPA's Standards For Management And Storage Off Transuranic Waste (40 CFR Part 191, Subpart A) At The Waste Isolation Pilot Plant (WIPP)* (EPA, 1997), which includes methods for dose calculation, modeling, and reporting. In 2012, the DOE updated the *Implementation Plan for 40 CFR Part 191, Subpart A* (DOE/WIPP 00-3121) (DOE, 2012b), which continues to implement the EPA guidance and outlines the 40 CFR Part 191, Subpart A, compliance program.

The LWA, Pub. L. 102-579, as amended, requires the EPA to establish criteria to certify DOE compliance with the radioactive waste disposal standards of 40 CFR Part 191, Subparts B and C, with regard to the WIPP. In addition, the Act requires the EPA to conduct recertification of continued compliance five years after the initial receipt of TRU waste for disposal and at five-year intervals thereafter until the end of the decommissioning phase. The EPA issued certification and recertification criteria in 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*, on February 9, 1996 (EPA, 1996).

5.2 Status of Compliance with the Regulatory Requirements

The CCA (DOE, 1996a) was submitted to the EPA in 1996. The EPA certified DOE compliance in 1998. DOE/WIPP-04-2131, *Title 40 CFR Part 191 Subparts B and C Compliance Recertification Application* (CRA) (DOE, 2004a) was submitted to the EPA on March 24, 2004. On March 29, 2006, the EPA recertified DOE compliance. On March 24, 2009, the DOE submitted the second five-year CRA to the EPA (DOE, 2009). On November 18, 2010, the EPA recertified DOE compliance. The third five-year CRA was submitted to the EPA on March 26, 2014 (DOE, 2014b).

Table 4 provides general information on regulatory requirements of the AEA and the EPA standards implementing those requirements.

Table 4: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Environmental Protection Agency

Regulatory Requirement	WIPP Compliance
1. Environmental Radiation Protection Standards, 40 CFR Part 191	The standards of 40 CFR Part 191 applied to the WIPP as of March 26, 1999, when the first shipment of CH-TRU waste was received and emplaced for permanent disposal.
2. Standards, 40 CFR § 191.03(b) (Subpart A)	*The combined annual dose equivalent to any member of the public in the general environment shall not exceed 25 mrem to the whole body and 75 mrem to any critical organ.* The results of the WIPP Effluent Monitoring Program have shown no releases of radionuclides that may adversely affect the public, thereby demonstrating compliance with 40 CFR § 191.03 standards. The regulatory standard specifies that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management and storage shall not exceed 25 mrem to the whole body and 75 mrem to any critical organ. In this program, the DOE emphasizes doses from releases through the air pathway. Air emissions are the only plausible pathway for radionuclide transport during receipt and emplacement of waste at the WIPP, either through the underground exhaust shaft exit or the ventilation system of the WHB. The DOE has demonstrated compliance with the radiation dose limits of Subpart A by conducting effluent monitoring since receipt of the CH-TRU and RH-TRU waste shipments at the WIPP. The Clean Air Act Assessment Package-1988 (CAP88)-PC computer modeling program is used to calculate radiation doses to demonstrate DOE compliance with the Subpart A standard. The model output specifies the effective dose equivalent (EDE) to which the public may be subjected by normal operation of the facility during the reporting periods, and is attached as Appendix A to this report. The CAP88-PC software provides the capability for assessments of both collective populations and maximally exposed individuals (MEIs). For both assessments, the DOE has examined radiation doses to individuals at any offsite point where there is a residence, school, business, or office. At the WIPP, consideration of businesses includes activities such as grazing, mining, or oil drilling in the vicinity of the site. Consequently, individual assessments at two locations (nominally 650 meters and 8,800 meters) are performed for compliance with 40 CFR Part 191, Subpart A and 40 CFR Part 61, Subpart H, respectively. These distances were re-measured and updated in 2015 using more modern methods to document these key locations. The locations selected are based upon the highest potential contaminant concentrations driven by annual wind patterns, and are not, in this case, at the closest physical distance to the emission point. Note: Collective population assessment is chosen for 40 CFR Part 61, Subpart H adjunct regulatory compliance reporting, for DOE compilation uses. The data are read from a population file for determination of doses to the combined population within an 80-km (50-mile) radius. The individual assessment option provides the MEI dose estimate giving the highest EDE to any member of the public to receive in the reporting year, not to exceed 10 mrem/year. (See Table 5 of this report.) In CY 2015, the EPA authorized the use of Version 4.0 of CAP88-PC for demonstration of compliance. Recent compliance reporting before this authorization used Version 3.0, which differs in several ways from the newer model. Version 4.0 uses updated human compartment models and uptake factors for many of the radioisotopes tracked at WIPP, resulting in about a 37 percent apparent reduction in calculated dose for Version 4.0

Table 4: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Environmental Protection Agency

Regulatory Requirement	WIPP Compliance
	compared to Version 3.0 using the same input factors. These differences are tabulated in Table A-5 of the "Annual Periodic Confirmatory Measurement Compliance Report for the U.S. Department of Energy Waste Isolation Pilot Plant – Emended," for CY 2014 (see Appendix A). For CY 2014, the adjusted EDE from operations at the WIPP exclusive use area located 650 meters from the point of release (exhaust shaft and WHB ventilation system) at the fence line maximum annual contaminant concentration location was approximately 1.49E-01 mrem per year to the whole body, and 6.09 mrem per year to the critical organ. In addition, for CY 2014, the adjusted EDE from facility operations to the MEI beyond the WIPP land withdrawal area located 8,800 meters from the point of release was about 2.90E-03 mrem per year to the whole body, and approximately 1.18E-01 mrem per year to the critical organ. These doses include the release of February 14, 2014, with dose calculations estimated using Version 4.0 of CAP88-PC. Note that with updated intake and transfer coefficients, the doses calculated using Version 4.0 are about 37 percent less than the doses using the same inputs run using Version 3.0, which had been used through CY 2014. A tabulation of the differences is found in Table A-5 of the "Annual Periodic Confirmatory Measurement Report for the U.S. Department of Energy Waste Isolation Pilot Plant – Emended," (see Appendix A). For CY 2015, the EDE at the WIPP exclusive use area located 652 meters from the point of release was approximately 4.12E-04 mrem per year to the whole body, and 1.38E-02 mrem per year to the critical organ. In addition, for CY 2015, the EDE from facility operations to the MEI beyond the WIPP land withdrawal area located 8,850 meters from the point of release was about 8.81E-06 mrem per year to the whole body, and approximately 2.76E-04 mrem per year to the critical organ. The results from CY 2014 and 2015 are below the 25 mrem per year limit to the whole body, and the 75 mrem per year limit to any critical organ as required by 40 CFR §191.03, Subpart A.
3. Containment Requirements, 40 CFR § 191.13 (Subpart B)	*The disposal systems for spent nuclear fuel or high-level or TRU radioactive waste shall be designed to provide a reasonable expectation that the cumulative releases to the accessible environment for 10,000 years shall have a likelihood of less than one chance in ten of exceeding the quantities calculated according to Table I (Appendix A) and less than one chance in 1,000 of exceeding ten times the quantities calculated in accordance with Table I.* These requirements were addressed in the CCA (DOE, 1996a) and CRAs (DOE, 2004a; DOE, 2009; and DOE, 2014b).
4. Individual Protection Requirements, 40 CFR § 191.15 (Subpart B)	*Disposal systems for waste and any associated radioactive material shall be designed to provide a reasonable expectation that, for 10,000 years after disposal, undisturbed performance of the disposal system shall not cause the annual committed effective dose (calculated in accordance with Appendix B of this Part) to exceed 15 mrem.* These requirements were addressed in the CCA (DOE, 1996a) and CRAs (DOE, 2004a; DOE, 2009; and DOE, 2014b).
5. Environmental Standards for Ground Water Protection, Disposal Standards,	*Disposal systems for waste and any associated radioactive material shall be designed to provide a reasonable*

Table 4: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Environmental Protection Agency

Regulatory Requirement	WIPP Compliance
40 CFR § 191.24 (Subpart C)	*expectation that, for 10,000 years after disposal, undisturbed performance of the disposal system shall not cause levels of radioactivity in any underground source of drinking water, in the accessible environment, to exceed the limits specified in 40 CFR Part 141 as they exist on January 19, 1994.* These requirements were addressed in the CCA (DOE, 1996a) and CRAs (DOE, 2004a; DOE, 2009; and DOE, 2014b).
6. WIPP Compliance Certification Criteria, 40 CFR Part 194	*This part specifies criteria for the certification or any re-certification, or subsequent actions relating to the terms or conditions of certification of the Department of Energy's Waste Isolation Pilot Plant's compliance with the disposal regulations found at part 191 of this chapter and pursuant to section 8(d)(1) and section 8(f), respectively, of the WIPP LWA. The compliance certification application submitted pursuant to section 8(d)(1) of the WIPP LWA and any compliance recertification application submitted pursuant to section 8(f) of the WIPP LWA shall comply with the requirements of this part.* As specified in Section 8(d)(1) of the LWA, the DOE submitted the CCA (DOE, 1996a) to the EPA on October 29, 1996. The CCA included facility information, regional descriptive information, summaries of more than 20 years of scientific studies, details of the long-term repository performance assessments, and descriptions of programs in place to monitor the performance of the WIPP repository. The EPA evaluated the CCA and on May 18, 1998, issued a final rule (63 Fed. Reg. 27354 through 27406), certifying that the DOE met the radioactive waste disposal standards and was in compliance with 40 CFR Part 191, Subparts B and C (EPA, 1998). Since certification of the WIPP, the DOE has maintained compliance with the EPA disposal regulations. The activities that must be performed to maintain compliance include: • Routine activities • Non-routine activities • Recertification activities Activities conducted on a regular basis are considered routine. Routine activities required by the EPA certification/recertification include monitoring and reporting changes to the CCA/CRA. Monitoring is conducted to comply with the requirements of 40 CFR § 191.14(b) in accordance with the criteria of 40 CFR § 194.42. Monitoring provides the data that indicates the disposal system is not deviating adversely from expected performance. The monitoring parameters are: • Waste activity • Culebra groundwater composition • Change in Culebra groundwater flow • Drilling rate in the Delaware Basin • Probability of encountering a Castile brine reservoir in the Delaware Basin • Creep closure and stresses • Extent of brittle deformation • Initiation of brittle deformation • Displacement of deformation features • Subsidence in the vicinity of the repository

Table 4: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Environmental Protection Agency

Regulatory Requirement	WIPP Compliance
	The organizations responsible for monitoring and the frequency for conducting the monitoring and reporting results are outlined in DOE/WIPP-99-3119, *Compliance Monitoring Implementation Plan for 40 CFR § 191.14(b), Assurance Requirement* (DOE, 2014e). Nonsignificant changes and updates that differ from information contained in the compliance certification are reported annually, by November 18, in accordance with the criteria of 40 CFR § 194.4(b)(4). This report, the Annual Change Report, was submitted to the EPA in November 2014 and 2015 (Annual Change Report – 2013/2014 and 2014/2015) (DOE, 2014a; DOE, 2015k), for this reporting period. Non-routine activities are those that occur occasionally, randomly, or only once; such as an EPA request for information, the implementation of active and passive institutional controls, decommissioning the site, or activities associated with planned or unplanned changes. Title 40 CFR § 194.4(b)(3) requires the DOE to report any planned or unplanned changes in activities or conditions pertaining to the disposal system that differ significantly from the most recent compliance application. Changes are evaluated by the EPA. A planned change request was submitted to the EPA on September 26, 2011 (DOE, 2012c). This request was to inform the EPA of the CBFO intent to modify the Final Certification Rule for 40 CFR Part 194 (EPA,1998), from the use of Option D panel closures to run-of-mine salt panel closures. On September 30, 2014, the Final Rule was posted by the EPA removing Condition 1 from the Certification Decision and approving the use of the run-of-mine salt panel closures in place of Option D panel Closures (EPA, 2014a). No planned change requests were submitted to the EPA during this reporting period.
7. WIPP Compliance Certification Criteria, 40 CFR Part 194	There have been no unplanned changes during this reporting period. The ongoing WIPP environmental monitoring programs have not detected substantial and/or deleterious deviations from the expected conditions. Recertification activities are required by Section 8(f) of the LWA, which establishes that every five years after the initial receipt of TRU waste for disposal at the WIPP and continuing until the end of the decommissioning phase, the Secretary of Energy must submit documentation to the Administrator of the EPA that the WIPP continues to comply with disposal regulations with respect to the WIPP disposal system. The DOE began emplacing TRU waste in the WIPP repository on March 26, 1999. With the initial receipt of waste, the requirement at Section 8(f) of the LWA was initiated. Each recertification application submitted to the EPA for certification must be prepared in accordance with the criteria in 40 CFR § 194.15. Based on the DOE submittal, the EPA will determine whether the DOE remains in compliance with the disposal regulations. The DOE submitted the first CRA to the EPA on March 26, 2004 (DOE, 2004a), and the EPA recertified the WIPP on March 29, 2006. The DOE submitted the second CRA to the EPA on March 24, 2009 (DOE, 2009), and on November 18, 2010, the EPA recertified the WIPP. The DOE submitted the third CRA to EPA on March 26, 2014 (DOE, 2014b).

6.0 CLEAN AIR ACT

6.1 Summary of the Law

The CAA, as amended, establishes a national regulatory strategy and program to protect and enhance air quality in the United States. The CAA includes a number of standards, requirements, and permit programs to protect the quality of air in attainment areas (areas in which air quality meets the appropriate standards) and to improve air in nonattainment areas (areas that do not meet the national primary or secondary ambient air-quality standard for an air pollutant).

Congress enacted the *Clean Air Act Amendments of 1990* (CAAA) (Pub. L. 101-549) on November 15, 1990. Several legislative actions have made minor amendments since then.

6.1.1 Title I, Air Pollution Prevention and Controls

Title I of the CAA contains requirements and standards for programs that govern air pollutant emissions from stationary sources. These include the National Ambient Air Quality Standards (NAAQS), the New Source Performance Standards (NSPS), the National Emission Standards for Hazardous Air Pollutants (NESHAP), the Prevention of Significant Deterioration (PSD) program, and requirements for nonattainment areas. Most of these programs include requirements for proposed new construction or for modifications of existing sources established in 40 CFR Part 61. The CAA also includes requirements for a program regulating specific categories of stationary sources that emit (or have the potential to emit) one or more hazardous air pollutants (HAPs) listed in Section 112(b) of the Act. Title 40 CFR Part 63 contains the implementing regulations for the HAPs program. The WIPP does not have stationary sources regulated under these requirements.

6.1.1.1 National Ambient Air Quality Standards, 40 CFR §§ 50.4 through 50.19, and 40 CFR Part 51

The NAAQS program was established by Title I of the CAA (and revised by Title I of the CAAA) for the six "criteria" pollutants: sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead. These standards establish the maximum levels of each pollutant allowed in the air within a particular area. The federal NAAQS are specified in 40 CFR §§ 50.4 through 50.19, and the program is implemented under 40 CFR Part 51, Requirements for Preparation, Adoption, and Submittal of Implementation Plans. The EPA has authorized the NMED to administer the NAAQS program. The federal NAAQS were superseded by the New Mexico Ambient Air Quality Standards for the six criteria pollutants (20.2.3 NMAC).

Based on the current air emissions inventory, WIPP operations do not exceed the 10-tons-per-year (tpy) emission limit for an individual HAP, the 25-tpy limit for a combination of HAP emissions, or the 10-tpy emission limit for criteria pollutants except for total suspended particulate matter and particulate matter less than 10 microns in diameter. Particulate matter is produced from fugitive sources related to the management of salt tailings extracted from the underground. Consultation with the NMED Air Quality Bureau (AQB) resulted in a March 2006 determination that a permit is not required for fugitive emissions of particulate matter that result from salt management at the WIPP. Proposed facility modifications are reviewed by the Permittees to determine if they will create new air emission sources and require permit applications.

Based on the initial 1993 air emissions inventory, CAA permits are not required at the WIPP. In 1993, the DOE obtained a New Mexico Air Quality Control Regulation 702 Operating Permit (recodified in 2001 as 20.2.72 NMAC, Construction Permits) for two backup diesel generators at the WIPP. The requirements and the compliance status associated with the operating permit for these generators are presented in Section 28.0. There have been no activities or modifications to the operating conditions of the diesel generators that would require reporting under the conditions of the permit for this reporting period and NMED has not requested an air emissions inventory since 2002.

6.1.1.2 Prevention of Significant Deterioration Program, 40 CFR § 51.166

The PSD program is designed for proposed new construction or the modification of existing major stationary sources. It pertains to a proposed new or modified major stationary source located in an attainment area, particularly if the source could impact the air quality in a national park, wilderness area, monument, seashore, or other areas of special national or regional natural, recreational, scenic, or historic value. The WIPP is not categorized as a major stationary source, as defined in 40 CFR § 51.166(b)(1)(i)(a), and the PSD program does not apply. A routine review and approval process is used at the WIPP to evaluate proposed actions and identify potential regulatory issues such as the applicability of the PSD program.

6.1.1.3 New Source Performance Standards, 40 CFR Part 60

The NSPS program regulates emissions from operating facilities and specifies emission standards and test methods for analyzing the emissions. This program, which was initiated by Section 111 of the CAA and is implemented by 40 CFR Part 60 (20.2.77 NMAC), Standards of Performance for New Stationary Sources, specifies standards of performance for air pollutant emissions from different types of facilities and equipment. Pollutants regulated under the NSPS include sulfur dioxide, nitrogen oxides, particulate matter, visible emissions (opacity), carbon monoxide, volatile organic compounds (VOCs), and lead. A routine review and approval process is used at the WIPP to evaluate proposed actions and identify potential regulatory issues, such as the applicability of NSPS.

6.1.1.4 National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61

Specific source category HAP emissions are regulated under Section 112 of the CAA (Title III of the CAAA) as implemented by 40 CFR Part 61 (20.2.78 NMAC), NESHAP. Before the CAA was amended in 1990, Subpart A of NESHAP listed only eight HAPs: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. The CAAA (§ 301) added 181 HAPs, significantly increasing the HAPs regulated under Subpart A.

The WIPP does not emit HAPs at levels subject to regulation under NESHAP. The WIPP is excluded from regulations under 40 CFR § 63.680, National Emissions Standards for Hazardous Air Pollutants from Off-Site Waste and Recovery Operations. Radioactive mixed wastes managed in accordance with applicable regulations under the AEA and NWPA authorities, are excluded from the definition of off-site materials in 40 CFR § 63.680(b)(2)(ii).

The DOE is exempt from regulation under 40 CFR Part 61, Subpart H, National Emission Standards for Emissions of Radionuclides Other than Radon from DOE Facilities, because it is a geological repository subject to the standards of 40 CFR 191 Subpart B. Pursuant to a May 16, 1995, MOU between the DOE and the EPA, the DOE agreed to comply with the requirements of 40 CFR Part 61, Subpart H.

6.1.1.5 Chemical Accident Prevention Provisions, 40 CFR Part 68

Under CAA Section 112(r), Accidental Release Prevention/Risk Management Plan Rule, the owners and operators of stationary sources are to prevent the accidental release of any substance listed in the implementing regulations. The list of regulated substances for accidental release prevention under § 112(r) of the CAA and the threshold quantities for these substances were finalized in 40 CFR Part 68, Chemical Accident Prevention Provisions. In order to comply with Subpart F of 40 CFR Part 68, Regulated Substances for Accidental Release Prevention, two sources are used to determine whether emissions from the WIPP exceed the regulatory threshold levels for chemicals listed in the final rule. The two sources are the *Air Emissions Inventory Report for WIPP* and the *WIPP Tier II Emergency and Hazardous Chemical Inventory Report* (DOE, 2015f). Of the 162 substances listed, none at the WIPP meet or exceed the final threshold levels. Consequently, the WIPP is not currently subject to these regulations.

6.1.2 Title II, Emission Standards for Mobile Sources

Although most of the requirements under the CAA pertain to stationary sources, the requirements under Title II of the CAA and the CAAA pertain to mobile sources and establish standards for motor vehicles and fuel. Many of these requirements are aimed at automobile manufacturers and petroleum companies (e.g., Part A of Title II, Motor Vehicle Emission and Fuel Standards). Federal agency fleets are covered in § 248 of the CAA. In accordance with the Alternative Fuel Transportation Program (10 CFR Part 490) and the *Energy Policy Act of 1992* (Pub. L. 102-486), federal agencies that operate fleets in nonattainment areas for ozone and/or carbon monoxide are required to use clean-fuel vehicles and must use clean alternative fuels when operating in the nonattainment area. Since the plan must be adopted only by federal agencies that operate a fleet with at least 20 light-duty vehicles in a metropolitan statistical area or a consolidated metropolitan statistical area with a 1980 population of at least 250,000 people, these regulations do not apply to the city of Carlsbad, which is the closest population center to the WIPP. In addition, most of the requirements for federal agency fleets under Title II are not applicable to this facility because it is not located in a nonattainment area. Regulations (40 CFR Part 80, Regulation of Fuels and Fuel Additives) make purchasers and consumers of gasoline products or their agents liable for using gasoline containing lead (i.e., more than 0.05 gram of lead per gallon) or lead additives for highway use after December 31, 1995. The WIPP complies with these regulations.

6.1.3 Title III, General Provisions

Title III of the CAA provides general provisions for the administration of the CAA and pertains to 40 CFR Part 50, National Primary and Secondary Ambient Air Quality Standards. The provisions of Title III include administration, federal procurement, suits, audits, and air quality monitoring and modeling. Title III of the CAA also requires that the EPA perform a comprehensive analysis of the impact of the CAAA. Title III does not add additional programs.

6.1.4 Title IV, Acid Deposition Control

Title IV of both the CAA and the CAAA is aimed primarily at utilities and power plants that emit large quantities of sulfur dioxide and/or nitrogen oxides. It seeks to reduce emissions of sulfur dioxide and nitrogen oxides to decrease the acid rain problem in the United States. Title IV is not applicable to the WIPP.

6.1.5 Title V, Permits

Most of the other permitting programs under the CAA are designed for proposed new construction or the modification of existing facilities. Title V of both the CAA and the CAAA, as promulgated in 40 CFR Part 70, State Operating Permit Programs, identify the operating permit requirements for major stationary sources. Those facilities required by the state or by the EPA to have an operating permit are expected to submit an operating permit application, compliance plan, and periodic compliance reports.

The EPA promulgated final approval of the State of New Mexico operating permit program and it became effective on January 27, 1997. The state program was established as Operating Permits and Operating Permit Emissions Fees in 20.2.70 NMAC and 20.2.71 NMAC, respectively.

The federal program (40 CFR Part 70) regulates and requires permits for both area and major sources. Major-source emission thresholds are used to determine which facilities require operating permits for both area and major sources under 40 CFR Part 70 and 20.2.70 NMAC. A facility is considered a major source, and is required to obtain an operating permit if the facility has the potential to emit or emits at least 100 tpy of any pollutant, 10 tpy of any single HAP, or 25 tpy of any combination of HAPs. Based on inventory emission calculations, the WIPP is not a major source and is not currently required to obtain a federal CAA operating permit. A routine review and approval process is used at the WIPP to evaluate proposed actions and identify potential regulatory issues such as the applicability of Title V permits.

6.1.6 Title VI, Stratospheric Ozone Protection

Title VI of both the CAA and the CAAA places restrictions on, and phases out the use of, ozone-depleting chemicals, particularly chlorofluorocarbons (CFCs). It is implemented by 40 CFR Part 82, Protection of Stratospheric Ozone. These regulations are designed to phase out the use of Class I and Class II substances. Class I substances (40 CFR § 82.4) are CFCs, halons, carbon tetrachloride, methyl chloroform, hydrobromofluorocarbons, and methyl bromide. Class II substances (40 CFR § 82.15) are hydrochlorofluorocarbons, which generally have a lower ozone-depleting potential than do CFCs. The production of most Class I substances was prohibited as of January 1, 1996 (methyl bromide was prohibited as of January 1, 2005). Effective January 1, 2015, the use of Class II substances was prohibited unless the substance is used and entirely consumed in producing other chemicals, or is used as a refrigerant in appliances manufactured prior to January 1, 2020. By January 1, 2030, the manufacture of Class II substances will be prohibited.

Implementing regulations pertaining to labeling requirements and the use and disposal of Class I substances during the service, repair, or disposal of appliances and industrial process refrigeration are codified in 40 CFR Part 82, Subpart E, The Labeling of Products Using Ozone-Depleting Substances. WIPP refrigerant recycling contractors provide recycling equipment, registrations, and training.

Most of the requirements pertaining to ozone-depleting substances (ODSs) such as CFCs are applicable primarily to manufacturers of the chemicals, products containing the chemicals, or products in which ODSs are used during the manufacturing process. These regulations are applicable to the WIPP and ODSs will no longer be available for use after the time specified in the regulations. Replacement products must be found. Any container in which Class I or Class II

substances (including waste) will be transported must have a warning label as required by 40 CFR § 82.106:

> *Warning: Contains [or Manufactured with, if applicable] [insert name of substance], a substance which harms public health and the environment by destroying ozone in the upper atmosphere.*

The WIPP WAC prohibits pressurized containers from being transported in approved CH-TRU and RH-TRU Type B packages in U.S. Department of Transportation (DOT) Type 7A containers. Wastes destined for the WIPP are excluded from the labeling requirements for Class I and Class II substances under 40 CFR 82.106(b) because carbon tetrachloride, a Class I substance, is a waste bound for discard.

6.2 Status of Compliance with the Regulatory Requirements

Table 5 provides general information on CAA requirements and the EPA and NMED regulations implementing those requirements.

Table 5: Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance
1. Control of Pollution from Federal Facilities, CAA § 118	*Each department of the executive, legislative, and judicial branches of the federal government having jurisdiction over any property or facility or engaged in any activity resulting in or that may result in the discharge of air pollutants and each employee thereof is subject to and must comply with federal, state, interstate, and local requirements regarding the control and abatement of air pollution in the same manner and to the same extent as any nongovernmental entity.* The DOE complies with applicable federal and state requirements pertaining to the release of air pollutants from the WIPP. Compliance with federal and state air quality requirements are described in this section and in Section 28.0.
2. National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities, 40 CFR Part 61, Subpart H (40 CFR § 61.90)	*The provisions of this subpart apply to operations at any facility owned or operated by the DOE that emits any radionuclides other than radon-222 and radon-220 into the air, except that this subpart does not apply to disposal at facilities subject to 40 CFR Part 191, Subpart B or 40 CFR Part 192.* The WIPP effluent monitoring program was established and placed in operation to comply with the provisions of the May 16, 1995, MOU Between the EPA and the DOE Concerning the CAA Emission Standards for Radionuclides 40 CFR Part 61, including Subparts H, I, Q, and T (DOE, 1995). The DOE continues to demonstrate compliance with this emission standard.
3. Notifications of Start-Up, 40 CFR § 61.09(a)	*The EPA will be notified of planned start-up between 30 and 60 days prior to start-up. The EPA will be notified of actual start-up of the WIPP within 15 days after that date.* On January 20, 1999, the DOE submitted notification letters to the EPA Administrator and the EPA Region 6 office to inform them of the planned start-up of the WIPP, scheduled for late March 1999 (DOE, 1999a). The start-up date was March 26, 1999, with the notification letters of actual start-up submitted to the EPA on this date (DOE, 1999b). These letters met the time frame requirements for notification.

Table 5: Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance
4. Standard, 40 CFR § 61.92	*Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an EDE of 10 mrem/year.* The DOE submitted the annual report of air emissions from the WIPP for CY 2014 and 2015 (DOE, 2015j; DOE, 2016f). These reports were submitted in compliance with the provisions of 40 CFR § 61.94 and the May 16, 1995, MOU between the EPA and the DOE concerning the CAA Emission Standards for Radionuclides, 40 CFR Part 61 including Subparts H, I, Q, and T. The WIPP CY 2014 effluent air emissions monitoring results were reported, and the EDE values to members of the public were calculated using the EPA-approved sampling procedures and computer model CAP88-PC, Version 3.0. For this BECR, the WIPP CY 2014 EDE values were calculated using the EPA-approved sampling procedures and computer model CAP88-PC, Version 4.0. The CY 2014 dose to the maximally exposed off-site individual was $5.9X10^{-03}$ mrem calculated using Version 3.0, and $2.9x10^{-03}$ mrem using Version 4.0 with updated location distances. The WIPP CY 2015 effluent air emissions monitoring results were reported, and the EDE values to members of the public were calculated, using the EPA-approved sampling procedures and computer model CAP88-PC, Version 4.0. The CY 2015 calculated dose to the maximally exposed off-site individual was $8.81x10^{-06}$ mrem. There are notable differences between Versions 3.0 and 4.0, resulting in an apparent lower dose to a member of the public for Version 4.0 when compared to identical inputs using Version 3.0. An in-house EPA analysis of the calculated doses between Versions 3.0 and 4.0 of CAP889-PC has shown that the dose in Version 4.0 is usually less than the dose in Version 3.0. This is primarily because the update of intake factors in Version 4.0 have been modified to be consistent with the latest version of the EPA Exposure Factors Handbook. Therefore, the user will likely see lower calculated doses in Version 4.0 for the receptor. A comparison of WIPP calculated doses using Versions 3.0 and 4.0 is provided in Table A-5 of Appendix A.
5. Emissions Monitoring and Test Procedures, 40 CFR § 61.93(a) and (b)	*Compliance with the standard, radionuclide emissions, shall be determined and EDE values to members of the public calculated using EPA-approved sampling procedures, computer models, or other procedures for which the EPA has granted prior approval. Radionuclide emission rates from point sources shall be measured at release points which have a potential to discharge radionuclides into the air in quantities which could cause an EDE in excess of 1.0 percent of the standard. For other release points, periodic confirmatory measurements shall be made to verify the low emissions.* WIPP has two effluent monitoring stations - Stations B and C. At each station, fixed air samplers (FASs) are used to collect representative samples of airborne particulates. Approved and controlled operating procedures are used at the WIPP to ensure that uniform methods are used to collect, package, and transport FAS filters. Station B FAS filter samples are collected at least once each working day from the filtered underground exhaust system. Station C, FAS filter samples are collected at least weekly from the filtered WHB exhaust system. Samples are composited on a monthly or quarterly basis, depending on sample location and the number of samples collected. These particulate filters are initially analyzed for gross alpha and gross beta activities. Filters from both stations are analyzed for plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu); americium-241 (^{241}Am); strontium-90 (^{90}Sr); cesium-137 (^{137}Cs); uranium-233/234 ($^{233/234}$U); and uranium-238 (^{238}U). The composite sample results are summed to obtain a total quantity for each radionuclide released from each

Table 5: Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance
	station. These detected radionuclide values are used as input into the CAP88-PC software package to calculate the EDE to members of the public for the purpose of demonstrating compliance with 40 CFR § 61.92. Underground ventilation for this reporting period was directed through the underground ventilation filters, and is monitored at Station B through daily sample filter collection. Station C, which monitors only the WHB and is physically separate from the underground ventilation circuits, was not affected by the airborne radiological particulate emission event. This configuration remained in place for the remainder of CY 2014, CY 2015, and the first quarter of CY 2016. Station A remained operable, but is used for non-emission underground air quality screening purposes only.
6. Emission monitoring and Test Procedures, 40 CFR § 61.93(c) and Appendix B, Method 114, Section 4.10	*A NESHAP Quality Assurance Program is required for facilities subject to Subpart H of NESHAP.* A QAP plan for sampling radionuclide emissions to the ambient air at the WIPP is in place.
7. Compliance and Reporting, 40 CFR § 61.94	*A NESHAP annual report must be submitted by June 30 for facilities subject to Subpart H of NESHAP.* The DOE filed NESHAP reports (DOE, 2015j; DOE, 2016f) by June 30 for both years in this reporting period. Reports filed are for previous calendar years.
8. Recordkeeping Requirements, 40 CFR § 61.95	*Facilities must maintain records documenting the source of input parameters, including the results of measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine the EDE. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard. These records must be kept at the site of the facility for at least five years and, upon request, be made available for inspection by the EPA Administrator or their authorized representative.* Monitoring for airborne radioactive emissions has been performed at the WIPP since 1998. Applicable records are maintained on-site for at least five years and are available for examination if requested by the EPA Administrator or an authorized representative. The results of the measurements, supporting calculations, analytical methods, and procedures used to determine the EDE are included in the records.
9. Application to Construct or Modify, 40 CFR § 61.96	*The submittal of a NESHAP application is required prior to construction or modification of any DOE facility that will emit radionuclides to the air.* Compliance with NESHAP (40 CFR § 61.96[b]) is maintained at the WIPP. No NESHAP application was submitted to the EPA during this reporting period because no new construction or modification that would emit radionuclides to the air at or above 1 percent of the 10 mrem public dose standard was performed in CY 2014, CY 2015, or the first quarter of CY 2016. Total estimated annual EDE values for the WIPP remained at less than 1 percent of the standard for this two-year period.
10. Regulation of Fuel and Fuel Additives, 40 CFR Part 80	Regulation regarding fuels and fuel additives pertaining to the WIPP is included in 40 CFR Part 80. See Section 28.0 for more detail regarding the State of New Mexico implementation of the CAA.

Table 5: Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance
11. Regulation of Fuel and Fuel Additives - Requests for Information, 40 CFR § 80.7	*If the Administrator, the Regional Administrator, or a delegate has reason to believe that a violation of Section 211(c) or Section 211(n) of the CAA or its implementing regulations with respect to the use of prohibited fuel (e.g., leaded) has occurred, they may require that any wholesale purchaser/consumer report information regarding receipt, transfer, delivery, or sale of gasoline represented to be unleaded and to allow the reproduction of such information at reasonable times. The purchaser/ consumer is also required to provide any other information to the EPA representative as requested to enable him/her to ensure that the purchaser/consumer acted in compliance with the applicable provisions of the CAA and the implementing regulations.* The WIPP procurement program ensures purchases of fuels are compliant with this regulatory requirement.
12. Regulation of Fuel and Fuel Additives - Controls and Prohibitions, 40 CFR § 80.22	*After December 31, 1995, no person shall dispense or supply gasoline produced with the use of lead additives or that contains more than 0.05 gram of lead per gallon, nor shall he or she supply or dispense gasoline represented to be unleaded unless it meets the criteria specified in 40 CFR § 80.2(g) or allow gasoline other than unleaded to be dispensed into a motor vehicle that is equipped with a gasoline tank filler inlet designed for the introduction of unleaded gasoline.* The WIPP procurement program ensures purchases of fuels are compliant with this regulatory requirement.
13. Regulation of Fuel and Fuel Additives - Liability for Violations, 40 CFR § 80.23	*In any case in which a wholesale purchaser-consumer or their employee or agent introduces gasoline other than unleaded into a motor vehicle equipped with a gasoline tank filler inlet designed for the introduction of unleaded gasoline, only the wholesale purchaser-consumer shall be deemed in violation.* The WIPP procurement program ensures purchases of fuels are compliant with this regulatory requirement.
14. Protection of Stratospheric Ozone, 40 CFR Part 82	A number of requirements have been promulgated that relate to CFCs and other ODSs. Most of these requirements pertain directly to manufacturers; however, because of the planned phase-out of these materials, the regulations also impact users of the materials. The use of CFCs and ODSs must be approved prior to purchasing and only if no alternatives are available. No new CFCs or ODSs have been approved for this reporting period.
15. Prohibitions and Required Practices, 40 CFR § 82.34	*No person repairing or servicing motor vehicles for consideration may perform any service on a motor vehicle air conditioner involving the refrigerant for the air conditioner without using approved refrigerant recycling equipment and unless they have been properly trained and certified by a technician certification program approved by the Administrator.* No government vehicle air conditioning systems are serviced, repaired, or maintained by WIPP employees. The DOE maintains a qualified vendor list and has procurement procedures in place to ensure that equipment is serviced by trained and certified vendors.

Table 5: Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance
16. Prohibitions, 40 CFR § 82.124(a)(4)	*On or after May 15, 1993, no person may modify, remove, or interfere with any warning statement required by this subpart, except as described in 40 CFR § 82.112.* Manufacturers must label appliances and products containing CFCs. The DOE industrial safety and hazardous materials management program plans require that warning labels must not be tampered with or removed. If a label is damaged and becomes unreadable, it is replaced.
17. Recycling and Emissions Reduction, Purpose and Scope, 40 CFR § 82.150	*This subpart applies to any person servicing, maintaining, or repairing appliances except for motor vehicle air conditioners. This subpart also applies to persons disposing of appliances, including motor vehicle air conditions. In addition, this subpart applies to refrigerant reclaimers, appliance owners, and manufacturers of appliances and recycling and recovery equipment.* WIPP employees do not service, maintain, or repair appliances. However, the facility owns and disposes of appliances. The DOE maintenance work instructions for recharging and reclaiming refrigerants and property management procedures dictate that WIPP appliances will be sold intact or the refrigerants removed by a certified recycling contractor.
18. Recycling and Emissions Reduction, 40 CFR § 82.154	*Prohibitions are specified for persons who maintain, service, repair, or dispose of appliances who may vent or otherwise release into the environment any refrigerant or substitute substance used as refrigerant in such equipment. De minimis releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition. No person may dispose of appliances except for small appliances, motor vehicle air conditioners, and motor vehicle air conditioner-like appliances unless the required practices described in 40 CFR § 82.156 are observed and equipment that is certified for that type of appliance is used. Prohibitions are also specified regarding recycling or recovery equipment.* *Prohibitions also exist for the sale of Class I or Class II substances consisting wholly or in part of used refrigerants.* *It is a violation of this subpart to accept a signed statement pursuant to 40 CFR § 82.156(f)(2) if the person knew or had reason to know that such a signed statement is false.* The DOE maintains a qualified vendor list and has procurement procedures in place to ensure that equipment is serviced by properly trained and certified vendors. The qualified vendor list also ensures that materials are disposed of at properly permitted facilities that comply with the applicable regulations. No Class I or II substances are sold or distributed from the WIPP.
19. Recycling and Emissions Reduction, Required Practices, 40 CFR § 82.156	*Any person opening appliances other than motor vehicle air conditioners must evacuate the refrigerant to a system receiver or to a recovery or recycling machine as specified. At least one piece of certified, self-contained recovery equipment must be available at their place of business.* *Leaks in appliances containing refrigerant must be repaired as specified.* The DOE maintains a qualified vendor list and has procurement procedures in place to ensure that equipment is serviced by trained and certified vendors. The qualified vendor list ensures that materials are disposed of at properly permitted facilities that comply with the applicable regulations.

6.3 Status of Compliance with the Permit Conditions

The permit for the backup diesel electrical power supply generators is the only CAA-related permit obtained for the WIPP. The requirements and the compliance status associated with the operating permit for these generators are presented in Section 28.0. The WIPP is in compliance with this permit.

7.0 FEDERAL WATER POLLUTION CONTROL ACT OF 1972 (CLEAN WATER ACT)

7.1 Summary of the Law

The *Federal Water Pollution Control Act of 1972* (33 U.S.C.§ 1251, et seq.) is typically referred to as the *Clean Water Act* and sets forth requirements for the discharge of pollutants into surface waters of the United States. The major programs under this Act are the oil pollution prevention standards of 40 CFR Part 112, and the National Pollutant Discharge Elimination System, 40 CFR Part 122.

7.2 Status of Compliance with the Regulatory Requirements

These programs are not applicable to activities conducted at the WIPP because the facility does not discharge pollutants into surface waters of the United States.

8.0 SAFE DRINKING WATER ACT

8.1 Summary of the Law

The SDWA, as amended, provides the regulatory strategy for protecting public water supply systems and underground sources of drinking water. As defined in the implementing regulations in 40 CFR Part 141, National Primary Drinking Water Regulations, these systems provide water for human consumption, have at least 15 connections, or regularly serve at least 25 people.

The SDWA also protects underground sources of drinking water from underground injection of contaminated fluids. Underground injection, defined as "subsurface emplacements of fluids by well injections" in 42 U.S.C. § 300f, is governed by the underground injection control program described in Subpart C of 40 CFR Part 144.

The EPA delegated authority for ensuring compliance with the SDWA National Primary Drinking Water Standards by approving the NMED drinking water regulations. These regulations are now included in 20.7.10 NMAC (see Section 30.0).

8.2 Status of Compliance with the Regulatory Requirements

The LWA specifically requires compliance with the SDWA. The NMED has authority to administer the SDWA in New Mexico. Table 6 provides general information and compliance with the regulatory requirements of the SDWA.

Table 6: Status of Compliance with the Regulatory Requirements of the *Safe Drinking Water Act*

Regulatory Requirement	WIPP Compliance
1. Scope, 40 CFR § 142.3(b)	Applicable requirements in this section are covered in the New Mexico program for the SDWA (see Section 30.0).
2. Underground Injection Control Program, 40 CFR Part 144	*The EPA has established a number of requirements for facilities that dispose of wastes by means of underground injection.* None of the wastes currently generated at the WIPP are injected underground, nor is TRU waste disposed of by underground injection at the WIPP. The EPA requirements for underground injection control do not apply to the WIPP.

9.0 TOXIC SUBSTANCES CONTROL ACT

9.1 Summary of the Law

The TSCA regulates the production, use, distribution, and disposal of new, potentially toxic chemical substances. The Act applies primarily to commercial manufacturers, importers, and processors of toxic chemicals. The WIPP is not a manufacturer or a processor of chemical products; therefore, most of the provisions of the TSCA do not apply. However, three sections of this Act pertain to existing commercial toxic substances rather than to the development of new chemicals. These sections deal with asbestos, indoor radon abatement, and polychlorinated biphenyls (PCBs).

9.1.1 Asbestos Hazard Emergency Response Act of 1986

Because of the potential for serious health hazards associated with asbestos, Congress amended the TSCA in 1986 by adding Title II, the *Asbestos Hazard Emergency Response Act*, to regulate asbestos-containing materials in schools. A survey of the buildings at the WIPP determined that there are no asbestos-containing materials in any of the structures.

In early 2014, bulk samples collected from brake pads on the winch at the air intake shaft showed the presence of asbestos. Personal and area air sampling showed airborne asbestos to be either non-detect or well beneath occupational exposure limits. The asbestos is not in friable form. Management controls were developed to manage, reduce, and eliminate exposures to WIPP personnel from the presence of asbestos. Sampling continued throughout this reporting period. Personal and area sampling for airborne asbestos results were either non-detect or below occupational exposure limits. Management controls will be reinstated if warranted by sampling results.

9.1.2 Indoor Radon Abatement

The Title III TSCA amendment, Indoor Radon Abatement, was added to address the national long-term goal with respect to radon levels in buildings, the air within the buildings in the United States should be as free of radon as the ambient air outside of buildings. One of the goal-driven requirements that Title III sets forth in 15 U.S.C. § 2669, Study of Radon in Federal Buildings, directs each federal department or agency that owns a federal building to conduct a study to determine the extent of radon contamination in such buildings. The DOE responded to this

requirement through *Results of the U.S. Department of Energy Indoor Radon Study* (DOE, 1990b).

9.1.3 Polychlorinated Biphenyls

Section 6(e) of the TSCA, PCBs, directed the EPA to phase out PCB manufacture and use according to a mandated timetable. The regulations at 40 CFR Part 761, Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, implement the PCB provisions of the TSCA. This part applies to parties who manufacture, process, distribute in commerce, use, or dispose of PCBs or PCB items. DOE policy prohibits the use of PCB items or equipment in DOE-installed equipment at facilities such as the WIPP. Surveys were performed at the DOE sites to identify PCBs or PCB-containing equipment and to eliminate the fluids and equipment in accordance with EPA storage and disposal regulations. No PCBs were found to be in use at the WIPP.

The PCB storage and disposal regulations are listed in the applicable subparts of 40 CFR Part 761. An initial report requesting authorization to store and dispose of TRU waste contaminated with PCBs, in accordance with the chemical waste landfill provisions of 40 CFR § 761.75, was submitted to EPA Region 6 on March 22, 2002 (DOE/WIPP-02-3196, *Waste Isolation Pilot Plant Initial Report for PCB Disposal* Authorization) (DOE, 2002). This initial report included requests for waivers to the technical requirements for hydrological conditions, surface and groundwater monitoring, and leachate collection. On May 15, 2003, the EPA Region 6 approved the disposal of TRU waste containing PCBs, in accordance with the Conditions of Approval (COA) (EPA, 2003). The chemical waste landfill permit is good for five years from the date of issuance. On February 5, 2005, the WIPP received the first shipment of PCB-contaminated TRU waste.

On April 9, 2012, the DOE submitted a request (DOE, 2012d) to EPA Region 6 for reauthorization of PCB disposal at the WIPP, in compliance with the COA. On May 21, 2013, the EPA reauthorized the DOE chemical waste landfill permit (EPA, 2013). This reauthorization enables the DOE to continue to dispose of PCBs in accordance with the revised COA. The DOE is required to submit a request for re-authorization of its chemical waste landfill permit at least one year prior to the expiration of the current permit, which expires May 21, 2018. During annual inspections, the EPA determined that operation of the WIPP is in accordance with the COA and does not present an unreasonable risk to human health or the environment in accordance with guidelines set forth in 40 CFR Part 761.

On March 11, 2014, the CBFO requested an emergency approval to expand the storage time for PCB TRU and PCB TRU mixed waste from 60 days, as required by the WIPP PCB COA, to 105 days (DOE, 2014n). On March 25, 2014, the EPA Region 6 responded with approval of the extension request (EPA, 2014b). On May 6, 2014, CBFO requested an additional storage time extension (DOE, 2014k) that was approved by the EPA Region 6 on May 29, 2014 (EPA, 2014c). On July 2, 2014, the CBFO requested an additional storage time extension from EPA Region 6 (DOE, 2014l). The EPA Region 6 approved this additional storage time request on July 11, 2014 (EPA, 2014d). On December 1, 2014, the CBFO requested an additional extension to the storage time from EPA Region 6 (DOE, 2014m). This additional request was approved on January 13, 2015 (EPA, 2015a). On April 22, 2015, the CBFO requested an additional storage time extension (DOE, 2015m) from EPA Region 6 that was granted on May 4, 2015 (EPA, 2015b).

9.2 Status of Compliance with the Regulatory Requirements

As additional extensions of mixed hazardous waste storage times were requested in accordance with the NMED administrative orders (NMED, 2014a, 2014b, 2014c), requests to EPA Region 6 for the same waste storage time extensions were submitted. The specific dates of the additional request to extend the storage time of PCB-contaminated TRU waste are identified in Section 9.1.3.

During this reporting period, the WIPP was in compliance with requirements for PCB marking, storage, and records and monitoring. Table 7 provides the compliance status of key requirements.

Table 7: Status of Compliance with the Regulatory Requirements of the *Toxic Substances Control Act*

Regulatory Requirement	WIPP Compliance
1. Study of Radon in Federal Buildings, TSCA, §309	*Each federal agency that owns a building must conduct a study of radon contamination in the building(s).* The DOE conducted an indoor radon study in response to this requirement and submitted the findings in *Results of the U.S. Department of Energy Indoor Radon Study* (DOE, 1990b). Radon concentrations measured were less than 1.0 picocuries per liter. These concentrations are below the 4-picocurie-per-liter level at which the EPA recommends further testing of indoor radon.
2. Prohibitions and Exemptions, 40 CFR § 761.20	*No person may use any PCB or any PCB item regardless of concentration in any way other than in a totally enclosed manner within the United States.* No PCBs were identified during this reporting period.
3. Storage and Disposal, 40 CFR Part 761, Subpart D	*In most circumstances, PCBs must be incinerated as required by 40 CFR § 761.70 or placed in chemical-waste landfills that meet the requirements of 40 CFR § 761.75 and that have been approved as a landfill for PCBs by the EPA.* On November 10, 2011, the WIPP received clarification from the EPA Region 6, on Section II.A.7 of the COA, for the disposal of up to one percent of the container volume of incidental liquids in disposal containers of PCB/TRU and PCB/TRU mixed waste. These incidental liquids were identified as, but not limited to, rainwater, groundwater, condensate, leachate, and dust control liquids. The DOE did not dispose of equipment that contained PCB fluids during the reporting period at the WIPP. Waste containing PCBs is currently stored in the WIPP WHB. The waste was received at the time of the 2014 radiological event but could not be emplaced. PCB storage time extensions have been approved by EPA Region 6.
4. Certificate of Disposal, 40 CFR § 761.218(b)	*The owner or operator of the disposal facility shall send the Certificate of Disposal to the generator identified on the manifest which accompanied the shipment of PCB waste within 30 days of the date that disposal of each item of PCB waste identified on the manifest was completed unless the generator and the disposer contractually agree to another time frame.* Certificate of disposal requirements were met during this BECR reporting period.

Table 7: Status of Compliance with the Regulatory Requirements of the *Toxic Substances Control Act*

Regulatory Requirement	WIPP Compliance
5. Records and Monitoring, 40 CFR § 761.180(b)(3)	*The owner or operator of a PCB disposal facility or a commercial storage facility shall submit an annual report, which briefly summarizes the records and annual document log required to be maintained and prepared to the EPA Regional Administrator by July 15.* Annual reports were submitted to the EPA Region 6 on July 7 of 2015, and June 8 of 2016. (DOE, 2015q; DOE, 2016i).
6. Chemical Waste Landfills, General, 40 CFR § 761.75	*A chemical waste landfill used for the disposal of PCBs and PCB Items shall be approved by the Agency Regional Administrator pursuant to paragraph (c) of this section. The landfill shall meet the requirements specified in paragraph (b) of this section, unless a waiver from these requirements is obtained pursuant to paragraph (c)(4) of this section. In addition, the landfill shall meet any other requirements that may be prescribed pursuant to paragraph (c)(3) of this section.* On May 21, 2013, the EPA Region 6 approved and reauthorized the DOE for disposal of PCBs at the WIPP (EPA, 2013). This approval is effective for five years.
7. Chemical Waste Landfills, Approval of Chemical Waste Landfills, 40 CFR § 761.75	*Prior to the disposal of PCBs and PCB items in a chemical waste landfill, the owner or operator of the landfill shall receive written approval of the Agency Regional Administrator for the Region in which the landfill is located.* On May 21, 2013, EPA Region 6 approved and reauthorized DOE for disposal of PCBs at the WIPP. This approval is effective for five years.

10.0 FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

10.1 Summary of the Law

The *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA) (7 U.S.C. § 136, et seq.) authorizes the EPA to regulate the registration, certification, use, storage, disposal, transportation, and recall of pesticides. Section 18 of the FIFRA authorizes the EPA to exempt state and federal agencies from any provision of the Act if emergency conditions requiring an exemption are determined to exist. Section 18 provides guidelines for urgent, non-routine situations that require the use of pesticides and for which exemptions may be authorized. Sections 19(a) and 25(a) of the FIFRA authorize the EPA to establish regulations and procedures regarding the disposal or storage of packages and containers of pesticides and the disposal or storage of excess amounts of such pesticides. The FIFRA provided for regulations for the acceptance of certain pesticides and recommended procedures for the disposal and storage of pesticides and pesticides containers; established procedures for the acceptance, disposal, or storage of packages and containers of pesticides; and provided for the disposal or storage of excess amounts of such pesticides. The standards of the FIFRA are considered mandatory for DOE facilities. The DOE requires applicators hired under contract by the WIPP to comply with the requirements of the *New Mexico Pesticide Control Act* and the implementing regulations set forth in 21.17.50 NMAC. More information on the state requirements is provided in Section 37.0. Use and application of restricted-use pesticides are only performed by

commercial pesticide applicators who are under contract with the DOE and are required to comply with federal and state standards.

10.2 Status of Compliance with the Regulatory Requirements

The two major requirements of the FIFRA and the compliance status are summarized in Table 8.

Table 8: Status of Compliance with the Regulatory Requirement of the *Federal Insecticide, Fungicide, and Rodenticide Act*

Regulatory Requirement	WIPP Compliance
1. Pesticide Products Required to be Registered, 40 CFR § 152.15	*No person may distribute or sell any pesticide product that is not registered under the FIFRA. The pesticide must be registered if the person who distributes or sells the substance knows that it will be used as a pesticide.* The WIPP does not distribute or sell pesticide products.
2. Labeling Requirements, 40 CFR § 156.10	*The directions for use shall include specific directions for the storage and disposal of pesticides and their containers.* The WIPP does not manufacture, formulate, or label pesticides.

11.0 NOISE CONTROL ACT OF 1972

11.1 Summary of the Law

In the *Noise Control Act of 1972* (42 U.S.C. § 4901, et seq.), the Congress declared it is the policy of the United States to promote an environment for all Americans that is free from noise that jeopardizes public health or welfare. According to 42 U.S.C. § 4901(a)(3), the primary responsibility for noise control is vested in state and local governments.

Federal regulation is deemed essential only for commercial noise sources requiring national uniformity of treatment (e.g., aircraft noise). Federal agencies are directed to carry out the programs within their control in a manner that furthers the policy. Section 4 of the Act states, "each agency having jurisdiction over any property or facility, or engaged in any activity resulting or which may result in the emission of noise, shall comply with federal, state, interstate, and local requirements regarding the control and abatement of environmental noise to the fullest extent consistent with their authority."

11.2 Status of Compliance with the Regulatory Requirements

An evaluation of the environmental noise level of the WIPP was conducted with the results published in the *Final Environmental Impact Statement Waste Isolation Pilot Plant* (FEIS) (DOE/EIS-0026) (DOE, 1980). When changes to the WIPP are suggested, an environmental impact review is conducted in accordance with the *National Environmental Policy Act* (NEPA) (refer to Section 12.0), which includes a review of noise generation. There were no changes to the WIPP during this reporting period that modified the noise level.

12.0 NATIONAL ENVIRONMENTAL POLICY ACT

12.1 Summary of the Law

The NEPA (42 U.S.C. § 4321, et seq.) is a comprehensive legislative policy statement on protection of the environment. The NEPA requires that the federal government considers potential environmental impacts as part of the decision-making process prior to the initiation of new projects and activities. The CBFO submits an annual mitigation report to the DOE headquarters every year. The mitigation report addresses the potential environmental impacts and the actions that mitigate the impacts for the previous year.

The Act also requires that the public should be allowed to review and comment on proposed projects with the potential to significantly affect the quality of the human environment. Congress created the Council on Environmental Quality (CEQ) as part of the NEPA. The CEQ, contained within the Executive Branch of the government, is the agency charged by Congress to advise the President with regard to national environmental policy. The CEQ regulations at 40 CFR Parts 1500 through 1508 outline specific requirements for the NEPA process, the preparation of environmental impact statements (EISs) or environmental assessments (EAs), public review and solicitation of comments on EISs, decisions with respect to an EIS or EA, and implementation of the decisions. The NEPA regulations instruct federal agencies to interpret and administer specific directives (such as regulations, plans, or orders) to implement the regulations within their agencies. General directives to federal agencies include considering the impacts of actions in decisions, providing necessary data for decisions, informing the public, and soliciting public input in the decision process.

12.1.1 Summary of DOE National Environmental Policy Act Regulations

The DOE NEPA regulations (10 CFR Part 1021, National Environmental Policy Act Implementing Procedures) implement the NEPA and supplement those requirements contained in 40 CFR Parts 1500 through 1508. DOE Order 451.1B, *National Environmental Policy Act Compliance Program*, assigns responsibilities for NEPA compliance to specified DOE organizations and individuals. DOE regulations also add a requirement for mitigation action plans and supplement analyses (SAs) and delineate specific categorical exclusions (CXs) for DOE facility operations.

The DOE regulations describe the process for preparation of DOE NEPA documents. In general, an EIS is prepared for proposed actions where the impacts of the action are likely to be significant, and a ROD is issued to announce the DOE decision and the rationale behind that decision. An EA is prepared for proposed actions where the environmental impacts of the action are not likely to be significant. An EA is followed by a finding of no significant impact (FONSI) if, after analysis, the impacts are found to be insignificant. If the analyses in an EA identify potentially significant impacts, an EIS is then prepared. RODs and EISs may contain commitments to mitigate adverse environmental impacts, which are included in mitigation action plans. Progress toward mitigation is reported annually to ensure that mitigation actions are being implemented and are effective. Supplemental analyses (SAs) examine the conclusions reached in previously prepared NEPA documents in light of changed circumstances to determine whether the impacts of the proposed actions have changed significantly and warrant additional NEPA analysis (normally an EA or a supplement to an EIS). Categorical exclusions are classes of actions that the DOE has determined do not individually or collectively have the potential for significant environmental impacts.

On September 27, 2011, the DOE approved the first revisions to its NEPA regulations in a decade. The regulations became effective on November 14, 2011. The revisions were designed to focus NEPA resources on projects with the potential for significant environmental impact, to better align the regulations with DOE current activities and recent experiences, and to update the provisions with respect to current technologies and regulatory requirements. The revisions focused primarily on DOE CX provisions by establishing 20 new CXs, most of which include criteria (e.g., acreage, location, and height limitations) that limit the covered actions. These CXs address actions such as stormwater runoff control, alternative fuel vehicle fueling stations and electric vehicle charging stations, and small-scale renewable energy projects.

12.2 Status of Compliance with the Regulatory Requirements

Table 9 provides general information on the regulatory requirements of NEPA and how those requirements are implemented.

Table 9: Status of Compliance with the Regulatory Requirements of the *National Environmental Policy Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements (NEPA)	Pursuant to NEPA requirements, the DOE published the FEIS (DOE/EIS-0026) (DOE, 1980). The FEIS analyzed and compared the environmental impacts of various alternatives for demonstrating the safe disposal of TRU waste resulting from national defense activities. Based on the environmental analyses in the FEIS, the DOE published the *Record of Decision for the Final Environmental Impact Statement, Waste Isolation Pilot Plant* in 1981 to proceed with the phased development of the WIPP (DOE, 1981). A number of mitigation commitments were specified in the ROD. The DOE published a SEIS (DOE, 1990a), which addressed alterations in the composition of the waste inventory, the transportation of waste to the WIPP, conducting a test phase at the WIPP, and management of mixed waste (TRU waste with hazardous constituents). The DOE published a *Record of Decision for the Supplement Environmental Impact Statement, Waste Isolation Pilot Plant* resulting from the SEIS in 1990 (DOE, 1990c). In October 1993, the DOE decided not to conduct the test phase at the WIPP and moved toward the initiation of waste disposal operations. In September 1997, the DOE published the SEIS-II (DOE, 1997a). The SEIS-II evaluated the circumstances that had changed since 1990 and newer site data that might result in different potential environmental impacts from WIPP disposal and closure operations. In January 1998, the DOE issued the ROD resulting from the SEIS-II (DOE, 1998). The SEIS-II ROD was prepared in coordination with the DOE waste management programmatic EIS ROD for TRU waste. The SEIS-II ROD describes the DOE decision to dispose of TRU wastes generated by defense-related activities at the WIPP. This decision was based on the DOE analysis of alternatives described in the SEIS-II. The DOE issued the *Mitigation Action Plan for the Records of Decision for the Waste Isolation Pilot Plant* (DOE/WIPP-91-030) on July 10, 1991 (DOE, 1991). This document addresses the mitigative commitments stated in the RODs to the 1980 FEIS and the 1990 SEIS, and discusses mitigative actions, organizations responsible for implementing these actions, and the status of each commitment. No new mitigation commitments were identified in the ROD for the SEIS-II. The Annual Mitigation Report is issued to track the status of each commitment not yet completed. The Annual Mitigation Reports for 2014 and 2015 were submitted to DOE Headquarters (DOE, 2014f; DOE, 2015g).

Table 9: Status of Compliance with the Regulatory Requirements of the *National Environmental Policy Act*

Regulatory Requirement	WIPP Compliance
2. Status of Other NEPA Documentation Related to WIPP	In addition to the FEIS, SEIS, and SEIS-II, the DOE has published additional NEPA documentation related to WIPP operations and associated waste programs. These documents have included EAs and FONSIs, SAs, and revised RODs. To date, no FONSI has resulted in additional mitigation commitments, and no SA has resulted in the need to prepare additional NEPA analysis beyond a revision to an existing ROD. The DOE issued an SA in September 2010 for packaging and handling of RH-TRU waste in shielded containers (DOE, 2010a). This document examined the impact of the packaging and emplacement at the WIPP of a portion of the RH-TRU waste inventory using a new container design called the lead shielded container. Based on the SA, the DOE determined that a supplemental or new EIS is not required. In February 2011, DOE issued a draft EIS, DOE/EIS-0375-D (DOE, 2011a), for the disposal of greater-than-class C low-level radioactive waste that analyzed an alternative for the disposal of material in the WIPP vicinity; DOE has not issued the final EIS. In October 2013, the DOE issued the final Supplemental Environmental Impact Statement for the Long-Term Management and Storage of Elemental Mercury, DOE/EIS-0423-S1 (DOE, 2013b), which analyzed an alternative to store mercury in the WIPP vicinity; the DOE has not issued a ROD for this EIS. In March 2014, the DOE issued an SA, DOE/EIS-0026-SA-09 (DOE, 2014c), for a proposed action to temporarily store defense TRU waste prior to disposal at the WIPP. This document examined the impacts of the temporary storage of defense TRU wastes at the Waste Control Specialists facility in Andrews, Texas, prior to eventual disposal at the WIPP. Based on the SA, the DOE determined that a supplemental or new EIS is not required. As a result of the February 14, 2014, event, a NEPA regulatory analysis and recommendation was prepared for each of the three ventilation projects: • Interim Ventilation System (IVS) • Supplemental Ventilation System (SVS) • Permanent Ventilation System(PVS) The CBFO NEPA Compliance Officer agreed with the recommendation that the IVS was categorically excluded from preparation of further NEPA documentation and issued the categorical exclusion determination (DOE, 2014h). CBFO provided a verbal statement that the SVS was also categorically excluded and will document that decision when the SVS project nears its start date. The NEPA regulatory analysis and recommendation for the PVS was submitted to the CBFO by Regulatory Environmental Services, and the CBFO agreed that the impacts to human health and the environment from the construction and operation of the PVS (i.e., additional exhaust shaft, drifts, and containment filter building) was bounded by the impacts analyzed in WIPP's existing programmatic NEPA documentation. The CBFO directed that this decision be memorialized in a NEPA Supplement Analysis.

Table 9: Status of Compliance with the Regulatory Requirements of the *National Environmental Policy Act*

Regulatory Requirement	WIPP Compliance
3. Operational Compliance with NEPA at WIPP	Day-to-day operational compliance with the NEPA at the WIPP is achieved by the review of proposed work, facility changes, and programmatic changes in accordance with a site compliance procedure. The CBFO NEPA Compliance Officer is responsible for making a determination as to whether additional NEPA documentation is required prior to the decision to implement these proposals. If the action is outside the WIPP NEPA compliance envelope (i.e., the NEPA analysis that has already been prepared for the WIPP), the CBFO NEPA Compliance Officer may make a determination that the proposed action is a CX. If the action is not covered by WIPP programmatic NEPA documentation and is not a CX, the CBFO NEPA Compliance Officer submits a recommendation to the appropriate official as delineated by DOE Order 451.1B regarding the need to prepare a SA, EA, or EIS to address the proposed action and oversees designated activities. The DOE made the following CX determinations during this reporting period: • July 7, 2014: Removal and replacement of high efficiency particulate air filters and filter building maintenance (DOE, 2014j). • November 17, 2014: Installation of an Interim Ventilation System to support recovery activities at the WIPP (DOE, 2014h). • February 25, 2015: CY 2015 Removal and replacement of high efficiency air filters at the WIPP facility (DOE, 2015l).

13.0 ATOMIC ENERGY ACT AND PRICE ANDERSON ACT AMENDMENTS

13.1 Summary of the Law

The AEA established a national program for research, development, and use of atomic energy for national defense and civilian purposes. Section 161 of the AEA authorized the U.S. Atomic Energy Commission to establish rules, regulations, and orders to protect health and minimize hazards to life or property through standards and restrictions pertaining to the design, location, and operation of facilities.

The *Energy Reorganization Act of 1974* split the U.S. Atomic Energy Commission into two new agencies: the NRC to regulate the commercial nuclear power industry, and the Energy Research and Development Administration to manage the energy research and development, nuclear weapons, and naval reactors programs. In 1977, the Energy Research and Development Administration was combined with the Federal Energy Administration to form the DOE. The AEA and subsequent reorganization acts gave the DOE authority to develop policies, issue orders, and promulgate regulations that address environmental, safety, and health protection aspects of radioactive waste and nuclear materials. Limits on radioactivity levels in TRU waste for disposal at the WIPP are set in Section 7 of the LWA. The radioactive constituents of the TRU waste shipped to and disposed of at the WIPP are regulated under the AEA by the DOE. Regulation is accomplished through orders, notices, directives, and policies and the DOE regulations in the 10 CFR Part 830, Nuclear Safety Management and 10 CFR Part 835, Occupational Radiation Protection.

Congress amended the AEA of 1954 with the *Price-Anderson Act* (42 U.S.C. § 2210) in 1957. The purpose of the *Price-Anderson Act* is threefold: (1) to promote growth and development of

nuclear energy through increased private industry participation, (2) to protect the public, and (3) to ensure compensation should a nuclear event occur that damages and/or injures members of the public by providing funds for recovery operations. Congress passed the *Price-Anderson Amendments Act of 1988* (PAAA) (Pub. L. 100-408), to allow the DOE to impose civil and criminal penalties on its contractors, subcontractors, and employees for violating any nuclear safety rule or order issued by the Secretary of Energy.

13.2 Status of Compliance through DOE Orders

Table 10 provides information on the WIPP compliance status for each of the DOE orders that implement the AEA relative to the protection of public health and safety and the environment, and relevant to the management of TRU waste at the WIPP.

Table 10: Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance
1. DOE Order 151.1C, *Comprehensive Emergency Management System*	This order establishes requirements for emergency planning, categorization, classification, preparedness, response, notification, public protection, and readiness assurance activities. The applicable requirements of this order are implemented through the WIPP emergency management program, the emergency response program, the training program, the emergency readiness program, and the records management program. The corrective actions and related tasks to ensure compliance with DOE Order 151.1C are outlined in the DOE and NWP corrective action plans. As part of the corrective action plans, the WIPP Emergency Management Plan has been enhanced to make it compliant with DOE Order 151.1C. The revised WIPP Emergency Management Plan includes consistent response actions for NWP and the CBFO to respond to operational emergencies. This includes recognizing emergencies, categorizing, and (as necessary) classifying and providing appropriate response measures to protect workers, the public, and the environment. Training, exercises, and drills are used to enhance emergency response personnel capabilities and demonstrate proficiency.
2. DOE Order 225.1B, *Accident Investigations*	The objective of this order is to prescribe requirements for conducting investigations of certain accidents occurring at DOE operations and sites; prevent the recurrence of such accidents; and contribute to improved environmental protection and safety and health of DOE employees, contractors, and the public. This order is implemented through WP 15-MD3102, *Event Investigation* (NWPa), and WP 15-GM1001, *Root Cause Analysis* (NWPb). The AIB determined that root causes of the fire event and radiological event included the degradation of key safety management programs and safety culture. The AIB also identified four contributing causes related to the effectiveness of the Nuclear Safety Program. CBFO and NWP corrective action plans address the Judgments of Need related to the root and contributing causes. The DOE and the NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with DOE Order 225.1B. (DOE, 2015i; NWP, 2015). Issues identified in the Accident Investigation Reports for the fire (DOE, 2014d) and radiological release phase 1 (DOE, 2014p) and phase 2 (DOE, 2015h) have associated corrective actions that are in various stages of completion.

Table 10: Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance
3. DOE Order 231.1B Admin Change 1, *Environment, Safety and Health Reporting*	The objective of this order is to ensure collection and reporting of information on environment, safety, and health that is required by law or regulation, or that is essential for evaluating DOE operations and identifying opportunities for improvement needed for planning purposes within the DOE. The order specifies the reports that must be filed, the people or organizations responsible for filing the reports, the recipients of the reports, the format in which the reports must be prepared, and the schedule for filing the reports. The order is implemented at the WIPP through the environmental monitoring program, the hazardous and universal waste management program, the WIPP Permit reporting and notifications compliance program, the radiation safety program, the dosimetry program, the fire protection program, NWP standard operating procedures, recordkeeping and reporting of occupational injuries and illnesses, and preparation and publication of the Annual Site Environmental Report.
4. DOE Order 414.1D, Admin Change 1, *Quality Assurance*	This order provides DOE policy, sets forth principles, and assigns responsibilities for establishing, implementing, and maintaining programs, plans, and actions to ensure quality achievement in DOE programs. The requirements are met through implementation of the DOE (DOE/CBFO-94-1012, *Quality Assurance Program Document* [DOE, 2010b]) and NWP QAPs (WP 13-1, NWP QAPD [NWPc]).
5. DOE Order 420.1B, Change 1, *Facility Safety*	This order specifies requirements for nuclear safety, criticality safety, fire protection, and natural phenomena hazards mitigation. This order was replaced by DOE Order 420.1C.
6. DOE Order 420.1C, *Facility Safety*	This order specifies requirements for nuclear safety, criticality safety, fire protection, and natural phenomena hazards mitigation. Site emergency plans, fire hazards analyses, and the *Waste Isolation Pilot Plant Documented Safety Analysis* (DSA) (DOE/WIPP-07-3372) (DOE, 2016c) incorporate response capabilities established by the baseline needs assessment for the emergency response organization. The requirements are implemented through the *Waste Isolation Pilot Plant Fire Hazard Analysis for the Waste Isolation Pilot Plant* (WIPP-023) (DOE, 2013c); and the DSA (DOE/WIPP-07-3372). DOE Order 420.1B, Admin Change 1, was superseded by DOE Order 420.1C. The DOE and the NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with DOE Order 420.1C. (DOE, 2015i; NWP, 2015) This resulted in a an update of the DSA (DOE, 2016c) to comply with DOE-STD-3009 (DOE, 2014g) and address the DSA related issues identified in the Accident Investigation Reports for the fire (DOE, 2014d) and radiological release phase 1 (DOE, 2014p) and phase 2 (DOE, 2015h). In response to the underground salt haul truck fire, NWP revised the WIPP Fire Protection Program to be compliant with DOE Order 420.1C, Facility Safety; DOE STD-1066-2012, Fire Protection; 30 CFR Part 57, Safety and Health Underground Metal and Nonmetal Mines; and applicable National Fire Protection Association codes and standards. The revised WIPP Fire Protection Program is integrated with ventilation design and operations, and underground operations for recognizing, controlling, and mitigating underground fires; credible underground fire scenarios are analyzed and response actions are developed to comply with DOE Order 420.1C and MSHA 30 CFR Part 57 requirements; emergency notification systems and alarms are maintained to ensure prompt notification and evacuation during emergencies; and combustion loads are within the parameters of the NWP Fire Hazard Analysis. WIPP has a pending exemption request for DOE-STD-1066-2012.

Table 10: Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance
7. DOE Order 435.1, Change 1, *Radioactive Waste Management*	The objective of this order is to ensure that DOE radioactive waste is managed in a manner that is protective of workers, public health and safety, and the environment. In the event that a conflict exists between requirements of this order and the LWA regarding application to the WIPP, the requirements of the LWA prevail. The applicable portions of this order are implemented through NWP low-level and mixed low-level waste management procedures, waste handling procedures, and by engineering design of the WHB and equipment, and the underground panel and room configurations.
8. DOE Order 436.1 *Departmental Sustainability*	This order requires DOE sites establish a site sustainability plan that identifies commitments for contributing to meeting the DOE sustainability goals, integrate the site sustainability plan with operational plans, and develop and implement EMSs that are certified or conform to ISO 14001:2004 with site sustainability plan goals integrated into the EMS (ISO 14001:2004(E)). The WIPP Site Sustainability Plan (DOE, 2015d) defines how the WIPP contributes to the DOE sustainability goals. It addresses performance and planned actions related to energy, fuel and water use, sustainable buildings, data center and electronics management, pollution prevention, fleet management and sustainable acquisition. Site sustainability plan actions are integrated into operations through the *Waste Isolation Pilot Plant Ten-Year Site Plan FY 2014 – FY 2023* (DOE, 2013d) and the EMS environmental objectives and targets. The WIPP EMS maintained certification to the ISO 14001:2004 EMS standard during this reporting period.
9. DOE Order 451.1B, Admin Change 3, *National Environmental Policy Act Compliance Program*	This order is implemented by NWP through adherence to a site NEPA compliance plan and procedure, and a CBFO management procedure. Further discussion of this requirement is presented throughout this report. A NEPA regulatory analysis was performed and recommendation on whether additional NEPA documentation was provided for the Interim, Supplemental Ventilation on November 17, 2014. A NEPA evaluation was also performed for the Permanent Ventilation System on November 17, 2014. The regulatory analysis and a recommendation for the Interim Ventilation System have been transmitted to the CBFO NEPA Compliance Officer. A CX determination has been made for the Interim Ventilation System. This CX covered the Permanent Ventilation System.

Table 10: Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance
10. DOE Order 458.1, Change 3, *Radiation Protection of the Public and the Environment*	This order establishes standards and requirements for operations of the DOE and its contractors with respect to protecting members of the public and the environment against undue risk from radiation. Activities and analyses describing compliance with the applicable requirements of this order are cited in the DSA (DOE, 2016c). Directions regarding release of potentially radioactive materials are specified in WP 12-RE3003, *Radiological Release of Potentially Contaminated Materials, Waste, and Items* (NWPd). Monitoring activities to document compliance with the Order are implemented through the WIPP ALARA (as low as reasonably achievable) program, the environmental monitoring program, the records management program, the radiation safety program, and health physics and radiological engineering procedures. Since the 2014 radiological event, the WIPP underground continues to operate in filtration mode, which effectively removes respirable particulate from the effluent air stream. In addition, the DOE has taken the initiative to implement several improvements. The DOE prepared the "U.S. Department of Energy Plan For Addressing The Areas For Improvement Identified By The U.S. Environmental Protection Agency," that addresses the following areas for improvement: • Update the Ambient Environmental Monitoring Network – Improve the design, location, maintenance, and overall capability of its ambient environmental air monitoring network. – Increased number of ambient environment air sampling locations from 7 to 17. • Strengthen Emergency Response Protocols – Better integrate routine and incident procedures to enhance preparedness of multiple organization field and laboratory staff to respond to releases. • Ensure the Highest Quality Laboratory Results – Implement stricter sample collection, sample tracking and documentation procedures to provide the high quality, defensible data.
11. DOE Order 460.1C, *Packaging and Transportation Safety*	This order establishes requirements for the packaging and transportation of hazardous materials, hazardous substances, and hazardous wastes. The order also establishes administrative procedures for the certification and use of radioactive and other hazardous materials packaging by the DOE. Requirements for portions of this order are addressed in NWP transportation procedures and the following safety analysis reports (SARs), and Certificate of Compliance (C of C) revisions specific to this reporting period: • Transuranic Package Transporter Model II (TRUPACT-II) SAR (DOE, 2013e), and C of C No. 9218 (June 13, 2013) (NRC, 2013a) • Transuranic Package Transporter Model III (TRUPACT-III) SAR (DOE, 2013f), and C of C No. 9305 (October 8, 2013) (NRC, 2013b) • Half Package Transporter (HalfPACT) SAR (DOE, 2013g), and C of C No. 9279 (June 19, 2103) (NRC, 2013c) • RH-TRU 72-B Cask SAR (DOE, 2016), and C of C No. 9212 (June 17, 2011) (NRC, 2016) • 10-160B Type B Radwaste Shipping Cask SAR (Energy Solutions, 2013), and C of C 9204 (December 27, 2013) (NRC, 2013d) The requirements are implemented through the DOE transportation program.

Table 10: Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance
12. DOE Order 460.2A, *Departmental Materials Transportation and Packaging Management*	This order establishes DOE policies and requirements for materials transportation and packaging operations, including traffic management, for other than intrabuilding and intrasite transfers. The order is implemented through the NWP transportation program.

13.3 Nuclear Safety Management Regulations – 10 CFR Part 830 Series

The DOE regulations that contribute to implementing requirements of the AEA were published in the Federal Register on April 5, 1994, 10 CFR Part 830, Nuclear Safety Management. Table 11 provides compliance status information on nuclear safety management regulations.

Table 11: Status of Compliance with the Nuclear Safety Management Regulations of the *Atomic Energy Act*

Regulatory Requirement	WIPP Compliance
1. General Requirements, 10 CFR §830.4	*No person may take or cause to be taken any action inconsistent with the requirements of this part. The contractor responsible for a nuclear facility must ensure implementation and compliance with the requirements of this part. The requirements of this part must be implemented in a manner that provides reasonable assurance of adequate protection of workers, the public, and the environment from adverse consequences, taking into account the work to be performed and the associated hazards.* The NWP has implemented and is complying with the requirements of 10 CFR Part 830, Subpart A, Quality Assurance Requirements, through implementation of the NWP QAPD (NWPc). Compliance with 10 CFR Part 830, Subpart B, Safety Basis Requirements, is achieved through the DSA DOE/WIPP-07-3372 (DOE, 2016c) and DOE/WIPP 07-3373, *Waste Isolation Pilot Plant Technical Safety Requirements* (TSRs) (DOE, 2016d). The DOE and the NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with 10 CFR § 830.4 (DOE, 2015i; NWP, 2015). This resulted in an update of the DSA (DOE, 2016c) to comply with DOE-STD-3009 (DOE, 2014g) and address the DSA-related issues identified in the Accident Investigation Reports for the fire (DOE, 2014d) and radiological release phase 1 (DOE, 2014p) and phase 2 (DOE, 2015h).
2. Record Keeping, 10 CFR §830.6	*Complete and accurate records will be maintained as necessary to substantiate compliance with the requirements of this part.* NWP personnel maintain complete and accurate records to substantiate compliance with the requirements of this part. Record-keeping requirements are described in more detail in the NWP QAPD (NWPc).

Table 11: Status of Compliance with the Nuclear Safety Management Regulations of the *Atomic Energy Act*

Regulatory Requirement	WIPP Compliance
3. Graded Approach, 10 CFR § 830.7	*Where appropriate, a contractor must use a graded approach to implement the requirements of this part, document the basis of the graded approach used, and submit that documentation to the DOE.* Risk factors and the graded approach to quality assurance (QA) are addressed in the NWP QAPD. Assignment of a specific quality code to an item or activity is commensurate with the associated risk classification. The resulting levels of control provide effective program management and incorporate due regard for the health and safety of the public and plant personnel, complexity, consequences of failure, environmental impacts, and the safe and reliable operation of the WIPP and the TRU transport packaging program. Procedure WP 09-CN3005, *Graded Approach to Application of QA Controls*, (NWPe) is used to implement the graded approach to the application of the QA criteria described in 10 CFR § 830.122.
4. Quality Assurance Program, 10 CFR § 830.121(a) and Quality Assurance Criteria, 10 CFR § 830.122	*The contractor responsible for the DOE nuclear facility must conduct its work in accordance with the criteria described in 10 CFR § 830.122.* Quality-related work is conducted in accordance with the criteria specified in 10 CFR § 830.122 and as described in the NWP QAPD.
5. Quality Assurance Program (QAP), 10 CFR § 830.121(b) and 10 CFR § 830.121(c)	*The contractor shall develop a QAP and submit it to the DOE for approval. Changes made to the QAP shall be submitted annually to the DOE for review. The contractor shall conduct work in accordance with the QAP.* *The QAP must describe how the QA criteria of 10 CFR § 830.122 are satisfied; integrate the QA criteria with the Safety Management System, or describe how the QA criteria apply to the Safety Management System; use voluntary consensus standards in its development and implementation; and describe how the contractor ensures that subcontractors and suppliers satisfy the QA criteria.* The NWP has developed a QAP as described in the NWP QAPD (NWPc) using the criteria specified in 10 CFR § 830.122. The NWP QAPD describes how the criteria of 10 CFR § 830.122 are met and how they apply to the Safety Management System. Voluntary consensus standards, such as the NQA-1-1989 (*Nuclear Quality Assurance*) national standard, Quality Assurance Program Requirements for Nuclear Facilities (with Addenda) (American Society of Mechanical Engineers, 1989), and supplementary requirements used to develop and implement the NWP QAPD are referenced in Table I-1 of the NWP QAPD, QA Program Source Documents. Subcontractor/supplier controls are discussed in the NWP QAPD. The DOE approved the current NWP QAPD in December 2015. The NWP conducts work in accordance with the QAP, as described in the NWP QAPD and incorporated into implementing procedures that control work.

Table 11: Status of Compliance with the Nuclear Safety Management Regulations of the *Atomic Energy Act*

Regulatory Requirement	WIPP Compliance
6. Quality Assurance Criteria, 10 CFR § 830.122	*The QAP must address management program, personnel training and qualification, quality improvement, documents, and records criteria. The QAP also must address performance (i.e., work processes, design, procurement, inspection, and acceptance testing) and assessment (i.e., management assessment and independent assessment criteria).* The NWP developed and implemented the NWP QAPD (NWPc) to address the QA criteria of 10 CFR § 830.122. The management program, organizational structure, functional responsibilities and authorities, interfaces, and planning considerations are described in the NWP QAPD. Personnel training and qualifications are described in the NWP QAPD. The NWP QAPD provides for quality improvement and includes a description of the requirements and responsibilities for ensuring that appropriate methods are used to enhance quality, detect and prevent quality problems, and take corrective actions when "conditions adverse to quality" have been detected. Requirements pertaining to documents and records are described in the Management and Operating Contractor (MOC) QAPD. The MOC QAPD addresses preparation, review, and approval of documents, and generation, classification, indexing, receipt, storage, preservation, disposition, retrieval, and correction of information in quality records. The Performance Quality Assurance Requirements section of the MOC QAPD addresses general performance QA requirements. Work processes include work activities; implementing procedures; item identification and control; special processes; handling, storage, and shipping; and status indicators. The Design Control section addresses design control requirements such as design input, process, analyses, interfaces, verification, and change. The Procurement section describes requirements pertaining to procurement planning, documents, evaluation of supplier performance, and commercial grade items. The Inspection and Testing section defines requirements and responsibilities for the inspection of items or activities affecting quality to verify conformance to specified criteria. The Monitoring, Measuring, Testing, and Data Collection Equipment section describes requirements and responsibilities for the control of measuring and test equipment. The Assessment Requirements section comprises two subsections: Management Assessment and Independent Assessment. The Management Assessment section describes processes to identify, correct, and track problems that impede achievement of organizational goals and objectives. The Independent Assessment section describes planning and conducting assessments to evaluate compliance with applicable QA requirements and implementing procedures, and evaluating the overall effectiveness of the quality program. The Sample Control and Quality Assurance Requirements section deals with sample control and identification; handling, storing, and shipping samples; disposition of nonconforming samples; environmental data operation samples; and documentation, control, and validation. The NWP QAPD also addresses software QA requirements.
7. Safety Basis, 10 CFR § 830.202(a)	*The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must establish and maintain the safety basis for the facility.* The NWP has implemented the requirements of 10 CFR § 830.202(a) through the DSA (DOE, 2016c) and TSRs (DOE, 2016d).

Table 11: Status of Compliance with the Nuclear Safety Management Regulations of the *Atomic Energy Act*

Regulatory Requirement	WIPP Compliance
8. Unreviewed Safety Question Process, 10 CFR § 830.203(a)	*The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must establish, implement, and take actions consistent with an unreviewed safety question (USQ) process that meets the requirements of this section.* DOE G 424.1-1B, Admin Change 1, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*, provides information to assist in the implementation and interpretation of 10 CFR § 830.203. The NWP has implemented the requirements of 10 CFR § 830.203 through implementation of NWP Unreviewed Safety Question procedure WP 02-AR3001, Unreviewed Safety Question Determination (NWPf).
9. Documented Safety Analysis, 10 CFR § 830.204(a)	*The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must obtain approval from the DOE for the methodology used to prepare the DSA for the facility unless the contractor uses a methodology set forth in Table 2 of Appendix A to this part.* DOE-STD-3009, Preparation Guide for U.S. DOE Non-Reactor Nuclear Facility Safety Analysis Reports (DOE, 2014g), is the approved methodology set forth in 10 CFR § 830.204[a] to meet 10 CFR Part 830, Subpart B. The NWP has implemented the requirements of 10 CFR § 830.204 by using DOE-STD-3009 to develop the DSA (DOE, 2016c). Supplemental guidance specific to TRU waste processing facilities, given in DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities* (DOE, 2007), was also used to develop the DSA. The substantial DSA update specifically affected ground control activities and the Waste Acceptance Criteria (WAC) for WIPP-acceptable waste. The WIPP WAC updates include two new appendices and new key attributes from Chapter 18 of the DSA.
10. Technical Safety Requirements, 10 CFR § 830.205(a)	*The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must (1) develop TSRs that are derived from the DSA …* DOE G 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements*, establishes the content of TSRs. The NWP complies with the requirements of 10 CFR § 830.205 by using DOE G 423.1-1B to prepare the TSRs. The NWP also uses DOE-STD-1186-2004, *Specific Administrative Controls* (DOE, 2004b), to prepare the TSRs (DOE, 2016d).

13.4 Nuclear Safety Noncompliance and the *Price-Anderson Amendments Act of 1988*

Table 12 provides information on Nuclear Safety Noncompliance and the PAAA.

Table 12: Status of Compliance with the Nuclear Safety Noncompliance and the *Price-Anderson Amendments Act*

Regulatory Requirement	WIPP Compliance
1. Nuclear Safety Noncompliance and the PAAA of 1988	*… DOE may either reduce or not impose the base civil penalty of up to $150,000 per violation per day, if the MOC promptly identifies the violation and reports it to the DOE. Conversely, the DOE will not mitigate the base civil penalty if the MOC does not promptly identify and report nuclear safety violations.* The NWP has voluntarily implemented a WIPP PAAA program to identify and self-report potential PAAA and worker safety and health noncompliance events. Procedures are in place at the WIPP to assist personnel in determining and reporting noncompliance issues. The program uses the DOE Price-Anderson Noncompliance Tracking System, a centralized data base, to report and track reportable PAAA nuclear safety noncompliance events. For the reporting period, the NWP has been cited with one PNOV from the DOE Office of Enforcement (HSS-40) which cites four Severity Level I violations and seven Severity Level II violations. Preliminary violations consisted of (1) the development and implementation of written plans and assessments, (2) fire prevention and preventive maintenance, (3) the emergency response program, (4) recordkeeping, (5) information requirements, (6) quality improvement, (7) work processes associated with the event response, (8) radiation protection design and associated work processes, (9) program establishment and administration, (10) training, and (11) work processes associated with waste characterization and acceptance. No civil penalties for worker safety and health violations were cited in the PNOV (DOE, 2016e). The PNOV after 30 days became an NOV.
2. Worker Safety & Health Program, 10 CFR Part 851	*851.5 Enforcement.* *(a) A contractor that is indemnified under Section 170d of the AEA (or any subcontractor or supplier thereto) and that violates (or whose employee violates) any requirement of this part shall be subject to a civil penalty of up to $75,000 for each such violation.* The WIPP PAAA program is used to identify and self-report potential worker safety and health noncompliance events per 10 CFR Part 851. The program uses the Price-Anderson Noncompliance Tracking System, a centralized database, to report and track PAAA worker safety and health noncompliance events. For the reporting period, the NWP has been cited with one PNOV from the DOE Office of Enforcement (HSS-40) for worker safety and health noncompliance events as described in Item 1 of this table.

14.0 ATOMIC ENERGY ACT AND THE U.S. NUCLEAR REGULATORY COMMISSION

14.1 Summary of the Law

As previously discussed, the AEA gives the NRC authority to develop policies, issue orders, and promulgate regulations that address environmental, safety, and health protection aspects of radioactive waste and nuclear materials in the civilian sector. Regulations promulgated by the NRC under the AEA appear in 10 CFR Part 1 to Part 199 and establish standards for the management of nuclear material and the protection of the public against radiation. Additional NRC regulations apply to the licensing of nuclear power plants and packaging, transportation, and geological disposal of radioactive materials.

14.2 Status of Compliance with the Regulatory Requirements

The WIPP was authorized by Section 213 of the Department of Energy National Security and Military Applications of the *Nuclear Energy Authorization Act of 1980* (Pub. L. 96-164; 93 Stat. 1259, 1265) to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities. The Act exempted waste managed at the WIPP from NRC regulation. The 1992 LWA required the DOE to use NRC-certified transportation packages for the transportation of TRU waste to the WIPP. The NRC regulations that apply to the WIPP transportation system are stated in 10 CFR Part 71, Packaging and Transportation of Radioactive Material, and are limited to those parts applicable to design certification and fabrication QA. Compliance with the regulations and applicable parts is demonstrated by the NRC approval of the packaging applications with C of C.

The NRC approved the packagings for transporting CH-TRU waste to the WIPP, which are the TRUPACT-II (C of C No. 9218, issued June 20, 2014) (NRC, 2014), the TRUPACT-III (C of C No. 9305, issued July 21, 2015) (NRC, 2015a), and the HalfPACT (C of C No. 9279, issued November 4, 2015) (NRC, 2015b). The NRC also approved packagings for transporting RH-TRU waste to WIPP, which are the RH-TRU 72-B cask (C of C No. 9212, issued March 2, 2016) (NRC, 2016), and the 10-160B cask (C of C No. 9204, issued August 14, 2015) (NRC, 2015c). For purposes of this section, the term "packaging" implies the TRUPACT-II, the HalfPACT, the TRUPACT-III, the RH-TRU 72-B cask, and the 10-160B cask. Table 13 provides compliance information for the regulatory requirements.

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
1. General License, 10 CFR § 71.17	*A general license is issued to any licensee of the Commission to transport, or deliver to a carrier to transport, licensed material in a package for which a license, C of C, or other approval has been issued by the NRC.* The DOE is not required to be a licensee. In addition, the DOE does not ship NRC-licensed Material in Type B Packages to the WIPP.

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
2. Exemption from Classification as Fissile Material, 10 CFR § 71.15	*Fissile material meeting the requirements of at least one of the paragraphs (a) through (f) of this section are exempt from classification as fissile material and from the fissile material package standards of §§ 71.55 and 71.59, but are subject to other requirements of this part, except as noted.* The application for the 10-160B and RH-TRU 72-B casks specifies that the contents are optionally controlled to limit the amount of fissile material that may be shipped to exempted quantities. The NRC reissuance of the C of C during this BECR reporting period confirms that the packaging continues to meet the applicable requirements of 10 CFR § 71.15.
3. Application for Package Removal, Subpart D, 10 CFR §§ 71.31 through 71.39	*The required contents of an application are described in this section. The application must include a package description/evaluation and description of the packaging and proposed contents as described in 10 CFR § 71.33 and must demonstrate that the package meets the appropriate NRC standards. In addition, the QA program for the design, fabrication, assembly, testing, maintenance, repair, modification, and use of the package must be described, along with established codes and standards. Additional information requested by the NRC must be provided.* The applications for the packaging describe the design, specifications, and safety evaluation in accordance with the NRC requirements. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
4. Demonstration of Compliance, 10 CFR § 71.41	*The tests specified in 10 CFR §§ 71.71 and 71.73 must be performed on the package to demonstrate compliance under normal conditions and hypothetical accident conditions, respectively.* The applications describe the analysis and testing to demonstrate compliance with both normal and hypothetical accident conditions of transport. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
5. General Standards for All Packages, 10 CFR § 71.43 and Lifting and Tie-Down Standards for All Packages, 10 CFR § 71.45	*Standards for all packages must be met. These include general standards such as size, seals and fastening devices, materials and construction of the package, valves, temperature, and prohibition of continuous venting during transport as well as lifting and tiedown standards.* The applications describe the packaging features, including tiedowns. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
6. External Radiation Standards for All Packages, 10 CFR § 71.47	*A package must be designed and prepared for shipment so that the radiation level at any external contact surface of the package does not exceed 200 mrem per hour and the transport index does not exceed 10.* The applications discuss the fact that the packagings and contents limit the dose rate at the contact surface of the packaging to less than 200 mrem per hour. The applications clarify that shipments are made under exclusive-use requirements such that the applicable dose rate requirements are under 200 mrem per hour at any point on the outer surface of the vehicle and 10 mrem per hour at 2 meters from the outer lateral surface of the vehicle (i.e., compliance is with 10 CFR § 71.47(b) instead of 10 CFR § 71.47(a)).
7. Additional Requirements for Type B Packages, 10 CFR § 71.51	*Type B packages must be designed, constructed, and prepared for shipment so as to prevent loss or dispersal of radioactive material, and so that no significant increase in external radiation levels and no substantial reduction in the effectiveness of the packaging occurs during normal transport. In addition, release of krypton-85 may not exceed 10,000 curies in one week, release of other radioactive material may not exceed a total amount A_2 in one week, and no external radiation dose rate may exceed 1 rem per hour at 1 meter from the external surface of the package during hypothetical accident conditions. Compliance with these requirements must not be predicated upon the use of filters or of a mechanical cooling system.* The applications discuss containment design and acceptance criteria. The NRC reissuance of the C of Cs confirms that the packaging continues to meet the applicable requirements of 10 CFR § 71.51.
8. General Requirements for All Fissile Material Packages, 10 CFR §§ 71.55 through 71.59	*All packages used to ship fissile material must be designed and constructed in accordance with 10 CFR §§ 71.41 through 71.47 and 71.51. In addition, each package must be designed and constructed and its contents so limited that the contents will remain subcritical during normal and accident transportation conditions and that the packaging will remain effective during normal transportation conditions. Specific standards for fissile material packages are described in 10 CFR § 71.59.* The applications for the TRUPACT-II, the HalfPACT, the TRUPACT-III, the RH-TRU 72-B cask, and the 10-160B cask discuss criticality; the contents are controlled to limit the amount of fissile material that may be shipped. Fissile classes have been replaced with a Criticality Transport Index. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
9. Special Requirements for Type B Packages Containing More Than 10^5A_2, 10 CFR § 71.61	*A Type B package containing more than 10^5A_2 must be designed so that its undamaged containment system can withstand an external water pressure of 2 MPa (290 psi) for a period of not less than 1 hour without collapse, buckling, or in-leakage of water.* The application for the RH-TRU 72-B cask describes the tests performed to demonstrate compliance with this requirement. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements. The TRUPACT-II, TRUPACT-III, HalfPACT, and the 10-160B are limited to less than 10^5A_2.

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
10. Special Requirements for Plutonium Shipments, 10 CFR § 71.63	*Shipments containing plutonium must be made with the contents in solid form if the contents contain greater than 0.74 TBq [terabecquerel] (20 Ci [curies]) of plutonium.* The applications for the TRUPACT-II, the HalfPACT, the TRUPACT-III, the RH-TRU 72-B cask, and the 10-160B cask describe the allowable plutonium contents of the packaging. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
11. Normal Conditions of Transport, 10 CFR § 71.71	*The behavior of each package design under tests and conditions simulating normal transportation conditions must be evaluated. The tests include thermal insulation for both heated and cold conditions, increased and reduced external pressure, vibration, water spray, free drop, corner drop, compressive loading, and penetration.* The applications describe the analyses and/or tests performed to demonstrate compliance with the normal conditions of transport. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
12. Hypothetical Accident Conditions, 10 CFR § 71.73	*Evaluation of a package for hypothetical accident conditions is based upon the sequential application of tests in the order specified to determine their cumulative effect on a package or array of packages. Tests include free drop, crush, puncture, thermal, and immersion as specified in 10 CFR § 71.73.* The applications describe the analyses and/or tests performed to demonstrate compliance with the hypothetical accident conditions of transport. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
13. Assumptions as to Unknown Properties, 10 CFR § 71.83	*When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other relevant property of fissile material in any package is not known, the fissile material will be packaged as if the unknown properties have credible values that will cause the maximum neutron multiplication.* The applications limit the amount of fissile material that may be shipped in the packagings. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
14. Opening Instructions, 10 CFR § 71.89	*Any special opening instructions must be sent or otherwise made available to the consignee prior to delivery of a package.* The applications provide operating and maintenance instructions for preparation, use, operation, inspection, and maintenance of the packagings. DOE personnel have the responsibility for training personnel at the generator sites in accordance with the application and implementing operations and maintenance manual. DOE personnel perform assessments and audits of the generator sites to ensure that WIPP-generated methods are being applied correctly. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements.
15. Reports, 10 CFR § 71.95	*Within 60 days, the licensee will report the following to the NRC: (1) any instance in which there was significant reduction in the effectiveness of any authorized packaging during use; (2) details of any defects with safety significance in packaging after first use and the means used to prevent recurrence; and (3) instances in which the COAs in the C of C were not observed in making a shipment.*

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
	The packaging maintenance program is defined and detailed in DOE procedures that address such topics as control of material, spare parts, and nonconformance reports. Maintenance records are maintained by the packaging maintenance engineers. No conditions causing decreased effectiveness have occurred to date. In accordance with the requirements of 10 CFR Part 71, Subpart H, the triennial surveillance assessment was conducted in 2015 and identified no areas of concern (AOCs) in the program. The following three 10 CFR 71.95(c) notifications were made to the NRC: • T.E. Sellmer to H. Akhavannik, dated August 8, 2014; CP:14:01202. Concerned 255 shipments from Los Alamos National Laboratory (LANL) to WIPP where the requirements of Section 4.3.2 of the *Contact Handled Transuranic Waste Authorized Methods for Payload Control* (TRAMPAC) were not adhered to (DOE, 2013a). Shipments from LANL and to the WIPP have been suspended until investigations and resulting corrective actions have been implemented and completed. • T.E. Sellmer to H. Akhavannik, dated October 1, 2014; CP:14:01232. Concerned 129 shipments from LANL to WIPP where the requirements of Section 6 (chemical compatibility) of the certificate were not adhered to. Shipments from LANL and to the WIPP have been suspended until investigations and resulting corrective actions have been implemented and completed. • T.E. Sellmer to H. Akhavannik, dated June 11, 2015; CP:15:01113. Concerned 8 shipments. 6 shipments from LANL to WIPP and 2 shipments from Los Alamos National Laboratory to Waste Control Specialists in Andrews, TX, from October 2, 2012, through April 23, 2014, where the requirements of Section 7 (shipping category assignment and incorrect TRUCON code assignment) of the certificate were not adhered to. Shipments from LANL and to the WIPP have been suspended until investigations and resulting corrective actions have been implemented and completed.
16. Advance Notification of Shipment of Irradiated Reactor Fuel and Nuclear Waste, 10 CFR § 71.97	*As specified in paragraphs (b), (c), and (d) of this section, each licensee shall provide advance notification to the governor of a State, or the governor's designee, of the shipment of licensed material, through, or across the boundary of the State, before the transport, or delivery to a carrier, for transport, of licensed material outside the confines of the licensee's plant or other place of use or storage.* The advance notification of shipments of nuclear waste as stated in 10 CFR § 71.97 does not apply to the WIPP. However, in cooperation and agreement with state organizations (e.g., Western Governors' Association), the DOE has agreed to provide written notification of the first five shipments in a corridor 14 days in advance. Further, the DOE will provide the states with an annual notification, including six-month updates, of the shipments planned for the coming year. The states receive the eight-week rolling schedule on a weekly basis. The eight-week rolling schedule provides the detail of the annual plan. State officials designated for receipt of information (or their designees) are provided access to the DOE Transportation Tracking and Communication System (TRANSCOM). Through TRANSCOM, the states can view the eight-week rolling schedule, detailed shipment information (operational status of the shipment, the location of the shipment, messages associated with the shipment) and shipment-specific emergency response and contact information.
17. Quality Assurance	*Subpart H of 10 CFR Part 71 (§§ 71.101 through 71.137)*

Table 13: Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
Requirements, 10 CFR §§ 71.101 through 71.137	*established the NRC QA requirements for packagings. The QA requirements pertain to design, purchase, fabrication, handling, shipping, storage, cleaning, assembly, inspections, testing, operation, maintenance, repair, and modification of components of packaging that are important for safety. The requirements address the licensee's QA organization (§ 71.103); QA program (§ 71.105); package design control (§71.107); procurement document control (§ 71.109); instructions, procedures, and drawings (§ 71.111); document control (§ 71.113); control of purchased material, equipment, and services (§ 71.115); identification and control of materials, parts, and components (§ 71.117); control of special processes (§ 71.119); internal inspections (§ 71.121); test control (§ 71.123); control of measuring and test equipment (§ 71.125); handling, storage, and shipping control (§ 71.127); inspection, test, and operating status (§ 71.129); nonconforming materials, parts, or components (§ 71.131); corrective action (§ 71.133); QA records (§ 71.135); and audits (§ 71.137).* The DOE is not required to be a licensee. The DOE does not transport NRC-licensed materials. Because the DOE is a federal entity, the NRC does not require the DOE to have an "NRC-approved program." The NRC expects the DOE to perform required oversight of the program. The WIPP Quality Assurance Program Plan for Type "B" Packaging (WP 08-PT.03) addresses the 18 criteria specified in Annex 2 of NRC Regulatory Guide 7.10, promulgated by the Office of Nuclear Regulatory Research (NWPg). The title of this guidance document is Establishing Quality Assurance Programs for Packaging Used in the Transport of Radioactive Material (NRC, 2005). The WIPP Quality Assurance Program Plan for Type “B” Packaging is reviewed and approved by the DOE; therefore, NRC approval is not required.

14.3 Status of Compliance with the Certificate of Compliance

The NRC has issued C of Cs to the DOE for the TRUPACT-II, HalfPACT, and RH-TRU 72B packages, and is a registered user for the TRUPACT-III and 10-160B by the NRC. Packages are designed, fabricated, assembled, tested, procured, used, maintained, and repaired in accordance with the C of Cs. Table 14 provides compliance information for the regulatory requirements.

Table 14: Status of Compliance with the Certificate of Compliance of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
1. Allowable Decay Heat, C of C, Page 3, 5(b)(2)	*Decay heat per payload must not exceed the values given in the TRAMPACs of the TRUPACT-II SAR, the TRUPACT-III SAR, the HalfPACT SAR, the RH-TRU 72-B Cask SAR, and the Consolidated 10-160B Cask SAR. (Note: The Transuranic WAC for WIPP indicates that the 10-160B does not require the preparation of a site-specific TRAMPAC.)* The decay heat within each payload container plus the measurement error shall be less than or equal to the decay heat limit specified in the packaging SARs.

Table 14: Status of Compliance with the Certificate of Compliance of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance
	The total decay heat from all containers in a TRUPACT-II shall not exceed 40 watts. The total decay heat from all containers in a HalfPACT shall not exceed 30 watts. The total decay heat from the payload container within the TRUPACT-III shall not exceed 80 watts. The total decay heat from the containers in a RH-TRU 72-B cask shall not exceed 50 watts for the neutron shielding canister, 90 watts for each RH-TRU waste canister and up to 270 watts for payloads greater than 12 pounds per cubic foot based on payload density. The total decay heat from all containers in a 10-160B cask shall not exceed 200 watts. The C of C identified the TRUPACT-II, the HalfPACT, the TRUPACT-III, and the RH-TRU 72-B cask as fissile material packagings, and the 10-160B as a fissile-exempt packaging with an option to ship as a fissile material package. Therefore, the requirements specified in 10 CFR § 71.59 and 10 CFR § 71.15, respectively, must be met. The available methods for determining and controlling the physical form of the wastes are visual examination, radiography, and acceptable knowledge. The chemical properties of the waste are determined by the allowable chemical constituents within a given waste type and are restricted so that the payload containers are safe for handling and transport. Chemical compatibility within and between the waste and the packaging ensures that no chemical process will occur that might pose a threat to the safe transport of the payload in the packagings. The configuration of the payload container and content is controlled as described in the TRAMPAC for each of the Type B packages. The CH-TRAMPAC, Section 2.5 describes filter vent requirements for the authorized containers for the TRUPACT-II and HalfPACT packages (DOE, 2012k). The TRUPACT-III TRAMPAC, Section 2.4 describes the filter vent requirements for the authorized container for the TRUPACT-III (DOE, 2012e). The RH-TRAMPAC, Section 2.4 describes filter vents for the authorized containers for the RH-TRU 72-B (DOE, 2016g). The CH-TRAMPAC, Section 5.3 describes venting and aspiration requirements for the TRUPACT-II and HalfPACT. The TRUPACT-III TRAMPAC, Section 5.3 describes the venting and aspiration requirements for the TRUPACT-III. The RH-TRAMPAC, Section 5.2 describes venting and aspiration requirements for the RH-TRU 72-B waste containers. Appendix 4.10.2 of the Consolidated 10-160B Cask SAR describes the venting and aspiration requirements for the 10-160B (Energy Solutions, 2013). The isotopic inventory for each payload container and the fissile content are discussed in Section 3 of the CH-TRAMPAC for the TRUPACT-II and HalfPACT, Section 3 of the TRUPACT-III TRAMPAC for the TRUPACT-III, Section 3 of the RH-TRAMPAC for the RH-TRU 72-B, and Appendix 4.10.2 of the Consolidated 10-160B Cask SAR for the 10-160B. Decay heat is discussed in Section 5 of the CH-TRAMPAC for the TRUPACT-II and HalfPACT, Section 5 of the TRUPACT-III TRAMPAC for the TRUPACT-III, Section 5 of the RH-TRAMPAC for the RH-TRU 72-B, and Appendix 4.10.2 of the Consolidated 10-160B Cask SAR for the 10-160B. The TRAMPACs and SARs discuss the payload shipping categories. The primary difference among the categories is their potential for gas generation and internal bagging configuration. For waste with an adequate margin of safety, an analytical prediction suffices. Wastes without such a margin of safety require testing, as described in the TRAMPACs and SARs.

15.0 HAZARDOUS MATERIALS TRANSPORTATION ACT

15.1 Summary of the Law

The *Hazardous Materials Transportation Act* (HMTA), as amended, is the primary transportation-related statute that affects the DOE. The objective of the HMTA is "to improve the regulatory and enforcement authority of the Secretary of Transportation to protect the nation adequately against risks to life and property which are inherent in the transportation of hazardous materials in commerce." The HMTA provides for safe intrastate and interstate transportation of hazardous materials (including nuclear materials).

The federal *Transportation of Hazardous Material* law (49 U.S.C. § 5101, et seq.) was reauthorized on October 31, 1994. This public law, which amends the HMTA, required the DOT to set standards for designating routes for the transportation of hazardous materials that are required to be placarded, establish regulations on training standards for hazardous materials transportation workers, issue safety permits to motor carriers for certain hazardous materials, and perform a railroad transportation safety study for certain highly radioactive materials. The DOT is also required to participate in international forums dealing with recommendations or legislation relating to mandatory standards and requirements pertaining to the transportation of hazardous materials, and to consult with interested agencies to facilitate consistency in international law with respect to hazardous materials transportation. In addition, the *Hazardous Materials Transportation Uniform Safety Act of 1990* (Pub. L. 101-615) requires registration and an annual registration fee for shippers and carriers of certain hazardous materials, such as radioactive materials, and establishes planning and training grants to the states for developing, improving, and implementing emergency plans.

Title 49 CFR Part 171, General Information, Regulations, and Definitions, sets forth the DOT requirements that are applicable to the transportation of hazardous materials and the packaging used in the transportation of those materials.

Title 49 CFR Part 172, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications Emergency Response Information, Training Requirements and Security Plans, lists and classifies the materials the DOT has designated as hazardous for the purpose of transportation, describes the communications requirements that apply when those materials are shipped, and details training requirements for those involved in the transportation of hazardous materials and the circumstances requiring written security plans for those entities handling certain high hazard materials in transportation.

In 49 CFR Part 173, Shippers - General Requirements for Shipments and Packagings, the DOT defines hazard classes for the purpose of transportation; establishes requirements in preparing materials for shipment; sets forth inspection, testing, and retesting responsibilities concerning containers built, repaired, or conditioned for use in the transportation of hazardous materials; sets forth requirements for transporting radioactive materials; classifies materials having more than one hazard; and describes criteria for testing certain hazardous materials and packaging for shipment.

In 49 CFR Part 175, Carriage by Aircraft, the DOT prescribes additional requirements to those in 49 CFR Parts 171, 172, and 173 concerning the transportation of hazardous material by air. Title 49 CFR Part 171, Subpart C, is the interface between the DOT, the International Air Transport Association, and the International Civil Aviation Organization. This allows air

shipments to be made under International Air Transport Association/ International Civil Aviation Organization regulations that are not in conflict with DOT regulations.

In 49 CFR Part 177, Carriage by Public Highway, the DOT sets forth additional requirements to promote the uniform enforcement of law to minimize danger to life and property in the transportation of hazardous materials by public highway. This section describes additional requirements for certain hazard classes, including radioactive materials, and proper separation and segregation of hazardous materials while in transportation.

Title 49 CFR Part 178, Specifications for Packagings, describes manufacturing and testing specifications for packaging and containers used for the transportation of hazardous materials.

15.2 Status of Compliance with the Regulatory Requirements

During this reporting period, materials that were sent off-site were appropriately packaged and complied with the regulations for off-site transportation. Table 15 provides WIPP compliance with regulatory requirements under the HMTA.

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
1. General Requirements, 49 CFR § 171.2	*Hazardous material to be shipped must be properly classed, described, packaged, marked, labeled, and in condition for shipment.* General requirements for the shipment of hazardous material are addressed in NWP programs, and implementing procedures, which identify the organizations and positions responsible for ensuring compliance with the HMTA. The NWP general programmatic transportation document is WP 08-NT.12, *NWP Transportation Program* (NWPh).The completion of several worksheets (e.g., Shipping Request, Shipment Worksheet for Ground Transportation, and Shipment Worksheet for Air Transportation) ensures compliance through careful documentation of required actions.
2. Hazardous Waste, 49 CFR § 171.3	*Requirements for the shipment of hazardous wastes include the preparation of manifests or other shipping papers, motor vehicle placarding, waste packaging, marking and labeling, and identification numbers for the generators and the transporters.* Manifesting, marking, labeling, placarding, and other requirements are addressed in the NWP transportation procedures. Completion of step-by-step worksheets and checklists ensure the compliant execution of these tasks in shipping hazardous wastes from the WIPP to an off-site TSDF.

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
3. Immediate Notice of Certain Hazardous Materials Incidents and Detailed Hazardous Materials Incident Reports, 49 CFR §§ 171.15 through 171.16	*Section 171.15 specifies the requirements of immediate notification by each entity in physical possession of hazardous materials (including hazardous wastes) that are involved in a hazardous material incident during the course of transportation (including loading, unloading, and temporary storage). Section 171.16 specifies the requirements for the submission of a written hazardous materials incident report by the entity in physical possession of a hazardous material when an incident occurs.* Requirements for transportation emergency notifications are specified in the NWP transportation program. This program and NWP procedures address reportable incident and reporting requirements, including the identification of organizations and other entities that receive reports. The transportation program specifies that the NWP will request a copy of the report submitted by the carrier to the DOT. No hazardous material incidents as defined in these regulations occurred during this reporting period.
4. Table of Hazardous Materials and Special Provisions, Subpart B, 49 CFR § 172.101 and § 172.102	*The Hazardous Materials Table designates materials listed as hazardous for the purpose of transporting those materials. Special Provisions contain packaging provisions, prohibitions, exceptions from requirements for particular quantities or forms of materials and requirements or prohibitions applicable to specific modes of transportation.* These requirements are covered in the NWP transportation program and apply to any "… material, including its mixtures and solutions that … is listed in Table 172.101 and/or in Appendix A to 49 CFR § 172.101, 'List of Hazardous Substances and Reportable Quantities.'" Transportation engineers (TEs) are trained in the use of this table as specified in NWP procedures.
5. Shipping Papers, Subpart C, 49 CFR §§ 172.200 through 172.205	*This subpart describes the requirements for the provision of shipping papers by persons who offer hazardous material for transportation. The shipping papers must include a description of the hazardous material and a shipper's certification. A "bill of lading" or "hazardous waste manifest" may be used depending on the commodity being shipped. Hazardous waste manifests must be retained for three years.* Requirements concerning shipping papers, including manifests for hazardous waste and bills of lading for hazardous materials, are described in NWP procedures. Each required record is identified and defined by forms attached to these procedures. Shipping papers are managed in accordance with NWP procedures and are retained on-site for three years.
6. Marking, Subpart D, 49 CFR §§ 172.300 through 172.338	*Marking requirements for the transportation of hazardous materials or substances are described in this subpart.* According to NWP procedures for shipments originating at the WIPP, the TE marks the shipment in accordance with Subpart D of 49 CFR Part 172.
7. Labeling, Subpart E, 49 CFR §§ 172.400 through 172.450	*This subpart describes the requirements for the labeling of packages or containment devices by persons who offer hazardous material for transport.* According to NWP procedure, the TE labels the containers and packages in accordance with Subpart E of 49 CFR Part 172.

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
8. Placarding, Subpart F, 49 CFR §§ 172.500 through 172.560	*This subpart describes the requirements for the placarding of hazardous material by persons who offer hazardous material for transport.* According to NWP procedure, the TE ensures that the vehicle that will transport hazardous materials or waste from the WIPP is properly placarded, if necessary.
9. Emergency Response Information, Subpart G, 49 CFR §§ 172.600 through 172.606	*This subpart describes the requirements for the provision of emergency response information during transportation and at facilities where hazardous materials are loaded for transportation, stored incidental to transportation, or otherwise handled during any phase of transportation.* According to NWP procedures, the TE delivers the shipping papers and the DOT Emergency Response Guides for the particular shipment materials to the driver and releases the shipment. These documents specify driver actions to be taken in the event of an incident during transportation. The TE provides the Central Monitoring Room (CMR) with copies of transportation documentation. The CMR is the 24-hour emergency contact for shipments of hazardous waste or materials. The NWP addresses on-site emergency response in its procedures and waste management plans.
10. Training Subpart H, 49 CFR §§ 172.700 through 172.704	*Prescribes minimal training requirements for the transportation of hazardous materials and specifies requirements that hazardous materials employers as established by the DOT must meet to ensure that their hazardous materials employees are trained in a systematic program. The following requirements are included: states may impose more stringent training requirements under certain conditions; the training curriculum must include general awareness and familiarization, hazardous material recognition and identification, function-specific topics, safety and emergency response information, and security awareness, and current hazardous materials employee training records must be maintained and contain specific training documentation including certification of training.* WIPP employees responsible for transportation of hazardous materials complete hazardous material transportation training. Through this training, employees become familiar with applicable hazardous material regulations, learn to recognize and identify hazardous materials, become knowledgeable of function-specific hazardous material regulations, and become knowledgeable of emergency response information and hazardous material communications requirements. The NWP provides each hazardous materials employee at the WIPP with initial and refresher training in accordance with established schedules. New employees, or employees who change jobs, are required to attend the training within 90 days of employment or job change. Until completion of training, they may work under the direct supervision of another certified hazardous materials employee. The NWP maintains records of current training, inclusive of the preceding three years. Training records are maintained in accordance with existing requirements. The TE qualification cards must be satisfactorily completed prior to the performance of work without supervision. Requalification is required every two years.
11. Safety and Security Plans Subpart I, 49 CFR §§ 172.800 through	*This subpart prescribes requirements for development and implementation of plans to address security risks related to the*

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
172.804	*transportation of hazardous materials. It includes a list of the type and quantity of hazardous materials that require developing a security plan, as well as a description of required components of the plan.* The WIPP hazardous material and site-generated waste shipments are not likely to require a security plan because the nature and quantity of such shipments do not meet the requirements. Shipments of TRU-mixed waste returned to the generator exceeding the requirements will be shipped under DOE/WIPP 03-3233, WIPP TRU Waste Transportation Security Plan (DOE, 2003).
12. Shippers – General Requirements for Shipments and Packages, Subpart A 49 CFR Part 173 §§ 173.1 through 173.13	*This part includes the requirements for preparing hazardous materials for shipment by air, highway, rail, or water and definitions and classifications of hazardous materials for transportation purposes.* NWP procedures encompass the requirements of these sections. Outbound WIPP shipments are evaluated and prepared by an NWP TE to ensure requirements are met.
13. Preparation of Hazardous Materials for Transportation, Subpart B, 49 CFR §§ 173.21 through 173.40	*This subpart describes the general requirements for the preparation of hazardous materials for transportation. The shipper's responsibilities are described and include the hazard classification and description of hazardous material and the determination that the packaging or container is an authorized packaging and that it has been manufactured, assembled, and marked properly.* According to NWP procedures, NWP Transportation Operations is responsible for ensuring that materials are packaged, marked, and labeled in accordance with applicable hazardous materials transportation requirements in 49 CFR Part 173. Personnel packaging hazardous materials are familiar with the packaging requirements for these materials, commensurate with the complexity of the packaging and the degree, nature, and quantity of hazard.
14. Definitions, Classification, and Packaging for Class 1, Subpart C, 49 CFR §§ 173.50 through 173.65	*Definitions, classifications, and requirements for packaging of Class 1 materials (explosives) are described.* The TE classifies and packages Class 1 materials for shipment in accordance with NWP procedures.
15. Definitions, Classification, Packaging Group Assignments, and Exceptions for Hazardous Materials Other Than Class 1 and Class 7, Subpart D, 49 CFR §§ 173.115 through 173.156	*Definitions, classifications, packing group assignments, and exceptions for hazardous materials, including flammable, nonflammable, poisonous and nonpoisonous gases, flammable liquids and solids, and toxic material are specified.* Applicable NWP procedures include worksheets for ground and air shipments. Actions required for the classification and packaging of hazardous materials are included in these worksheets.
16. Non-Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7, Subpart E, 49 CFR §§ 173.158 through 173.230	*Non-bulk packaging requirements for hazardous materials other than Class 1 and Class 7 materials are described. Specific requirements are described in 49 CFR §§ 173.158 through 173.198 for nitric acid; wet batteries; corrosive nonexplosive smoke bombs; chemical kits; gallium; hydrogen fluoride; mercury; smokeless powder for small arms; aircraft hydraulic power unit fuel tanks; paint, paint-related material, adhesives and ink; refrigerating machines; liquid pyrophoric materials; barium azide;*

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
	nitrocellulose based film; highway or rail fuses; lithium batteries and cells; matches; pyrophoric solids, metals, or alloys; white or yellow phosphorus; certain Group 1 poisonous materials; mixtures of bromoacetone, methyl bromide, chloropicrin, and methyl chloride or of chloropicrin and methyl chloride or of chloropicrin and compressed gas; hydrogen cyanide; infectious substances; and nickel carbonyl. [List not all-inclusive. Refer to actual regulations for complete list.] NWP procedures direct the TE to classify each shipment using the information provided in the shipping request by completing a shipment worksheet. If required, the requester and/or the TE obtain additional information to classify the shipment properly. Based on this information, the TE determines the packaging requirements.
17. Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7, Subpart F, 49 CFR §§ 173.240 through 173.249	*This subpart describes permissible packagings for hazardous materials larger than 119 gallons in size depending on physical state and type of hazard.* NWP procedures direct the TE to classify each shipment using the information provided in the request for disposal by completing a shipment worksheet. If required, the requester and/or the TE obtain additional information to classify the shipment properly. Based on this information, the TE determines the packaging requirements.
18. Class 7 (Radioactive) Materials, Subpart I, 49 CFR §§ 173.401 through 173.477	*This subpart sets forth requirements for the transportation of radioactive materials by carriers and shippers and includes requirements for package design, package testing, empty radioactive materials packaging, and NRC-approved packages.* The SARs and TRAMPACs for CH-TRU and RH-TRU waste control the packaging and shipment of radioactive waste to the WIPP. These documents define how packaging requirements are determined, including verification that the quantity and form of material to be shipped meet the requirements of the C of Cs and/or tested parameters of the intended package. NWP TEs receive and ship radioactive materials in accordance with DOT regulations, using NWP procedures.
19. Carriage by Aircraft, 49 CFR Part 175	*This part describes requirements that must be observed with respect to the transportation of hazardous materials by aircraft. Included are provisions relating to unacceptable hazardous materials shipments; acceptance and inspection of shipments; discrepancy reports; notification of the pilot in command; shipping papers; keeping and replacement of labels; reporting hazardous materials incidents; quantity limitation; orientation, securing, and location of cargo containing hazardous materials; compatibility of packages; damaged shipments; and specific regulations applicable according to the classification of the material, including special limitations and requirements for Class 7 (i.e., radioactive) materials).* An NWP procedure provides guidance for shipping hazardous materials by air. Hazardous materials shipped by air from the WIPP are in accordance with the International Air Transport Association, International Civil Aviation Organization, and 49 CFR §171, Subpart C. Most of the requirements of this section are for operators, not offerors, and do not apply to the WIPP. The transportation of hazardous waste by air transport is prohibited.

Table 15: Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance
20. General Information and Regulations, Subpart A, 49 CFR § 177.800; Driver Training and 49 CFR § 177.816	*These sections set forth requirements for training, including the following: a carrier may not transport or cause to be transported hazardous material by motor vehicle unless each of its hazardous materials employees has received the appropriate specialized training. Each of the carrier hazardous materials drivers must have the appropriate state-issued commercial driver's license with the proper endorsement.* Radioactive waste and hazardous waste are transported to and from the WIPP is by contract carrier. Transportation employees are required to be properly trained, with certification information maintained in training records. Drivers must have a commercial driver's license with a hazardous materials endorsement. In addition, the NWP has a motor carrier program plan for the local transport of empty packaging and miscellaneous hazardous materials.
21. Specifications for Packagings, 49 CFR Part 178	*This part contains prescribed manufacturing and testing specifications and inspection requirements for packaging and for containers used for the transportation of hazardous materials.* WIPP QA procedures define the methodology by which specified criteria are verified. The CH-TRU Type B and RH-TRU Type B packages have been developed to transport TRU waste to the WIPP from the generator sites. The WIPP WAC requires that packaging meets the requirements of DOT Specification 7A Type A for WIPP storage and disposal. Packaging purchased for the transport of hazardous materials from the WIPP receives a QA review beginning with the purchase order and completed with acceptance of packaging for use. NWP TEs use an NWP procedure worksheet to specify the performance-oriented packaging necessary to satisfy packaging requirements for each shipment of hazardous materials from the WIPP.
22. Routing of Class 7 (Radioactive) Materials, Subpart D, 49 CFR Part 397	*Shipments of highway route controlled quantities of radioactive materials must be transported on preferred routes. The carrier shall prepare a written route plan and shall provide a copy to the driver and shipper. Drivers transporting a Class 7 Highway Route Controlled Quantity of (radioactive) materials must have received written training within the previous two years and must have in their immediate possession a certificate of training that includes a proper statement of authentication.* Written route plans for highway route controlled quantities are provided for shipments to the WIPP by the contract carriers. Drivers must have a commercial driver's license with a hazardous materials endorsement, and must be trained and certified to transport highway route controlled quantity radioactive materials.

16.0 MATERIALS ACT OF 1947

16.1 Summary of the Law

The *Rules and Regulations Governing Disposal of Materials; Payment; Removal Without Charge, Lands Excluded*, also referred to as the *Materials Act of 1947* (30 U.S.C. § 601, et seq.) authorizes the U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) to dispose of mineral (including, but not limited to, sand, stone, gravel, pumice, cinders, and clay) and vegetative materials on public lands under the BLM jurisdiction at fair market value while

ensuring that adequate measures are taken to protect the environment and to minimize damage to public health and safety during the authorized removal of such materials. Under the Act, no mineral material shall be disposed of if the Secretary of the DOI determines that the aggregate damage to public lands and resources would exceed the benefits to be derived from the proposed sale or free use of the material.

In the LWA, the DOE was granted authority and responsibility for the management of WIPP land and the disposal of materials (e.g., mined salt), consistent with Sections 2 and 3 of the *Materials Act of 1947*. The LWA directs the DOE to produce a WIPP land management plan (LMP) to address the disposal of salt tailings in accordance with Sections 2 and 3 of the *Materials Act of 1947*.

16.2 Status of Compliance with the Regulatory Requirements

Table 16 provides the compliance status of the *Materials Act of 1947* requirements.

Table 16: Status of Compliance with the Regulatory Requirements of *Materials Act of 1947*

Regulatory Requirement	WIPP Compliance
1. The WIPP LWA Pub. L 102-579	*The Secretary shall dispose of salt tailings extracted from the withdrawal area that are not needed for backfill at the WIPP under Section 2 of the Materials Act of 1947. Disposal shall be to the highest responsible qualified bidder after formal advertising and such other notice as deemed appropriate except the secretary may authorize negotiation of a contract for the disposal if the disposal is for materials to be used in connection with a public works improvement program on behalf of a federal, state, or local governmental agency or it is impracticable to obtain competition for disposal of the materials.* An agreement for the sale of 300,000 tons of run-of-mine salt from the WIPP to Magnum Minerals LLC of Hereford, Texas, was reached in December 2009. This requirement was met in that the contract was negotiated without use of competitive bidding as the Secretary determined it was impracticable to obtain competition and that the proceeds from the disposal of the materials would be used in connection with a public works improvement program. This program was terminated with salt shipments ceasing February 14, 2014.
2. The WIPP LWA Pub. L 102-579	*The Secretary shall dispose of salt tailings extracted from the withdrawal area that are not needed for backfill at the WIPP under Section 3 of the Materials Act of 1947. Moneys received from the disposal of materials shall be disposed of in the same manner as moneys received from the sale of public lands.* The Carlsbad Soil and Water Conservation District administers the contract, with revenues generated by the sale staying in Southeast New Mexico and benefitting area public works projects.

17.0 FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976

The DOE manages its properties (e.g., surface realty components) in accordance with the LWA and the WIPP LMP (DOE/WIPP-93-004) (DOE, 2015n) to include concurrent memoranda and agreements with participating state and federal agencies.

17.1 Summary of the Law

One of the objectives of the *Federal Land Policy and Management Act of 1976* (FLPMA) (43 U.S.C. § 1701, et seq.) is to ensure the following:

> *…public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.*

The WIPP LMP (DOE, 2015n) integrates applicable land management provisions of the LWA; BLM planning regulations (43 CFR Part 1600) issued under the authority of the FLPMA; the NEPA, as amended; DOE NEPA regulations (10 CFR Part 1021); and existing MOUs between the DOE and local, state and/or federal agencies. The LMP is designed to provide a comprehensive framework for the management and coordination of WIPP land use. The LMP, and subsequent amendments, will continue to apply to the use of WIPP lands through the decommissioning phase.

The guidelines in the LMP provide for the management and oversight of WIPP lands under the jurisdiction of the DOE and lands outside the WIPP boundary that are used in the operation of the WIPP (e.g., groundwater surveillance well pads outside the withdrawal area). Furthermore, this plan provides for multi-agency involvement in the administration of DOE land management actions. Documents referenced in the LMP are available to any person and/or organization desiring to conduct activities on WIPP lands under the purview of the DOE and those involved in development and/or amending existing land management actions. Documents can be obtained from the U.S. Department of Energy, Carlsbad Field Office, P.O. Box 3090, Carlsbad, New Mexico 88221.

17.2 Status of Compliance with the Permit

Table 17 provides details on the compliance status of each right-of-way awarded to DOE by the BLM.

Table 17: Status of Compliance with the Permit Conditions of the *Federal Land Policy and Management Act of 1976*

Regulatory Requirement	WIPP Compliance
1. Rights-of-Way Under the Federal Land Management 43 CFR Part 2800	*Several conditions are common to the rights-of-way (grants) awarded to the WIPP by the BLM. These common conditions are:* *(1) That the subject of the rights-of-way is under the control and jurisdiction of the DOE;* *(2) That right of access and use is reserved to DOE personnel and those authorized by the DOE and to BLM personnel and their authorized permittees, licensees, and lessees;* *(3) That any products or resources on lands within the rights-of-way remain under the jurisdiction of the issuing agency;* *(4) That applicable regulations under 43 CFR Part 2800 and the*

Table 17: Status of Compliance with the Permit Conditions of the *Federal Land Policy and Management Act of 1976*

Regulatory Requirement	WIPP Compliance
	provisions of the rights-of-way be followed; and *(5) That reclamation seeding requirements align with BLM standards and guidelines for the Carlsbad Resource Area.* The subjects of the rights-of-way are under the control and jurisdiction of the DOE. Right of access and use of structures is reserved by the DOE and the BLM and their authorized personnel, permittees, licensees, and lessees. The LWA transferred administrative responsibility for WIPP lands from the DOI to the DOE. These lands were also withdrawn from all forms of entry, appropriation, and disposal under the public land laws, including the mineral leasing laws (subject to existing, valid rights). Reclamation of disturbed areas is an ongoing activity at the WIPP and is performed as described in the LMP. Seeding is conducted in accordance with the requirements established by the BLM Roswell District for the Carlsbad Resource Area.
2. When do I need a grant? 43 CFR Part 2800	The DOE constructed the facilities for each specific right-of-way as stipulated by the right-of-way and continues to comply with standard stipulations. Rights-of-way are obtained, renewed, or canceled as necessary.

18.0 PUBLIC RANGELANDS IMPROVEMENT ACT

18.1 Summary of the Law

Congress has recognized that vast segments of public rangelands produce less than the potential for livestock, wildlife habitat, recreation, forage, and water and soil conservation benefits. The *Public Rangelands Improvement Act of 1978* (43 U.S.C. § 1901, et seq.) was enacted to address the concerns that such rangelands could remain in an unsatisfactory condition and that some areas could decline further under existing levels of management.

With the passage of this Act, Congress reaffirmed a national policy and commitment to:

- Inventory and identify current public rangeland conditions and trends;
- Manage, maintain, and improve the condition of public rangelands so that they become as productive as is feasible; and
- Continue the policy of protecting wild free-roaming horses and burros while facilitating the removal and disposal of excess wild free-roaming horses and burros that pose a threat to themselves, their habitat, and other rangeland values.

The LWA transferred jurisdiction, statutory authority, and responsibility for the management of the withdrawn lands at the WIPP from the DOI to the DOE. Section 4 of the LWA, Establishment of Management Responsibilities, directs the DOE to conduct the management of grazing consistent with the *Public Rangelands Improvement Act*, the *Taylor Grazing Act* (Section 19.0), and FLPMA Title IV, Range Management (Section 17.0).

The implementing regulations of 43 CFR Part 4100, Grazing Administration - Exclusive of Alaska, provide uniform guidance for the administration of grazing on public lands. According to 43 CFR § 4100.0-2:

> *The objectives of these regulations are to promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions; to promote the orderly use, improvement and development of the public lands; to establish efficient and effective administration of grazing of public rangelands; and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands. These objectives shall be realized in a manner that is consistent with land use plans, multiple use, sustained yield, environmental values, economic and other objectives stated in the Taylor Grazing Act of June 28, 1934, as amended (43 U.S.C. §§ 315, 315a-315r); Section 102 of the FLPMA and the Public Rangelands Improvement Act of 1978 (43 U.S.C. § 1901[b][2]).*

18.2 Status of Compliance with the Regulatory Requirements

Table 18 provides the compliance status of the *Public Rangelands Improvement Act* requirements.

Table 18: Status of Compliance with the Regulatory Requirements of the *Public Rangelands Improvement Act*

Regulatory Requirement	WIPP Compliance
1. Land Use Plans, 43 CFR § 4100.0-8	*Grazing on administered public lands shall be managed under the principle of multiple use and sustained yield and must be in accordance with the applicable land-use plan.* In accordance with the LWA and as addressed in the LMP, the DOE intends to continue current range-management practices with no immediate changes. Grazing will continue on the withdrawn lands as it has since prior to the LWA. As indicated in the LMP (DOE, 2015n), the BLM will administer range management activities in accordance with the LMP, Appendix C, which is an MOU between the DOE and the BLM.

19.0 TAYLOR GRAZING ACT

19.1 Summary of the Law

The *Taylor Grazing Act* (43 U.S.C. § 315, et seq.) was enacted by Congress in 1934 to establish a means for federal management of public lands used for grazing. The intent of Congress was to define grazing rights and to protect these rights through regulation. This Act is intended to prohibit injury to public grazing lands from unregulated grazing and directs the orderly use of and improvement to public grazing lands by establishing grazing districts and a grazing permit system.

The LWA withdrew public lands and transferred jurisdiction over WIPP lands from the DOI to the DOE. As a result of the LWA, the DOE was given statutory authority and responsibility for the management of the withdrawn land consistent with the FLPMA (see Section 17.0), the LWA,

and other applicable laws such as the *Taylor Grazing Act*. Under the LWA, the DOE may allow grazing to continue where it was established before the enactment of the LWA, consistent with the applicable implementing regulations of the *Taylor Grazing Act*, 43 CFR Part 4100, Grazing Administration - Exclusive of Alaska. As indicated in the LMP, the BLM continues to administer the grazing permit program and to collect the grazing fees. The WIPP land withdrawal area affects two grazing allotments (i.e., land designated and managed for the grazing of livestock).

The implementing regulations of 43 CFR Part 4100 provide uniform guidance for the administration of grazing on public lands, exclusive of Alaska. The objectives of these regulations are orderly use, improvement, and development of public grazing lands; enhancement of grazing land productivity by the prevention of overgrazing and soil deterioration; stabilization of the livestock industry dependent upon the public range; and provision of inventory and categorization of public rangelands on the basis of range conditions and trends. These objectives must be consistent with land-use plans, multiple-use, sustained yield, environmental values, and other general objectives as stated by the *Taylor Grazing Act*.

19.2 Status of Compliance with the Regulatory Requirements

Table 19 provides the compliance status of requirements under the *Taylor Grazing Act*.

Table 19: Status of Compliance with the Regulatory Requirements of the *Taylor Grazing Act*

Regulatory Requirement	WIPP Compliance
1. Land Use Plans, 43 CFR § 4100.0-8	*Grazing on public lands shall be managed under the principles of multiple use and sustained yield in accordance with applicable land-use plans.* As indicated in the LMP, the BLM will administer range management activities in accordance with the MOU between the DOE and the BLM. Under the MOU, the DOE agrees to retain responsibility for grazing management decisions affecting the two grazing allotments within the land withdrawal area (LMP, Appendix C, Section VI - B) (DOE, 2015n).
2. Allotment Management Plans and Resource Activity Plans, 43 CFR § 4120.2	*An allotment management plan shall be prepared in careful and considered consultation, cooperation, and coordination with BLM personnel, the landowners involved, the district grazing advisory board, and any other affected interests.* The WIPP land withdrawal area affects two grazing allotments administered by the BLM. The 290-acre DOE exclusive use area and 23 additional acres set aside for reclamation sites, storage yards, etc., are the only portions of the land withdrawal area not currently used for livestock activity. As indicated in the LMP, the BLM will administer range management activities in accordance with the MOU between the DOE and the BLM. Under the MOU, "The DOE agrees to retain responsibility for grazing management decisions affecting the two grazing allotments within the land withdrawal area." (LMP, Appendix C, Section VI - B) (DOE, 2015n).

20.0 BALD AND GOLDEN EAGLE PROTECTION ACT

20.1 Summary of the Law

The *Bald and Golden Eagle Protection Act* (16 U.S.C. §§ 668-668d) makes it unlawful to take (i.e., capture, kill, or destroy), possess, molest, or disturb bald eagles and golden eagles, alive or dead, their nests, or their eggs anywhere in the United States.

The regulations in 50 CFR Part 13, General Permit Procedures, provide uniform rules, conditions, and procedures for the application for, and the issuance, denial, suspension, revocation, and general administration of, permits issued pursuant to 50 CFR Part 13 Subpart B, Application for Permits. The provisions in this part are in addition to other regulations, and apply to permits issued under these regulations, including 50 CFR Part 22.

The import, export, purchase, sale, and or barter of bald or golden eagles, their parts, nests, or eggs are not permitted by Subpart B. The purpose of the regulations in 50 CFR Part 22, Eagle Permits, is to govern the taking, possession, and transportation of bald and golden eagles for scientific, educational, and depredation-control purposes and for the religious purposes of Indian tribes.

20.2 Status of Compliance with the Regulatory Requirements

Table 20 provides the compliance status of requirements under the *Bald and Golden Eagle Protection Act*.

Table 20: Status of Compliance with the Regulatory Requirements of the *Bald and Golden Eagle Protection Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements	During this reporting period, no bald or golden eagles nested within the WIPP land withdrawal area; however, individual eagles overwinter on WIPP lands. Overwintering eagles are provided considerations during determinations of land-use actions. WIPP personnel will file an application for an eagle permit as required if the need for such a permit is perceived. For any affecting construction activities, a typical NEPA Mitigation Plan would require that: *…surveys for raptor nests, including burrows, and nesting structures are performed by the BLM Carlsbad Field Office (CFO) multiple times before and throughout the project. A 100-meter avoidance buffer will be employed around inactive raptor nests and a 200-meter buffer will be employed around active raptor nests. Portions of the project within these distances can be either delayed until the nest fledges or up to 90 days.* No qualifying construction activities occurred during this reporting period.

21.0 MIGRATORY BIRD TREATY ACT

21.1 Summary of the Law

The *Migratory Bird Treaty Act* (16 U.S.C. § 703 et seq.) is intended to protect birds that have common migratory flyways between the United States and Canada, Mexico, Japan, and Russia. ”Migratory bird” means any bird that belongs to a species listed in 50 CFR § 10.13. The Act makes it unlawful "at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, or attempt to take, capture, or kill …any migratory bird, any part, nest, or eggs of any such bird" unless specifically authorized by the Secretary of the Interior by direction or through regulations permitting and governing these actions.

The regulations in 50 CFR Part 13, General Permit Procedures, provide uniform rules, conditions, and procedures for the application for and the issuance, denial, suspension, revocation, and general administration of permits issued pursuant to 50 CFR Subpart B.

The regulations in 50 CFR Part 21, Migratory Bird Permits, supplement the general permit regulations with respect to permits for the taking, possession, transportation, sale, purchase, barter, importation, exportation, and banding or marking of migratory birds.

21.2 Status of Compliance with the Regulatory Requirements

Table 21 provides the compliance status of requirements under the *Migratory Bird Treaty Act*.

Table 21: Status of Compliance with the Regulatory Requirements of the *Migratory Bird Treaty Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements	Hunting privileges for the public within the WIPP land withdrawal area will continue except for the areas that are posted against trespass. Routine inspections of equipment at the WIPP are performed during the nesting season to monitor for early signs of nesting and to remove nesting materials before a nest can be established or tag out equipment in which birds have made a home. The DOE maintained a U.S. Fish and Wildlife Service (USFWS) migratory bird special purpose permit (USFWS, 2014), which allows for the relocation of certain bird species that are found nesting on equipment and could be in danger due to routine operations. No activities involving migratory birds took place at the WIPP during the reporting period.

22.0 ENDANGERED SPECIES ACT

22.1 Summary of the Law

The *Endangered Species Act* (ESA) was enacted in 1973 to prevent the extinction of certain species of animals and plants. This Act provides strong measures to help alleviate the loss of species and their habitats and places restrictions on a wide range of activities involving endangered and threatened animals and plants to help ensure their continued survival. With limited exceptions, this Act prohibits activities that could potentially impact these protected

species unless authorized by a permit from the USFWS. Under Section 1536 of the Act and the implementing regulations in 50 CFR Part 402, Interagency Cooperation-Endangered Species Act, as Amended, the EPA is prohibited from authorizing activities likely to jeopardize the continued existence of threatened or endangered species or critical habitat. A biological assessment and formal consultation, followed by the issuance of a biological opinion by the USFWS, may be required for a species that is determined to be in potential jeopardy.

The regulations in 50 CFR Part 13, General Permit Procedures, provide uniform rules, conditions, and procedures for the application for and the issuance, denial, suspension, revocation, and general administration of permits issued pursuant to 50 CFR Subchapter B. The provisions in this part are in addition to other regulations and apply to permits issued under them, including 50 CFR Parts 17 and 22.

The regulations of 50 CFR Part 17, Endangered and Threatened Wildlife and Plants, implement the ESA. The regulations in this part outline the requirements for permits for activities involving endangered wildlife and identify those species of wildlife and plants recognized as endangered or threatened with extinction.

22.2 Status of Compliance with the Regulatory Requirements

Table 22 provides the compliance status of requirements under the ESA.

Table 22: Status of Compliance with the Regulatory Requirements of the *Endangered Species Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements	To ensure that WIPP environmental protection programs were current in consideration of sensitive and protected species, the 1996 *Waste Isolation Pilot Plant Threatened and Endangered Species Survey*, DOE/WIPP-97-2228 (DOE, 1996b), was conducted from August to November 1996. No threatened or endangered species were found within the WIPP land withdrawal area boundaries during the 1996 survey. Consequently, no current activities impacting endangered species are conducted at the WIPP. No permits, biological assessments, or formal consultations are required. On March 27, 2014, the lesser prairie chicken was listed and is protected by the ESA. The lesser prairie chicken has favorable habitat within the WIPP land withdrawal area and other surrounding areas affected by WIPP operational activities (e.g., drilling boreholes). The DOE adheres to established BLM timing restrictions for protection of the lesser prairie chicken when performing off-site field activities.

23.0 NATIONAL HISTORIC PRESERVATION ACT

23.1 Summary of the Law

The *National Historic Preservation Act* (NHPA) (16 U.S.C. § 470, et seq.) was enacted to protect the nation's cultural resources in conjunction with the states, local governments, Indian tribes, and private organizations and individuals. The Act also established the National Register of Historic Places. The State Historic Preservation Officer (SHPO) coordinates state participation in implementing the NHPA. The NHPA was last amended in 2000.

Section 106 of the NHPA requires that a federal agency head who has jurisdiction over a federal, federally assisted, or federally licensed undertaking take into account the effects of the undertaking on historic properties included in or eligible for the National Register of Historic Places. This is accomplished through consultation among the federal agency, the SHPO, and other interested parties during the early stages of planning.

Section 110 of the NHPA requires each federal agency to provide a program to protect and preserve historic properties and is implemented through regulations at 36 CFR Part 800, Protection of Historic Properties. The regulations require development of a treatment plan by a federal agency that identifies historic properties likely to be discovered during the implementation of an undertaking and how they will be managed.

Since 1976, cultural resource investigations have recorded 60 archaeological sites and 91 isolated occurrences within the 16-square-mile WIPP boundary. The number of sites within the WIPP boundary was confirmed with the completion of a comprehensive archaeological database created in July 1994.

In 1997, the DOE officially entered into a Joint Powers Agreement with agencies from the State of New Mexico (DOE, 1997b). One of the participating agencies is the SHPO. Commitments by both agencies are established in the agreement with regard to notification time lines. In addition, the agreement reiterates the DOE obligation to manage cultural resources in accordance with Sections 106 and 110 of the NHPA, the *Archaeological Resource Protection Act*, *Native American Graves Protection and Repatriation Act*, and applicable DOE orders.

23.2 Status of Compliance with the Regulatory Requirements

Table 23 summarizes the regulatory requirements and compliance status under the NHPA.

Table 23: Status of Compliance with the Regulatory Requirements of the *National Historic Preservation Act*

Regulatory Requirement	WIPP Compliance
1. Assessment of Adverse Effects, 36 CFR § 800.5	*In consultation with the SHPO, the federal agency official with jurisdiction over an undertaking is responsible for assessing the effect of an undertaking on affected historic properties, obtaining the SHPO concurrence when the effect is not considered adverse, and notifying and submitting summary documentation to the Council.* The DOE submitted documentation to the New Mexico SHPO describing excavation activities and the avoidance of potential historical sites. A determination of No Adverse Effect from the WIPP activities on historic properties was made by the SHPO in May 1980. This determination was applicable for the primary construction activities associated with the WIPP. Since the 1980 determination, the DOE has evaluated minor construction activities in previously undisturbed areas for potential impacts to cultural resources. New surface-disturbing activities are evaluated by a licensed archaeologist and concurrence is obtained from the SHPO prior to allowing the action to proceed. No new surface disturbing activities were evaluated during this reporting period.

Table 23: Status of Compliance with the Regulatory Requirements of the *National Historic Preservation Act*

Regulatory Requirement	WIPP Compliance
2. Document Standards, 36 CFR § 800.11	*After a determination by the federal agency official presiding over an undertaking that the potential for the discovery of historical property exists, the agency official may develop a plan for the treatment of such properties if discovered and include this plan in documentation prepared to comply with 36 CFR § 800.5.* The LMP outlines objectives and planned actions for the management of cultural resources within the withdrawal area.
3. Permit Requirements and Exceptions, 43 CFR § 7.5	*Any person proposing to excavate and/or remove archaeological resources from public lands and to carry out activities associated with such excavation and/or removal shall apply for a permit for the proposed work and shall not begin the proposed work until a permit has been issued.* Avoidance of known archaeological sites is the primary mitigation measure used at the WIPP. There were no archaeological clearances required and conducted during this reporting period. There were no requests for mitigation submitted to the SHPO during this reporting period.

24.0 NEW MEXICO ENVIRONMENTAL IMPROVEMENT ACT

24.1 Summary of the Law

The enactment of the *New Mexico Environmental Improvement Act* (§§ 74-1-1 through 74-1-16 NMSA 1978) created the Environmental Improvement Board to promulgate regulations and standards to protect health and safety and the environment. The *New Mexico Environmental Improvement Act* also created the Environmental Improvement Division, now known as the NMED. The Act directs the NMED to assume responsibility for environmental management and protection to demonstrate that environmental policy provides optimal health, safety, social, and economic well-being for the people of New Mexico. The NMED is directed to maintain, develop, and enforce regulations and standards in areas including water supply, liquid waste, air quality, radiation control, health and safety, hazardous wastes, and USTs. Many of these regulations and standards have been determined to be applicable to the WIPP. These include the HWA, the *Solid Waste Act* (§ 74-9 NMSA 1978), the petroleum storage tank regulations (20.5 NMAC), the *Ground Water Protection Act* (GWPA) (§§ 74-6B-1 through 74-6B-14 NMSA 1978), the *Air Quality Control Act* (§§ 74-2-1 through 74-2-22 NMSA 1978), the *New Mexico Water Quality Act* (§§ 74-6-1 through 74-6-17 NMSA 1978), and the Wastewater and Water Supply Facilities regulations (20.7 NMAC).

24.2 Status of Compliance with the Regulatory Requirements

Since the radiological event in February 2014, the NMED has issued administrative orders to help in the recovery of the WIPP. The Permittees have implemented a WIPP Recovery Plan to provide a safe and environmentally sound approach for bringing the WIPP back to an operational state. Since the event, the DSA has been rewritten, the procedures to determine Contingency Plan implementation have been rewritten, and a process to ensure inspections are performed accurately and on time is being developed. The Permittees also perform a review of

new regulatory proposals by regulatory agencies with a determination of how these proposals affect the WIPP.

Furthermore, the NMED issued the Settlement Agreement and Stipulated Final Order (NMED, 2016a) for the purpose of resolving ACO HWB-14-21. The NMED, DOE, and NWP agreed to settle violations identified in the ACO HWB-14-21, through corrective actions (presented as Attachment A of the Settlement Agreement and Stipulated Final Order), monthly NMED appraisal of corrective action progress, and submittal of evidence of completion within 60 calendar days of the effective date of the Settlement Agreement (unless an alternative date is approved by NMED).

25.0 NEW MEXICO HAZARDOUS WASTE ACT

25.1 Summary of the Law

The HWA is intended to ensure the New Mexico environment is maintained; to confer optimal health, safety, comfort, and economic and social well-being on its inhabitants; and to protect the proper utilization of its lands. The HWA established the program for hazardous waste management in New Mexico.

On January 11, 1985, New Mexico received authorization from the EPA to administer the base federal hazardous waste program, effective January 25, 1985. On January 2, 1996, the EPA provided New Mexico with authorization to implement the 1984 HSWA. With this authorization, the EPA determined that the revisions to the New Mexico hazardous waste program met the requirements of Section 3006(b) of the RCRA by demonstrating that the state program was equivalent to and consistent with the federal program, and that the state program provided adequate enforcement authority to implement the revised HSWA authority under RCRA.

Section 74-4-4.E of the HWA allows the Environmental Improvement Board to adopt federal hazardous waste management regulations by reference after public notice and public hearing. New Mexico has adopted the entire body of the EPA hazardous waste regulations, with some substitutions, omissions, and exceptions. With regard to the management of mixed waste, on July 11, 1990, the EPA published its acceptance of the New Mexico revised hazardous waste program, effective July 25, 1990. This authorization allows New Mexico to regulate the hazardous constituents of mixed waste under the revised HWA. In May of 2000, New Mexico adopted federal regulations 40 CFR Parts 260 through 279, which were effective June 14, 2000. This authorization allowed the state to regulate the hazardous constituents of the mixed waste to be sent to WIPP unless changes in the federal regulations have been made and not adopted by the NMED. In March 2009, NMED adopted the federal regulations effective July 1, 2008, except for 40 CFR Part 267. On this occasion, the NMED instituted several deviations from the federal program, requiring certain records to be maintained until closure of the facility and incorporating provisions for allowing aerosol cans to be managed as universal waste under 40 CFR Part 273.

The New Mexico Hazardous Waste Management Regulations are applicable to the WIPP in three different areas. First, WIPP personnel generate hazardous waste, universal waste, and used oil and are therefore required to comply with the standards applicable to generators of hazardous waste codified in 40 CFR Part 262 (20.4.1.300 NMAC), standards for universal waste management under 40 CFR Part 273, and standards for the management of used oil under 40 CFR Part 279. As long as site-generated wastes are managed in accordance with the applicable parts of 40 CFR Part 279, no permit is required for the accumulation of these wastes.

In addition, the WIPP generates mixed waste containing both hazardous and radioactive components, and is subject to the requirements of 40 CFR Part 262.

Second, the WIPP is a storage and disposal facility for TRU mixed waste, which required DOE to obtain a permit in accordance with 40 CFR Part 270 (20.4.1.900 NMAC and 20.4.1.901 NMAC) and comply with the TSDF regulatory requirements of 40 CFR Part 264 (20.4.1.500 NMAC). The WIPP Permit was issued by the NMED on October 27, 1999 (NMED, 1999). The NMED issued the 10-year renewal Permit November 30, 2010, with an effective date of December 30, 2010 (NMED, 2010a).

Third, USTs are regulated under the New Mexico petroleum storage tank regulations, codified as 20.5 NMAC. The New Mexico petroleum storage tank regulations differ somewhat from the federal regulations specified in 40 CFR Part 280.

25.2 Status of Compliance with the Regulatory Requirements

25.2.1 Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Table 24 summarizes the applicable regulatory requirements and compliance status for hazardous waste generators under 20.4.1.300 NMAC, which corresponds to the federal implementing regulations of 40 CFR Part 262. Because New Mexico adopts the federal implementing regulations by reference, the citations list references from the federal regulations (e.g., 40 CFR Part 262) first, followed by the New Mexico regulatory citation.

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
1. Hazardous Waste Determination, 40 CFR § 262.11 (20.4.1.300 NMAC)	*The generator of solid waste is required to determine whether the waste is hazardous as defined in 40 CFR Part 261.* Hazardous waste is currently generated from maintenance, construction, and other support operations at the WIPP. Mixed waste is currently generated from radiological control and decontamination activities resulting from the February 14, 2014, radiological release. These wastes are characterized through knowledge of the materials and processes that generated the waste, MSDS (or SDS), or waste sampling and analysis.
2. EPA Identification Number, 40 CFR § 262.12 (20.4.1.300 NMAC)	*An EPA identification number is required for each generator of hazardous waste. In addition, a generator must not offer waste to transporters or TSDFs that have not received an EPA identification number.* The DOE has obtained an EPA identification number for the WIPP: NM4890139088. The DOE uses only transporters or TSDFs that have an EPA identification number.

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
3. General Requirements, 40 CFR § 262.20 (20.4.1.300 NMAC)	*Compliance with the manifest requirements is mandatory for shipping hazardous waste off-site.* The WIPP uses the EPA-specified Uniform Hazardous Waste Manifest (EPA Form 8700-22; Rev. 3-05) for off-site hazardous waste shipments. The EPA required the use of this uniform manifest as of September 5, 2006. Off-site shipments of mixed waste are documented using both a Uniform Hazardous Waste Manifest and a Uniform Low-Level Radioactive Waste Manifest (NRC Form 540).
4. Manifest Tracking Numbers, Manifest Printing, and Obtaining Manifests, 40 CFR § 262.21 (20.4.1.300 NMAC)	*A generator may use manifests printed by any source so long as the source of the printed form has received approval from the EPA to print the manifest.* Manifests used at the WIPP are obtained from an EPA-approved source.
5. Number of Copies, 40 CFR § 262.22 (20.4.1.300 NMAC)	*The manifest shall consist of sufficient copies to provide two for the generator and one each for the transporter and owner or operator of the designated facility.* Manifests used at the WIPP contain sufficient copies to fulfill this requirement.
6. Use of the Manifest, 40 CFR § 262.23 (20.4.1.300 NMAC)	*The generator must sign the manifest certification by hand, obtain the handwritten signature of the initial transporter and date of acceptance on the manifest, and retain one copy. The generator must give the transporter the remaining copies of the manifest. Other requirements of this regulation pertain to shipments by water, rail, or to a designated facility in an authorized state which has not yet obtained authorization to regulate that particular waste as hazardous.* The WIPP hazardous waste management and transportation procedures are used to ensure that these requirements are met. Hazardous and mixed waste generated at the WIPP are sent to TSDFs in states authorized to regulate that particular hazardous or mixed waste.
7. Packaging, 40 CFR § 262.30 (20.4.1.300 NMAC)	*EPA and DOT packaging requirements must be met before shipping hazardous waste off-site.* The WIPP transportation and shipping procedures address these requirements. The WIPP is responsible for proper packaging of hazardous and mixed waste shipped from the site.
8. Labeling and Marking Requirements, 40 CFR § 262.31 and § 262.32 (20.4.1.300 NMAC)	*DOT labeling and marking requirements must be met before shipping hazardous waste off-site.* The WIPP hazardous waste management and transportation procedures address these requirements to ensure that each package of hazardous or mixed waste is properly labeled and marked before being shipped off-site.
9. Placarding, 40 CFR § 262.33 (20.4.1.300 NMAC)	*DOT placarding requirements must be met before shipping hazardous waste off-site.* The WIPP hazardous waste management and transportation procedures address these requirements to ensure that each shipment of hazardous or mixed waste is placarded in accordance with regulations.

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
10. Accumulation Time, 40 CFR § 262.34(a) (20.4.1.300 NMAC)	*Large-quantity generators may accumulate hazardous wastes on-site in containers for up to 90 days without a permit.* An accumulation start date is placed on each container of hazardous or mixed waste generated at the WIPP at the time that waste is first added to the container or the waste exits a satellite accumulation area (SAA) as described in 40 CFR § 262.34(c). The WIPP follows hazardous waste management, storage area inspection, and waste disposal plans and procedures to ensure that accumulation time is not exceeded.
11. Accumulation Time , 40 CFR § 262.34(a)(1)(i) (20.4.1.300 NMAC)	*Except as provided in paragraphs (d), (e), and (f) of this section, a generator may accumulate hazardous waste on-site for 90 days or less without a permit or without having interim status, provided that the waste is placed in containers, and the generator complies with Subparts I, AA, BB, and CC of 40 CFR Part 265.* Hazardous and mixed waste management, storage area inspection, and waste disposal procedures are in place to verify that no waste is accumulated for more than 90 days. Compliance with Subpart I of 40 CFR Part 265, Use and Management of Containers, is required for waste placed in containers. The requirements of this subpart pertain to the condition of containers, compatibility of waste with the containers, closing containers during storage, inspections, the location of containers holding ignitable or reactive waste, the segregation of incompatible wastes, and air emission standards. WIPP hazardous waste management procedures are used to ensure compliance with Subpart I of 40 CFR Part 265. These include weekly inspections for container condition, container/waste compatibility, and the segregation of incompatible wastes. The hazardous waste storage area is located more than 50 feet from the WIPP property line for compliance with the requirements for ignitable or reactive waste (40 CFR § 265.176). Container Level 1 controls (use of properly closed DOT-approved containers less than or equal to 0.1 cubic meter) are used to ensure compliance with Subpart CC standards. Subparts AA and BB do not apply to hazardous waste management activities at the WIPP. Implementation of these standards is required in less-than-90-day container accumulation areas but not in SAAs, per 40 CFR § 262.34(c)(1). Areas exclusively storing mixed waste are not subject to the Air Emissions Standards for Tanks, Surface Impoundments, and Containers, per 40 CFR § 265.1080. To date, containers used for storing organic waste have been less than 0.1 cubic meter, and implement Container Level 1 Controls by using DOT-approved containers.
12. Accumulation Time, 40 CFR § 262.34(a)(2) (20.4.1.300 NMAC)	*Each container of hazardous waste must be clearly marked with the date of the initial accumulation of the waste.* For waste that is not managed in an SAA, the accumulation date is placed on a container when waste is first added to the container. When waste is managed in an SAA, the accumulation date is placed on the container when the container becomes full or when it is removed from the SAA.
13. Accumulation Time , 40 CFR § 262.34(a)(3) (20.4.1.300 NMAC)	*While being accumulated on-site, each container and tank is labeled or marked clearly with the words "Hazardous Waste."* Each hazardous waste container in the 90-day storage area and SAA is clearly marked with the words "hazardous waste," as described in WIPP procedures. Container markings are inspected weekly.

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
14. Accumulation Time , 40 CFR § 262.34(b) (20.4.1.300 NMAC)	*A generator of 1,000 kilograms or greater of hazardous waste in a calendar month, or greater than 1 kg of acute hazardous waste listed in §§261.31 or 261.33(e) in a calendar month, who accumulates hazardous waste or acute hazardous waste for more than 90 days is an operator of a storage facility and is subject to the requirements of 40 CFR parts 264 (Subpart B, General Facility Standards, Personnel Training; Subpart C, Preparedness and Prevention, and Subpart D, Contingency Plan and Emergency Procedures)… and 40 CFR Part § 268.7(a)(5) (waste analysis plan [WAP] for prohibited waste under the LDRs) are required.* The DOE complies with this requirement through WIPP Permit Part 2, Sections 2.6, Security; 2.7, General Inspection Requirements; 2.8, Personnel Training; 2.10, Preparedness and Prevention; 2.11, Hazards Prevention; and 2.12, Contingency Plan; and WIPP Permit Attachment D, RCRA Contingency Plan. Compliance is also ensured through various emergency response procedures, formal personnel training, and operation, maintenance, and testing of emergency equipment. Details of compliance activities follow. **Preparedness and Prevention, 40 CFR Part 264, Subpart C**: The WIPP is designed, maintained, and operated to minimize the possibility of fire, explosions, or unplanned release of hazardous waste to the environment. Inspections of waste handling areas and equipment are conducted periodically in accordance with applicable regulations and Permittee procedures. Corrective actions are accomplished through spill management procedures and action requests. The following communication and alarm systems are in place at the WIPP: one-way communication by the public address (PA) system and its intercom phones and paging channels; local and facility-wide alarm systems, pagers and plectrons; and two-way communication using an intraplant telephone system, mine phones, and portable two-way radios. Inspection procedures are in place for the communication and alarm systems and the fire protection equipment. These procedures include provisions for testing and maintenance to ensure that equipment will be operable in an emergency. Spill control and decontamination equipment is inspected weekly, and the results are recorded on inspection sheets as defined in the WIPP Permit, Attachment E, Inspection Schedule, Process and Forms. Adequate aisle space is maintained in the WIPP hazardous waste storage area to allow for emergency response activities. The DOE supports local ambulance and emergency medical services through MOUs with off-site emergency response agencies for fire fighting, medical assistance, and law enforcement. Outside agencies with which DOE has an MOU have received current copies of the WIPP RCRA Contingency Plan. **Contingency Plan and Emergency Procedures, 40 CFR Part 264, Subpart D**: The RCRA Contingency Plan defines responsibilities, provides guidance for the coordination of activities, and describes procedures and actions to minimize the threat to human health and the environment from fires, explosions, or release of hazardous waste or hazardous waste constituents. The plan describes actions that must be taken in response to fires, explosions, or unplanned release of hazardous waste or hazardous waste constituents to air, soil, or water. The plan lists agreements with local authorities, the names, addresses, and phone numbers of persons qualified to act as RCRA Emergency Coordinators, and the emergency equipment at the facility; and includes an evacuation plan. As stated in the plan, the RCRA Emergency Coordinator has the authority to commit the resources necessary to respond

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
	to an emergency. Copies of the plan and amendments are provided to the NMED and outside agencies with which DOE has agreements for assistance in an emergency. The DOE maintains the distribution list for the plan and is responsible for providing up-to-date copies. A comprehensive review of the plan is conducted at least annually, and the plan is modified as necessary to ensure information is up-to-date. The WIPP Permit modifications are submitted, if necessary, whenever applicable regulations are revised; if the plan fails in an emergency; if the facility changes in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency; or if the list of RCRA Emergency Coordinators or the list of emergency equipment changes. A RCRA Emergency Coordinator, on-site 24 hours a day, 7 days a week, coordinates all emergency response measures. The primary RCRA Emergency Coordinator is the on-duty Facility Shift Manager. Emergency Coordinators are familiar with the RCRA Contingency Plan. The RCRA Contingency Plan has provisions that meet emergency procedure requirements such as communication of an emergency to employees, notification of the appropriate agency if assistance is needed, identification of hazardous materials, assessment of hazards, and notification of any incident that requires implementation of the RCRA Contingency Plan. **Personnel Training, 40 CFR §264.16**: Formal training at the WIPP is conducted in accordance with the DOE training program. **Testing, tracking and recordkeeping requirements for generators, treaters, and disposal facilities, 40 CFR § 268.7(a)(5)**: TRU mixed waste received at the WIPP is exempt from the LDRs. Hazardous waste generated at the WIPP is sent off site for disposal in compliance with 40 CFR Part 268, LDRs. If hazardous waste shipped off site is subject to a treatment standard or technology, an LDR notice is on file with the receiving TSDF specifying the treatment requirements prior to land disposal. The DOE and the NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with requirements (DOE, 2015i; NWP, 2015). The Permittees continue to implement improvements to the maintenance, emergency preparedness, and training programs through which compliance with these requirements is maintained. These improvements are defined in the CBFO and NWP corrective action plans. Examples of improvements included in the corrective action plans are: performing independent evaluations of programs or components of programs, revising program and procedure documents (e.g., fire, spill and release, work control), and revising and providing updated training courses. In addition, multiple drills have been (and will continue to be) conducted to evaluate effectiveness of revised procedures and training.
15. Accumulation Time, 40 CFR § 262.34(b) (20.4.1.300 NMAC)	*The 90-day storage period may be extended for up to 30 days due to unforeseen, temporary, and uncontrollable circumstances.* Applicable WIPP procedures provide instruction for the shipment of hazardous waste off site prior to the 90-day deadline and if a request for an extension is needed. There were no extensions requested during this reporting period.
16. Accumulation Time, 40 CFR § 262.34(c)(1)	*There are a number of requirements for SAAs. These include the limit of 55 gallons of hazardous or 1 quart of acutely hazardous*

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
(20.4.1.300 NMAC)	*waste (listed in 40 CFR § 261.33[e]) and the requirement that the SAA be located at or near the point of generation of the waste and under the control of the operator.* None of the SAAs have a capacity that exceeds 55 gallons. The WIPP SAA management procedure addresses how inspections are conducted to verify that the 55-gallon limit per SAA is not exceeded. In addition, the procedure defines requirements for placing waste in an SAA, and defines the responsibilities of the waste generator. No acutely hazardous waste was generated at the WIPP during this reporting period; therefore, SAAs for acutely hazardous waste have not been established. The SAAs are located at or near the points of generation of the hazardous waste, and are under the control of the operator generating the waste. The SAAs remained in compliance with these requirements throughout this reporting period.
17. Use and Management of Containers, Subpart I, 40 CFR §§ 265.171, 265.172, and 265.173(a), 40 CFR § 262.34(c)(1)(i) (20.4.1.300 NMAC)	*For SAAs, requirements for hazardous waste generators from 40 CFR Part 265, Subpart I, pertain to the condition of the containers (§ 265.171), compatibility of the waste with the container (§ 265.172), and the necessity to keep the containers closed when not actually adding waste to or removing it from the containers (§ 265.173[a]). In addition, a container holding hazardous waste must not be opened, handled, or stored in a manner that could rupture the container or cause it to leak (40 CFR § 262.34[c][1][i]).* The weekly inspections are performed to ensure that containers used to hold hazardous waste in SAAs are in good condition. If a container is defective, the waste is removed and transferred to another container. Procedures address waste/container compatibility and the requirement that containers are closed except when waste is being added or removed. Procedures address the requirement that containers shall not be opened, handled, or stored in a manner that could cause the container to rupture or leak by requiring the inspection of containers before and after transportation from the SAA to the staging area.
18. Accumulation Time, 40 CFR § 262.34(c)(1)(ii) (20.4.1.300 NMAC)	*Marking of each hazardous waste container as "hazardous waste" is required.* Applicable WIPP procedures are in place, and weekly inspections are conducted, to verify that each container of hazardous waste in an SAA is clearly marked as hazardous waste.
19. Accumulation Time, 40 CFR § 262.34(c)(2) (20.4.1.300 NMAC)	*If waste accumulates in one of the SAAs in excess of the 55-gallon or 1-quart limit, the container(s) containing the excess waste must be marked with the date on which excess waste began accumulating, and excess accumulation wastes must be moved to the 90-day storage area within three days.* Procedures and weekly inspections ensure that waste in an SAA is moved to the 90-day accumulation area before excess amounts are accumulated. There were no excess accumulations in the SAAs during this reporting period.

Table 24: Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 20.4.1.300 NMAC

Regulatory Requirement	WIPP Compliance
20. Record-Keeping, 40 CFR § 262.40 (20.4.1.300 NMAC)	*Manifests, test results, waste analyses, biennial reports, and exception reports must be kept on-site for at least three years.* Required records are maintained by the WIPP on site for a minimum of three years. Waste analyses and reports supporting LDRs are kept on file for a minimum of three years.
21. Biennial Report, 40 CFR § 262.41 (20.4.1.300 NMAC)	*Each generator of hazardous waste that ships the waste off-site to an approved TSDF must file a report to the EPA by March 1 of every even-numbered year. This report is required to contain a description of the efforts undertaken during the year to reduce the volume and toxicity of the waste and a comparison of the volume and toxicity of the waste to previous years.* The most recent Generator-Biennial Report was submitted in February 2016 (DOE, 2016a).
22. Exception Reporting, 40 CFR § 262.42 (20.4.1.300 NMAC)	*Exception reporting is required if a copy of the manifest is not returned to the generator within 45 days of the date of acceptance of the hazardous waste by the transporter.* The WIPP hazardous waste management procedures address exception reporting. No exception reports were required during this reporting period.
23. Additional Reporting, 40 CFR § 262.43 (20.4.1.300 NMAC)	*The Secretary, as he or she deems necessary, may require generators to furnish additional reports concerning the quantities and disposition of wastes identified or listed in 40 CFR Part 261.* No additional reports have been requested during this reporting period.
24. Special Requirements for Generators of Between 100 and 1,000 Kilograms Per Month, 40 CFR § 262.44 (20.4.1.300 NMAC)	*A generator of greater than 100 kilograms (kg) but less than 1,000 kg of hazardous waste in a calendar month is subject to only … record keeping; … exception reporting; and … additional reporting requirements.* The WIPP is a large-quantity generator (over 1,000 kg in any calendar month). This regulation is not applicable.
25. Standards; Containers 40 CFR § 264.1086(c)(4)(iii) (20.4.1.500 NMAC)	*When a defect is detected for the container, cover, or closure devices, the owner or operator shall make first efforts at repair of the defect no later than 24 hours after detection and repair shall be completed as soon as possible but no later than five calendar days after detection. If repair of a defect cannot be completed within five calendar days, then the hazardous waste shall be removed from the container and the container shall not be used to manage hazardous waste until the defect is repaired.* If the contents of a leaking container cannot be immediately transferred to a nondefective container, NWP personnel will temporarily plug or patch the leak as soon as it is detected. As soon as possible after a container defect is detected, but no later than the end of the work shift, NWP personnel transfer hazardous waste into a nondefective container or place the defective container inside a larger, compliant overpack container. Empty defective containers are crushed and sent to a scrap metal recycler. Repaired containers are not used at the WIPP.

25.2.2 Compliance with Standards Applicable to Transporters of Hazardous Waste, 40 CFR Part 263 (20.4.1.400 NMAC)

The DOE conducts assessments or audits to review compliance with requirements of applicable federal regulations and DOE orders that pertain to hazardous waste transportation activities. A summary of the requirements for transporters of hazardous or mixed waste and the compliance status of each requirement is provided in Table 25.

Table 25: Status of Compliance with Standards Applicable to Transporters of Hazardous Waste, 40 CFR Part 263 (20.4.1.400 NMAC)

Regulatory Requirement	WIPP Compliance
1. General, 40 CFR § 263.10(a) (20.4.1.400 NMAC)	*Transporters of hazardous/mixed waste must comply with applicable DOT regulations.* Cast Specialty Transportation, Inc., and Visionary Solutions, LLC, were contracted to transport TRU waste to the WIPP from the generator sites during this reporting period. DOE transportation management programs incorporate applicable DOT regulations from 40 CFR Part 263. A transporter hired to transport TRU and TRU mixed waste from the generator sites to the WIPP, or to transport site-generated waste from the WIPP to an off-site TSDF, must comply with DOT regulations.
2. EPA Identification Number, 40 CFR § 263.11 (20.4.1.400 NMAC)	*The transporter of hazardous waste must have an EPA identification number from the EPA Administrator.* A transporter hired to ship TRU and TRU mixed waste to the WIPP has an EPA identification number. The transporters used to transport site-generated hazardous and mixed waste from the WIPP to off-site TSDFs must have EPA identification numbers. During this BECR reporting period, the following transporters were used for off-site transportation of site-generated hazardous and mixed waste: Hittman Transport and Advanced Chemical Transport.
3. Compliance with the Manifest System and with Record-Keeping, 40 CFR §§ 263.20 through 263.22 (20.4.1.400 NMAC)	*The transporter must comply with relevant manifest and recordkeeping requirements.* The WIPP transportation management plans require that transporters comply with requirements of the manifest system. A transporter hired to ship TRU mixed waste to the WIPP must comply with these requirements. When shipments of TRU mixed waste are received at the WIPP, the manifest is signed and a copy is immediately given to the transporter. Applicable records are maintained by the WIPP. Transporters of site-generated hazardous and mixed waste are given copies of manifests that include both transporter and generator signatures before leaving the WIPP. Transporters ensure that the manifests accompany the hazardous waste shipments and are signed and delivered to the designated TSDF.

Table 25: Status of Compliance with Standards Applicable to Transporters of Hazardous Waste, 40 CFR Part 263 (20.4.1.400 NMAC)

Regulatory Requirement	WIPP Compliance
4. Hazardous Waste Discharges, 40 CFR § 263.30 (20.4.1.400 NMAC)	*The transporter will take appropriate immediate action in the event of a discharge of hazardous waste during transportation.* The WIPP transportation management plans address actions that are undertaken to protect human health and the environment. A transporter that ships TRU mixed waste to the WIPP must have these capabilities. No hazardous waste discharges occurred during transportation for this reporting period. Transporters used for site-generated hazardous and mixed waste shipments to off-site TSDFs have spill control plans that address hazardous or mixed waste discharges during shipment. No hazardous or mixed waste discharges occurred during this reporting period.
5. Discharge Cleanup, 40 CFR § 263.31 (20.4.1.400 NMAC)	*A transporter must clean up any hazardous waste discharge that occurs during transportation or must take any action(s) required by federal, state, or local officials to render the discharge nonhazardous to human health and the environment.* In the event of a hazardous waste discharge during transportation, cleanup activities will be undertaken, as required. A transporter of TRU waste to the WIPP must be capable of ensuring adequate cleanup of hazardous or mixed waste released to the environment during a transportation incident or accident. No hazardous or mixed waste discharges occurred during this reporting period. Transporters used for site-generated hazardous or mixed waste shipments carry spill control plans and cleanup equipment. In the event of a hazardous or mixed waste discharge, cleanup activities will be undertaken. There were no hazardous or mixed waste discharges during this reporting period.

25.2.3 Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

An operating permit for the WIPP was issued on October 27, 1999 (NMED, 1999). The permit authorized the Permittees to receive TRU and TRU mixed waste, store the waste, and dispose of the waste in underground hazardous waste disposal units (HWDUs). The NMED issued the WIPP Permit 10-year renewal on November 30, 2010 (NMED, 2010a). Applicable requirements of a permitted RCRA disposal facility are described in Table 26.

For this reporting period, the NMED issued two administrative orders (AO2 and AO3), although three were issued in 2014 (NMED, 2014a, 2014b, 2014c). AO1 addressed Permit requirements that could not be met due to inaccessibility to the surface for normal activities. AO1, issued on February 27, 2014, provided for monitoring and reporting to NMED the status of recovery from the two February 2014 events (NMED, 2014a). It required weekly reporting on above-ground compliance and permitted surface-related requirements. The weekly reports are available online at: http://www.wipp.energy.gov/library/Information_Repository.htm**.**

AO2, issued May 12, 2014, addressed the Permit requirements for the WIPP underground. Due to the accumulation of soot and radiological contamination from the February 5 and 14, 2014, events, the Permittees began developing plans for repository recovery, which included methodically surveying the underground for contamination, proceeding with mine stabilization,

and conducting decontamination of equipment, surfaces, and structures. It was expected that areas of the underground would be inaccessible for a prolonged period of time until recovery efforts could be initiated and/or completed. Due to the inaccessibility of portions of the underground, underground equipment inspections, VOC monitoring, geotechnical monitoring, hydrogen and methane monitoring, and mine-ventilation-rate monitoring could not be conducted by the Permittees. Additionally, the Permit did not address storage of derived waste in the underground, which became necessary due to the decontamination efforts.

Because certain Permit-required activities were unable to be performed, the NMED directed the Permittees to prepare and submit an underground compliance plan for review and comment. This plan was to contain a detailed compliance schedule for requirements that could not be met, including identification of underground Permit requirements, compliance status, and a schedule for achieving compliance and underground recovery. AO2 specified that upon resolution of the NMED comments, future revisions or updates to the *Underground Compliance Plan* were to be reviewed and approved by the NMED prior to the changes being implemented (NMED, 2014b).

The Permittees submitted the draft *Underground Compliance Plan* to the NMED on June 25, 2014. However, much of the plan was contingent upon the Permittees' decisions relative to a path forward for recovery of the facility. Consequently, on September 24, 2014, the NMED notified the Permittees that it had suspended review of the draft plan pending the release of the Waste Isolation Pilot Plant Recovery Plan (NMED, 2014d). The NMED directed that, upon finalization of the WIPP Recovery Plan, the Permittees would provide an updated *Underground Compliance Plan,* which was submitted to the NMED on October 20, 2014. The revised plan described the activities for completion before recovery of the facility could commence. Activities such as ensuring mine stability and adequate ventilation were necessary to establish the safety and habitability of the underground. Cleaning of the hoist from the unrelated fire of the salt-haul truck was required to ensure that there was alternate egress from the mine. To facilitate the recovery process, the underground was divided into specific areas called zones. Within each zone, a sequence of activities was to take place before normal, or limited, activities could resume. Designation of zones and the timing of these activities were based, to some extent, on the amount of contamination anticipated or measured. According to the plan, as zones were released in the underground, Permit-required activities would be scheduled to resume as normal tasks, subject to limitations imposed by the recovery process (e.g., scheduled high-efficiency particulate air filter change-outs). In the revised *Underground Compliance Plan*, the Permittees committed to provide a status of activities that would enable the recovery and resumption of Permit-required underground inspections and monitoring in the regularly scheduled reports to the NMED. An updated *Underground Compliance Plan* had not been submitted as of the end of the reporting period of March 31, 2016.

Before the February 14, 2014, radiological event, derived waste was generated in the WHB from radiological swipes generated during waste receipt or clean-up of surface contamination at the facility. Up to that point, derived waste was stored in the WHB permitted unit on the surface prior to disposal in the underground. Storage of derived waste in the WIPP underground was not needed prior to the radiological event. AO2 directed the Permittees to develop an underground derived waste storage plan to be submitted to the NMED for approval. Specifically, the NMED directed the Permittees to provide a detailed description of the underground derived waste storage areas, the ventilation volumetric flow rate in those areas (including how it is protective of human health and the environment), and how derived waste storage would be achieved in compliance with 40 CFR Part 264, Subpart I, Use and Management of Containers; the WIPP Treatment, Storage, and Disposal Facility Waste Acceptance Criteria; and other applicable RCRA and Permit requirements. Similar to the *Underground Compliance Plan,* future

revisions or updates to the *Underground Derived Waste Storage Plan* will be reviewed by the NMED prior to the changes being implemented.

The Permittees submitted the *Underground Derived Waste Storage Plan* to NMED on June 25, 2014, in accordance with AO2. The RCRA and Permit requirements addressed in the Plan included traffic patterns for the derived waste, inspections, and minimum aisle space. The WIPP WAC has provisions for management, storage, and disposal of certain PCBs. However, there was no indication that the waste streams associated with the exothermic reaction contained PCBs. If PCBs were to be discovered in the derived waste from the clean-up of the underground, the Permittees would notify the EPA Region 6 and wait for the EPA to submit a written approval authorizing the new storage areas. On December 2, 2014, the NMED approved the plan with comments and directed the Permittees to submit a revision to the *Underground Derived Waste Storage Plan* that addressed the comments and incorporated necessary revisions. A revised *Underground Derived Waste Storage Plan* was submitted to the NMED on January 6, 2015.

Additionally, AO2 augmented the reporting period prescribed by AO1 from weekly to bi-weekly and augmented information required by AO1 to include the following information:

- The current status of activities required by Attachment D of the Permit, RCRA Contingency Plan
- Updates on activities performed pursuant to the *Underground Compliance Plan*
- Updates on activities performed pursuant to the *Underground Derived Waste Storage Plan*, including a description of any underground derived waste produced, the contents, container type, container location, total container count, and approximate volume of derived waste per container
- The status of the underground, including the accessibility for personnel performing Permit-required activities, the status of recovery activities, and the status of underground inspections required by the Permit
- A listing of additional requirements placed upon the WIPP by any state or federal agency related to corrective actions resulting from the two incidents
- A waste emplacement layout map of Panel 7, Room 7
- The most recent Weekly Map update showing waste disposal and mining activities in Panels 7 and 8
- Documentation of the “as found” condition of Panel 7, including relevant photographs
- Documentation of the “as found” condition of the Panel 6 partial closure system, including relevant photographs
- A summary of recovery-related work in Panel 7, including relevant photographs
- A status of the WHB and Waste Shaft soot clean-up activities

The NMED also directed the Permittees to add trichloroethylene (TCE) to the list of VOC target analytes monitored. The Permittees submitted a Class 2 PMR on September 8, 2015, to NMED to add TCE to the Permit-specified target analyte list, and also to make other program changes, including monitoring at surface locations.

AO2 set forth the requirement that, under no circumstances, would the Permittees resume normal operations at the WIPP without the prior inspection and approval of the NMED. Furthermore, the NMED directed the Permittees to submit a detailed compliance schedule with the compliance status of each underground Permit requirement, a proposed timeline, including dates, for compliance and achieving underground recovery; plans related to attaining compliance with the Permit; the reasons for Permit noncompliance; and any other pertinent information. The Permittees submitted this information to the NMED on June 25, 2014.

AO3, issued May 20, 2014, exclusively addressed the new requirement for a *WIPP Nitrate Salt Bearing Waste Container Isolation Plan*. This plan was to contain a detailed proposal for expedited closure of underground hazardous waste storage unit Panel 6 and Room 7, Panel 7, where suspect LANL waste containing nitrate salts mixed with organic absorbent was emplaced, including schedules for those closures. It was suspected that the exothermic reaction causing the radiological release in the WIPP underground occurred in one container of waste from a LANL nitrate salt-bearing waste stream. Nitrate salts came into contact with an organic sorbent, causing the exothermic reaction and a breach of the container. At the time of the third administrative order, it was believed that 368 containers contained similar nitrate-salt-bearing waste in the WIPP underground: 313 in Panel 6 and 55 in Room 7 of Panel 7.

As directed by the NMED administrative order, the Permittees submitted the *WIPP Nitrate Salt Bearing Waste Container Isolation Plan* on May 30, 2014. The plan included a detailed proposal for the expedited closure of underground hazardous waste storage units in Panel 6 and Room 7 of Panel 7 to mitigate the threat of a radioactive material release. The plan included information regarding the volumetric flow rate for ventilation in the WIPP underground, a discussion of how the volumetric flow rate is protective of human health and the environment through continued filtration, and a description of how volumetric flow rate will be achieved while the Plan was being implemented.

On August 5, 2014, the NMED approved the Permittees' proposals for the initial closure of Panel 6 and to continue to use the mine ventilation system in filtration mode. However, the NMED provided comments and requested that the Plan be revised and resubmitted. The revised *WIPP Nitrate Salt Bearing Waste Container Isolation Plan*, submitted September 30, 2014, included an updated description of the WIPP Recovery Plan; additional detail regarding the schedule for final closure of Panel 6 (preventing further access to the panel), and closure of Panel 7, Room 7 (establishing a barrier, but one that could allow later access); analysis that supports the assumptions regarding possible hazards posed by nitrate salt bearing waste in Panel 6 and Panel 7, Room 7; and additional detail regarding ventilation enhancements for accomplishing the work as proposed.

The NMED provided further direction to the Permittees on March 30, 2015, which included the following: (1) an approval of the proposed closure for Panel 7, Room 7; (2) specification that the permanent closure for Panel 6 was to be approved through the regulatory permit modification process; and (3) a request for an update to Revision 1 of the plan. Revision 2 of the *WIPP Nitrate Salt Bearing Waste Container Isolation Plan* was submitted to the NMED on May 29, 2015.

On June 2, 2015, the DOE announced the isolation of waste containers from the LANL nitrate salt bearing waste stream. Closure of the WIPP Panel 7, Room 7 was completed on May 29, 2015 following the initial closure of Panel 6 on May 13, 2015, in compliance with the NMED administrative order. This information may be found on the WIPP Recovery website at http://www.wipp.energy.gov/pr/2015/Nitrate_waste_stream_isolated_at_WIPP.pdf.

On January 22, 2016, the NMED issued the Settlement Agreement and Stipulated Final Order (NMED, 2016a) for the purpose of resolving ACO HWB-14-21, dated December 6, 2014. The ACO HWB-14-21 was issued to the Permittees for violations of the Hazardous Waste Act, the Hazardous Waste Management Regulations and the Facility Permit, EPA I.D. Number NM4890139088-TSDF. The NMED, DOE, and NWP agreed to settle those violations identified in the ACO HWB-14-21, through corrective actions (presented as Attachment A of the Settlement Agreement and Stipulated Final Order), monthly NMED appraisal of corrective action progress, and submittal of evidence of completion within 60 calendar days of the effective date of the Settlement Agreement (unless an alternative date is approved by NMED). The evidence of completion was submitted to the NMED on March 18, 2016. The evidence of completion submittal consisted of the required documentation prescribed in Attachment A of the Settlement Agreement and Stipulated Final Order, including four work plans. These work plans consisted of anticipated dates of completion that were beyond the 60 calendar day deadline. The Permittees submit monthly progress reports to the NMED on the corrective actions found in in these work plans.

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
1. Purpose, Scope and Applicability, 40 CFR § 264.10 (20.4.1.500 NMAC)	*The regulations in Subpart B apply to owners and operators of hazardous waste facilities, except as 40 CFR § 264.1 provides otherwise.* The portions of Subpart B applicable to the WIPP are identified in 40 CFR §§ 264.11 through 264.18, and this table.
2. Identification Number, 40 CFR § 264.11 (20.4.1.500 NMAC)	*Each TSDF must have an EPA identification number.* The EPA identification number for the WIPP is NM4890139088.
3. Required Notices, 40 CFR § 264.12(b) (20.4.1.500 NMAC)	*The owner or operator of a facility that receives waste from an off-site source must inform the generator that the appropriate permits are in place and the waste will be accepted.* On January 12, 2000, the DOE sent notification to applicable generators that a permit had been received. As new generators become certified under the WIPP TRU program, notifications are sent to the generators stating that the appropriate permits are in place and that waste meeting the WIPP WAC will be accepted in accordance with the WIPP Permit. No new generators were identified for this reporting period. Therefore, no notifications were sent.
4. General Waste Analysis, 40 CFR § 264.13 (20.4.1.500 NMAC)	*A detailed chemical and physical analysis of a representative sample of the wastes is required before a TSDF may treat, store, or dispose of waste. The owner/operator of the TSDF must inspect and, if necessary, analyze the waste received to ensure that it matches the identity of the waste described in the accompanying manifest. The owner/operator must follow a written WAP to ensure compliance with these requirements.* General waste analysis is addressed in the WIPP Permit Part 2, General Facility Conditions, and WIPP Permit Attachments C, Waste Analysis Plan;

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	C1, Waste Characterization Sampling Methods; C3, Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Methods; C4, TRU Mixed Waste Characterization Using Acceptable Knowledge; C5, Quality Assurance Project Plan Requirements; C6, Audit and Surveillance Program; and C7, TRU Waste Confirmation. Characterization methods consist of acceptable knowledge, visual examination, radiography, and additional sampling and analysis for homogeneous solids, soil, and gravel waste forms. The Permittees examine a representative subpopulation of the waste prior to shipment to confirm that the waste contains no ignitable, corrosive or reactive waste and that the EPA hazardous waste numbers are allowed by the permit. The NMED ACO No. HWB-14-21, Section II, Paragraphs 116 and 117, describe the agency's alleged violations of this requirement. On December 30, 2014, the NMED docketed an Order Granting an Extension of Time To File an Answer and Request a Hearing for the CBFO and NWP. On January 9, 2015, the Respondents filed a Request for Hearing and Answer. On January 22, 2016, the NMED issued the Settlement Agreement and Stipulated Final Order for the purpose of resolving ACO HWB-14-21. Corrective actions regarding items 116 and 117 of the ACO are described in Attachment A of the Settlement Agreement and Stipulated Final Order. Corrective actions include the creation of work plans and the submittal of revised procedures and interface agreements to address accepting D001 waste and incompatible waste (NMED, 2016a).
5. Security, 40 CFR § 264.14 (20.4.1.500 NMAC)	*Security measures are required to prevent the possibility of unknowing and/or unauthorized entry by persons or livestock onto the active portion of the facility. A 24-hour surveillance system or barrier is required, and the facility must be posted.* Security requirements are contained in the WIPP Permit, Part 2, Section 2.6, Security. The WIPP Property Protection Area is enclosed within an 8-foot high chain-link fence, and 24-hour surveillance is conducted by guards trained to prevent unauthorized entry onto the facility. Signs are posted with the legend "Danger—Authorized Personnel Only" in both English and Spanish. The perimeter fence, gates, and signs are inspected daily for evidence of tampering or structural damage in accordance with Permittee-approved procedures, under the WIPP Security Plan umbrella.
6. General Inspection Requirements, 40 CFR § 264.15 (20.4.1.500 NMAC)	*The owner/operator must inspect the facility for malfunctions, deterioration, operator errors, and discharges that cause actual or potential releases of hazardous constituents to the environment or a threat to human health. A written schedule must be developed and followed for inspecting monitoring, safety, and emergency equipment; security devices; and operating/structural equipment needed to prevent, detect, or respond to environmental or human health hazards. The inspections must be recorded in an inspection log or summary and kept for at least three years.* The Permittees implement inspection procedures for monitoring, safety, and emergency equipment; security devices; and operating and structural equipment. Written schedules (WIPP Permit Attachment E, Inspection Schedule, Process, and Forms) establish the frequency of routine inspections. Cognizant individuals develop and maintain procedures that outline the types of inspections of equipment and systems that will be performed. Each organization responsible for inspections maintains its own inspection information. Completed inspection sheets include a signature, date and time of inspection; observations made; and the date and nature of repairs or remedial

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	actions. Inspection documentation is maintained in the operating record for a minimum of three years. The fire event and radiological event in February 2014 disrupted completion of some routine inspections as outlined in Permit Attachment E, Tables E-1 and E-1A. After notification to the NMED of the events and in recognition that the WIPP would not be able to resume normal activities for a protracted period of time, the NMED issued an administrative order (AO1) on February 27, 2014, followed by an administrative order on May 12 (AO2). These administrative orders provided instruction on how to address inspections that could not be completed due to inaccessibility of portions of the underground. These orders required the permittees to submit routine reports that included the status of permit-required surface and underground inspections. Further directives from the NMED adjusted the submission frequency. The reports were submitted as follows: • Weekly, beginning March 14, 2014 • Bi-Weekly, beginning June 13, 2014 • Monthly, beginning October 15, 2014 Reports submitted to the NMED under the administrative orders can be accessed from the WIPP Information Repository. Documents for this reporting period are located at: http://www.wipp.energy.gov/library/Information_Repository.htm
7. Personnel Training, 40 CFR § 264.16 (20.4.1.500 NMAC)	*Personnel training must be provided to facility personnel within six months of their employment or new assignment; personnel must not work in unsupervised positions until the training has been completed. The training program must be designed to ensure that facility personnel can respond effectively to an emergency. The training program must teach personnel those hazardous waste management procedures that are relevant to the positions in which they are employed. The program must be directed by a person trained in hazardous waste management procedures. The job title for each position at the facility that is related to hazardous waste management, the name of the employee filling the position, a written description of the training required, and records that document that the training and/or job experience has been completed are also required. These records must be kept until closure for current personnel and for at least three years for former employees.* Training requirements are specified in the WIPP Permit Attachments F, Personnel Training; F-1a, Job Title/Job Description; and F-1b, Training Content, Frequency, and Techniques. Attachment F1, RCRA Hazardous Waste Management Job Titles and Descriptions, lists applicable job titles with detailed descriptions, and Attachment F2, Training Course and Qualification Card Outlines, describes the training courses required by the WIPP Permit. Training is conducted in accordance with the WIPP Training Program WP 14-TR.01 (NWPi) and associated procedures. The training includes General Employee Training for WIPP employees, other classroom training, and on-the-job training. WIPP-related training is conducted by qualified instructors. The Permittees maintain a listing of hazardous waste management job titles, names and titles of employees assigned to hazardous waste management jobs, and job descriptions that identify RCRA duties. Records on active and inactive personnel are kept at the WIPP for the specified time periods. The AIB Reports for the fire event and radiological event identified some

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	aspects of training as contributing causes. Training areas identified in the reports that are related to this requirement were emergency management, fire response, and radiological worker. The Judgments of Need identified in the DOE and NWP corrective action plans identify the bases and actions that are being taken to ensure compliance with training requirements (DOE, 2015i; NWP, 2015). General Employee Training and the Emergency Management Training Plan have been revised and a Fire Department Training Plan has been developed to enhance training of personnel and responders. Drills and exercises are performed at a greater frequency to compliment training and response.
8. General Requirements for Ignitable, Reactive, or Incompatible Wastes, 40 CFR § 264.17 (20.4.1.500 NMAC)	*Precautions must be taken to prevent accidental ignition or reaction of ignitable or reactive waste. Any mixture or commingling of incompatible wastes must be conducted so that it does not generate extreme heat or pressure, fire or explosion, violent reaction; does not produce uncontrolled toxic airborne materials; does not produce uncontrolled flammable fumes or gases; does not damage the structural integrity of the device or facility; or does not threaten human health or the environment.* The WIPP is prohibited from accepting ignitable, corrosive, or reactive waste as specified in the WIPP Permit Part 2, General Facility Conditions, and Attachment C, Waste Analysis Plan. Addendum B2 of the WIPP Permit Application, Chemical Compatibility Analyses of Waste Forms and Container Materials, reported the results of an analysis of the compatibility of the TRU waste streams with each other and with waste containers, backfill, and other facility materials. On July 30, 2014, the Permittees notified the NMED that they were provisionally applying the D001 hazardous waste number to 368 containers from LANL waste stream LA-MIN02-V.001 based on continuing investigations into the cause of the radiological release. On September 5, 2014, the Permittees provided the NMED with corrections to the discrepant hazardous waste manifests associated with the 368 containers. The NMED Compliance Order No. HWB-14-21, Items 116 and 117 describe the violations of this requirement. On December 30, 2014, NMED docketed an Order Granting an Extension of Time To File An Answer and Request a Hearing for the CBFO and NWP. On January 9, 2015, the Respondents filed a Request for Hearing and Answer.
9. Location Standards, 40 CFR § 264.18 (20.4.1.500 NMAC)	*Facilities where disposal of hazardous waste will be conducted must not be located near a fault as listed in 40 CFR § 270.14(b)(11). Facilities in a 100-year flood plain must be designed, constructed, operated, and maintained to prevent washout by a 100-year flood. No noncontainerized or bulk liquid hazardous waste may be emplaced in such structures as a salt bed formation or an underground mine except at the DOE WIPP in New Mexico.* Eddy County is not listed as a political jurisdiction in which compliance with the seismic standard of 40 CFR § 264.18(a) must be demonstrated. The WIPP does not lie within a 100-year flood plain.
10. Design and Operation of Facility, 40 CFR § 264.31 (20.4.1.500 NMAC)	*Facilities must be designed, constructed, maintained, and operated to minimize the possibility of fire, explosions, or any unplanned release of hazardous constituents to air, soil, or surface water that could threaten human health or the environment.*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	Waste-handling facilities are designed, constructed, maintained, and operated to minimize the possibility of a fire, explosions or any unplanned release of hazardous waste or hazardous waste constituents. General facility conditions for maintenance and operation of the WIPP are stated in the WIPP Permit Part 2, General Facility Conditions. Preventive procedures, structures, and equipment are specified in the WIPP Permit Part 2, Section 2.10, Preparedness and Prevention. An inspection schedule for equipment instrumental in preventing, detecting, or responding to environmental or human health hazards is given in the WIPP Permit Attachment E, Inspection Schedule, Process and Forms. WIPP Permit Attachment D, RCRA Contingency Plan, defines the responsibilities and coordination of activities to minimize hazards to human health and the environment from fires, explosions, or release of hazardous waste or hazardous waste constituents to air, soil, or surface water. This plan also consists of descriptions of processes and emergency responses to hazardous substances, CH and RH-TRU mixed waste, and other hazardous waste handled at the WIPP. The AIB reports for the February 2014 events identified that lack of effectiveness of the maintenance program was a contributing factor to both events. The corrective action plans address the contributing causes through improved CBFO oversight of the NWP Maintenance Program and NWP developing a comprehensive Maintenance Program to meet requirements for maintenance and reliable performance of structures, systems, and components. During development of the enhanced NWP Maintenance Program, existing inspection and preventive maintenance activities defined in the Permit continue to be completed in accordance with the appropriate authorizations (Permit and/or administrative orders).
11. Required Equipment, 40 CFR § 264.32 (20.4.1.500 NMAC)	*All facilities must be equipped with an internal communications or alarm system for immediate emergency instruction; devices to summon external emergency assistance; fire extinguishers and fire-control, spill-control, and decontamination equipment; and water or foam equipment, sprinklers, or water-spray systems.* The intraplant communication systems, designed to provide immediate emergency instructions to facility personnel, include communication by the PA system and its intercom phones and paging channels, an intraplant telephone system, mine phones, pagers and plectrons, portable two-way radios, and local and facility-wide alarm systems. The procedures for notifying facility personnel of an emergency are described in the RCRA Contingency Plan, WIPP Permit Attachment D. Various alarm systems are used at the WIPP. The PA system has two alarm tones in use, a yelp and a gong. Its signals are produced in the master PA system console by a tone generator and are transmitted sitewide over the paging channel of the system, overriding normal use. Whenever TRU mixed wastes are handled, two people, at a minimum, are involved in the operation. The WHB contains readily accessible telephones and PA stations throughout. The mine phones are the primary means of communication underground, although the PA system is also available. Underground communication and alarm systems are arranged to meet the requirements of 30 CFR § 57.4360, which regulates the operation of underground mines and is required by the Mine Safety and Health Administration. Telephones or other two-way communication equipment are provided for communications from underground to the surface. Alarm systems capable of promptly warning personnel in the underground are provided and maintained in operating condition. Typically, these provisions include a

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	flashing light positioned to be easily seen. If personnel are assigned to work areas beyond the warning capabilities of the system, provisions are made to alert them and to provide for their safe evacuation. The external communication systems, designed to provide two-way communication with outside agencies or for summoning emergency assistance from off-site, include the commercial telephone system and two-way radios. The WIPP Permit Part 2, General Facility Conditions, specifies preventive procedures, structures, and equipment. The RCRA Contingency Plan, WIPP Permit Attachment D, describes the capabilities and locations of the fire-suppression equipment and systems. The WIPP water system supplies water for domestic use and fire protection. Water is furnished by the City of Carlsbad. Fire sprinkler systems are installed in the Pumphouse, the Guard and Security Building, the Support Building, the WHB, the Exhaust Filter Building, the TRUPACT Maintenance Facility, the Engineering Building, the Safety and Emergency Services Building, the Training Building, trailers and several other warehouse and maintenance buildings. The WIPP maintains a fire brigade and has on-site fire fighting equipment. Fire hydrants and hose connections for fire fighting are located throughout the facility. There is no fire fighting water supply system underground. Instead, the underground is equipped with fire extinguishers of various types and in various locations (including vehicles), and a fire truck with a dry chemical extinguisher and a foam extinguisher. The underground fuel station is equipped with an automatic dry chemical extinguishing system. The subsequent accident investigation report (DOE, 2014d) regarding the 2014 salt haul truck identified issues with the underground evacuation alarm and strobe, the onboard fire suppression system on the haul truck, the use of fire extinguishers, operation of the equipment, and the associated training and drills. Actions are in progress to correct the identified deficiencies. The DOE and the NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with requirements (DOE, 2015i; NWP, 2015).

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
12. Testing and Maintenance of Equipment, 40 CFR § 264.33 (20.4.1.500 NMAC)	*All facility communications or alarm systems and fire-control, spill-control, and decontamination equipment must be tested and maintained as needed to ensure its proper operation during an emergency.* Equipment instrumental in preventing, detecting, or responding to environmental or human health hazards, such as alarm systems, fire protection equipment, and decontamination equipment, are tested and maintained to ensure proper operation in a time of emergency. Alarms, spill control, and decontamination equipment are inspected periodically in accordance with the WIPP Permit Attachment E, Inspection Schedule, Process and Forms. The subsequent accident investigation report regarding the salt haul truck fire in February 2014 (DOE, 2014d) identified issues with maintenance of the specific haul truck and other underground equipment. Identified issues included, but are not limited to, discrepancies between manufacturer maintenance recommendations and actual maintenance performed, and various underground components that were either out of service or being configured in a manner that hampered communications and critical equipment operations during an emergency. Corrective actions have been identified and are in progress to address the identified deficiencies. The DOE corrective action plan and the NWP identify the corrective actions that are being taken to ensure compliance with requirements (DOE, 2015i; NWP, 2015).
13. Access to Communications or Alarm Systems, 40 CFR § 264.34 (20.4.1.500 NMAC)	*Immediate access to a communications or internal alarm system is required for personnel involved when handling hazardous waste. If just one employee is ever on the premises during operations, he or she must have immediate access to a device (e.g., telephone) for summoning external emergency assistance.* The following communication and alarm systems are available at the WIPP: the PA system and its intercom phones and paging channels, an intraplant telephone system, mine phones, local and facility-wide alarm systems, pagers and plectrons, and portable two-way radios. The WIPP Permit Part 2, Section 2.10, Preparedness and Prevention, specifies preventive procedures, structures, and equipment. The WIPP Permit, Attachment E, Inspection Schedule, Process and Forms, provides an inspection schedule for this equipment and describes its location. Alarms and telephones are strategically placed in and adjacent to hazardous and TRU waste management facilities. There is more than one employee on the premises at all times.
14. Required Aisle Space, 40 CFR § 264.35 (20.4.1.500 NMAC)	*Aisle space must be maintained to allow the unobstructed movement of personnel and of fire-protection, spill-control, and decontamination equipment to any area of facility operation unless aisle space is not needed for these purposes.* The WIPP Permit, Part 2, General Facility Conditions, and Section 2.10, Preparedness and Prevention, and Permittee procedures, and Part 3, Container Storage, call for maintaining appropriate aisle space for all stored waste in the WHB. No aisle space is required to be maintained between containers permanently emplaced in the HWDUs as designated in WIPP Permit, Attachment A2, Geologic Repository. Aisle space requirements were maintained for this reporting period.
15. Arrangements with Local Authorities, 40 CFR § 264.37	*Arrangements with local authorities must be made for the provision of emergency services if needed. Requirements include familiarizing the local authorities with the layout of the facility,*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
(20.4.1.500 NMAC)	*properties of hazardous waste to be handled, possible evacuation routes, and other information needed for emergency responses.* The Permittees have established MOUs with off-site emergency response agencies for the provision of emergency services. Outside agencies with which MOUs have been established receive copies of the RCRA Contingency Plan and amendments as required by the WIPP Permit, Part 2, General Facility Conditions, and 40 CFR §§ 264.53 and 264.54.
16. Purpose and Implementation of Contingency Plan, 40 CFR § 264.51 (20.4.1.500 NMAC)	*Each owner/operator must have a contingency plan for their TSDF. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or unplanned releases of hazardous waste or hazardous constituents to the environment. The provisions of the plan must be carried out whenever a fire, explosion, or release of hazardous waste or hazardous constituents could threaten human health or the environment.* The RCRA Contingency Plan defines owner/operator responsibilities; provides guidance for coordination of activities; and is designed to minimize hazards to human health and the environment from fires, explosions, or unplanned release of hazardous waste or hazardous waste constituents. The facility remains in stand-down through the end of the reporting period. The RCRA Contingency Plan has been activated since April 11, 2014.
17. Content of Contingency Plan, 40 CFR § 264.52 (20.4.1.500 NMAC)	*The contingency plan must describe the actions taken by facility personnel in response to fires, explosions, or unplanned releases of hazardous waste or hazardous constituents to the environment. The plan must describe arrangements agreed to by local authorities and emergency response units and must list the current names, addresses, and phone numbers (work and home) of Emergency Coordinators. Emergency equipment must be listed, along with the location, description, and capabilities of the equipment. An evacuation plan for facility personnel must be included.* The RCRA Contingency Plan describes actions that must be taken in response to fires, explosions, or unplanned release of hazardous waste or hazardous waste constituents to air, soil, or water, and describes agreements with local authorities (police and fire departments, hospitals, contractors, and state and local emergency response teams). It also lists the names, addresses, and phone numbers of persons qualified to act as Emergency Coordinators, provides a list of emergency equipment at the facility, and includes an evacuation plan.
18. Copies of Contingency Plan, 40 CFR § 264.53 (20.4.1.500 NMAC)	*Copies of the contingency plan and revisions to the plan must be maintained at the facility and submitted to the local police and fire departments, hospitals, and state and local emergency response teams that may be called upon to provide emergency services.* Copies of the RCRA Contingency Plan are maintained at the WIPP at document locations accessible to emergency responders, and on the WIPP network available to WIPP personnel. The Permittees maintain a distribution list and are responsible for distributing the RCRA Contingency Plan to local officials and MOU agencies when the plan is modified. When the plan is revised, copies are provided to each outside agency with which the Permittees have agreements for assistance in an emergency.
19. Amendment of Contingency Plan, 40 CFR § 264.54	*The contingency plan must be reviewed and immediately revised, if necessary, whenever applicable regulations are revised; the*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
(20.4.1.500 NMAC)	*plan fails in an emergency; the facility changes in a way that increases the potential for fire, explosions, or release of hazardous waste; or the list of Emergency Coordinators or emergency equipment changes.* The RCRA Contingency Plan is reviewed at least annually, and the WIPP Permit is modified whenever applicable regulations are revised; the plan fails in an emergency; the facility changes in a way that materially increases the potential for fires, explosions, or releases of hazardous waste, hazardous waste constituents, or changes the response necessary in an emergency; the list of Emergency Coordinators changes; or the list of emergency equipment changes. The Contingency Plan was modified by several Class 1 Permit modifications dated November 7, 2014, February 13, 2015, August 27, 2015, September 30, 2015, December 30, 2015. Those modifications amended the following information: • Clarification that notification to the ERT and mine rescue team of an event may be performed using phones, pagers, or cellular phones and in the case of the mine rescue team, the PA system may also be used. • Updates to Table D-8 and D-9, Federal and State Hazardous Material Reporting Tables with current contact information. • Clarifications to ensure that the duties of the RCRA Emergency Coordinator and the Incident Commander are defined consistent with their training. • Updates to references. • Updates to the list of RCRA Emergency Coordinators for the WIPP. Copies of the modified RCRA Contingency Plan were distributed to the appropriate on-site departments and off-site agencies and the Secretary of the NMED. These modification were determined to be administratively complete by NMED on March 4, 2015 and January 27, 2016.
20. Emergency Coordinator, 40 CFR § 264.55 (20.4.1.500 NMAC)	*At least one employee (on the facility premises or on call) must be designated as the Emergency Coordinator, with the responsibility for coordinating emergency response measures. The Emergency Coordinator must be familiar with the contingency plan, operations and activities at the facility, the location and characteristics of waste handled, location of facility records, and the facility layout. The Emergency Coordinator must have the authority to commit the resources needed to carry out the contingency plan.* A RCRA Emergency Coordinator is on-site at the WIPP 24 hours a day, 7 days a week, and is responsible for coordinating emergency response measures. The primary RCRA Emergency Coordinator is the Facility Shift Manager, who is on duty at the time of any incident that requires implementation of the RCRA Contingency Plan. RCRA Emergency Coordinators are listed in the RCRA Contingency Plan. These employees have the requisite training, experience and authority to perform this role.
21. Emergency Procedures, 40 CFR § 264.56 (20.4.1.500 NMAC)	*In the event of an imminent or actual emergency, the Emergency Coordinator or designee must notify facility personnel via internal alarms or communications systems and must notify state or local agencies if help is needed. A release, fire, or explosion mandates that the Emergency Coordinator obtain appropriate information, assess possible hazards, make any notifications required, prevent the spread or reoccurrence of the incident, monitor if necessary,*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	recover waste, prevent handling of incompatible waste in the area, ensure that emergency equipment is cleaned up and fit for use after the event, and record details regarding the incident in the facility operating record. The owner or operator must note specific information about any incident that requires the contingency plan to be implemented. This information must be recorded in the facility operating record. A written report must be submitted to the regional EPA office and the NMED within 15 days of the incident. The NMED and the SERC must be contacted in the event of a spill incident that may endanger human health or the environment. The RCRA Emergency Coordinators are familiar with the RCRA Contingency Plan. Emergency management procedures incorporate provisions of the RCRA Contingency Plan, such as communicating emergency information to employees, notifying appropriate agencies to obtain assistance, identifying hazardous materials, assessing hazards, and making the necessary notifications. The appropriate agencies include the Carlsbad Police Department, the Carlsbad Fire Department, and the Eddy County Sheriff's Department. The Facility Shift Manager is responsible for coordinating the cleanup of spills. Disposal of the waste resulting from spill cleanup is the responsibility of the Permittees. Equipment used in an emergency is decontaminated before being placed back in service. If decontamination is not possible, equipment is disposed of according to Permittee procedures and replaced. Equipment listed in the plan is kept clean and fit for its intended use. As described in the plan, a daily log is maintained in the WIPP CMR. Incidents, regardless of whether or not they activate the plan, are recorded in the CMR log. The RCRA Contingency Plan addresses the requirement that the NMED and SERC must be notified in the event of a spill that would endanger human health or the environment. The RCRA Contingency Plan was implemented April 11, 2014. The DOE and NWP corrective action plans identify the corrective actions that are being taken to ensure compliance with requirements (DOE, 2015i; NWP, 2015). Specifically, the corrective action plans address the contributing causes related to notification of facility personnel of an imminent or actual event and ensure appropriate information is obtained, hazards are properly assessed, and notifications are made, as necessary, for an event.
22. Use of Manifest System, 40 CFR § 264.71 (20.4.1.500 NMAC)	*If a facility receives hazardous waste or hazardous constituents accompanied by a manifest, the owner or operator or designee must sign and date each copy of the manifest to certify receipt of the waste, note any significant discrepancies in the manifest, return at least one copy of the manifest to the transporter, send a copy of the manifest to the generator within 30 days, and retain a copy of the manifest for at least three years.* Permittee waste management and transportation procedures implement regulations on the use and retention of hazardous waste manifests. Generator sites are required to provide a manifest for shipments of TRU mixed waste. Significant manifest discrepancies are noted as required and a copy of the manifest is returned to the generator within 30 days. The Permittees were notified by LANL that manifest discrepancies occurred as indicated in the following link:

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	http://eprr.lanl.gov/oppie/service On September 5, 2014, the Permittees provided the NMED with corrections to the discrepant hazardous waste manifests associated with the 368 containers (49 discrepant manifests). The Permittees have corrected these discrepancies on a provisional basis. Relevant information has been sent to the NMED and the affected generator/storage facilities.
23. Manifest Discrepancies, 40 CFR § 264.72 (20.4.1.500 NMAC)	*Manifest discrepancies are differences between the quantity or type of hazardous waste designated in the manifest and that actually received. Upon discovering a significant discrepancy, the owner or operator must try to reconcile the discrepancy with the generator or transporter. If not resolved within 15 days, the owner or operator must notify the Secretary.* Permittee waste-handling and transportation procedures provide instruction and guidance for handling manifest discrepancies. The generator will be notified of discrepancies, and the discrepancies will be recorded in the remarks section of the appropriate form. If the discrepancies cannot be resolved within 15 days, they will be reported in writing to the Secretary of the NMED. Forty-nine manifest discrepancies were recorded during this reporting period (48 from LANL and one from Idaho National Laboratory) and subsequently reported to the NMED.
24. Operating Record, 40 CFR § 264.73 (20.4.1.500 NMAC)	*The owner/operator must keep a written operating record at the facility. Information relating to the type and amount of hazardous waste, its location and quantity at each location, cross-references to specific manifest documents and records and the results of waste analyses, summary reports and details of incidents requiring implementation of the contingency plan, records and results of inspections, monitoring and analytical data and any corrective actions taken, and closure cost estimates must be included. In addition, information on the annual certification of a waste minimization program must be kept in the operating record.* The WIPP Permit Part 2, General Facility Conditions, establishes, and the Permittees comply with, the requirements for maintaining the written operating record. Closure cost estimates are not required for the WIPP. The NMED modified 20.4.1.500 NMAC effective March 1, 2009, to require most records to be maintained until closure. The retention period for operating records specified by the WIPP Permit was revised with the permit renewal application. Annual certifications of the waste minimization program are kept in the operating record. The initial report of the RCRA Contingency Plan implementation was provided to the NMED on April 28, 2014. Six additional supplements to the report of implementation were provided to the NMED on July 7, 2014, August 18, 2014, March 23, 2015, May 8, 2015, September 16, 2015, and November 25, 2015. These reports are part of the RCRA operating record and are available at the facility. Copies of these supplements can be accessed through the WIPP Information Repository under the heading RCRA Contingency Plan Implementation Reports at the bottom of the webpage. The Information Repository is accessible at: http://www.wipp.energy.gov/library/Information_Repository.htm
25. Availability, Retention, and Disposition of Records, 40 CFR § 264.74 (20.4.1.500 NMAC)	*Records required under this part, including plans, must be retained and made available for inspection by Department designees. The retention period for records required under this part is automatically extended during the course of any unresolved enforcement action or as requested by the Secretary.*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	Records of waste disposal locations and quantities must be submitted to the appropriate agencies upon closure of the facility. The WIPP Permit establishes requirements for maintaining a written operating record. The Permittee implementation includes provisions for furnishing records upon request to the EPA and the NMED, as well as provisions for submitting a copy of waste emplacement locations and quantities to appropriate state and federal regulators. In the event of an enforcement action, records are retained for the duration of the action.
26. Biennial Report, 40 CFR § 264.75 (20.4.1.500 NMAC)	*The owner or operator of a TSDF must submit a copy of a biennial report to the Secretary by March 1 of each even-numbered year using EPA Form 8700-13B.* The Permittees submit TRU mixed waste data for the TSDF biennial report to the NMED. The last biennial report was submitted in February 2016 (DOE, 2016a).
27. Unmanifested Waste Report, 40 CFR § 264.76 (20.4.1.500 NMAC)	*A report must be submitted to the Secretary for any hazardous waste accepted for treatment, storage, or disposal that is not accompanied by a hazardous waste manifest.* As required by the WIPP Permit Part 2, Section 2.13, Manifest System; Permit Attachment C, Waste Analysis Plan; and the WIPP WAC, a hazardous waste manifest is transmitted with each shipment of TRU mixed waste to the WIPP. No unmanifested waste reports for hazardous waste shipments were required during this reporting period.
28. Additional Reports, 40 CFR § 264.77 (20.4.1.500 NMAC)	*Additional reports required of the owner or operator of a TSDF by the Secretary are reports relating to releases, fire, or explosions; groundwater contamination and monitoring data; facility closure; and air emissions under Subparts AA, BB, and CC of this part.* The NMED issued three administrative orders in response to the fire event and radiological event of 2014. The administrative orders required the following additional reports. • Periodic reports on the status of recovery from the two events. Initially the reports were required weekly, then frequency was changed by NMED to biweekly, and then monthly. • The Underground Compliance Plan was prepared and initially provided to the NMED on June 25, 2014, and subsequently updated on October 30, 2014. The NMED has not provided comments on the October 30 submittal. • The Underground Derived Waste Storage Plan was submitted on June 25, 2014, and was approved by the NMED on December 2, 2014. Revision 1 of the plan, addressing NMED comments, was submitted on January 6, 2015. • The WIPP Nitrate Salt Bearing Waste Container Isolation Plan was submitted to NMED on May 30, 2014, with approval of portions of the plan on August 5, 2014. Revision 1, addressing NMED comments on the initial submission, was submitted to NMED on September 30, 2015. On January 22, 2016, the NMED issued the Settlement Agreement and Stipulated Final Order (NMED, 2016a) for the purpose of resolving ACO HWB-14-21. The NMED, DOE, and NWP agreed to settle violations identified in the ACO HWB-14-21, through corrective actions (presented as Attachment A of the Settlement Agreement and Stipulated Final Order), monthly NMED appraisal of corrective action progress, and submittal of evidence of completion within 60 calendar days of the effective date of the Settlement

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	Agreement (unless and alternative date is approved by NMED.) The evidence of completion was submitted to the NMED on March 18, 2016. The evidence of completion submittal consisted of the required documentation prescribed in Attachment A of the Settlement Agreement and Stipulated Final Order, including four work plans. These work plans consisted of anticipated dates of completion that were beyond the 60 calendar day deadline. The Permittees submit monthly progress reports to the NMED on the corrective actions found in in these work plans. Reports are accessible from the WIPP Information Repository at: http://www.wipp.energy.gov/library/Information_Repository.htm.
29. Releases From Solid Waste Management Units, Applicability, 40 CFR § 264.90 (20.4.1.500 NMAC)	*A groundwater monitoring system is required by the owner or operator of a surface impoundment, landfill, or land treatment facility used to manage hazardous waste. All or part of the groundwater monitoring requirements may be waived if the owner/operator can demonstrate that there is no potential for migration of liquid from the facility via the uppermost aquifer to water supply wells or to surface water. The demonstration, in writing, must be certified by a qualified geologist or geotechnical engineer.* A groundwater detection monitoring program is required by the WIPP Permit Part 5, Groundwater Detection Monitoring, and is incorporated into the WIPP Permit as Attachment L, WIPP Groundwater Detection Monitoring Program Plan. This program has been implemented.
30. Required Programs, 40 CFR § 264.91 (20.4.1.500 NMAC)	*The owner or operator must institute a detection monitoring program. The Secretary will specify in the facility permit the specific elements of the program.* The WIPP Groundwater Monitoring Program Plan (WP 02-1) meets this requirement (NWPj). During this reporting period, water level monitoring and annual sampling and analysis were performed, and results submitted to the NMED semi-annually in accordance with the WIPP Permit Part 5, Section 5.10.2, Submittal of Results.
31. Ground-water Protection Standard, 40 CFR § 264.92 (20.4.1.500 NMAC)	*The owner or operator must comply with conditions specified in the facility permit that are designed to ensure that hazardous constituents detected in the groundwater do not exceed concentration limits under 40 CFR § 264.94.* The WIPP Groundwater Detection Monitoring Program results showed no significant difference from baseline concentrations, confirming the absence of contamination during this reporting period as outlined in the WIPP Permit Part 5, Section 5.10.3, Determination of Contamination, and WIPP Permit Attachment L, WIPP Groundwater Detection Monitoring Program Plan.
32. Hazardous Constituents, 40 CFR § 264.93 (20.4.1.500 NMAC)	*The Secretary will specify in the facility permit the hazardous constituents to which the groundwater protection standard applies.* The NMED has specified the target analytes for the WIPP groundwater monitoring program. These analytes are listed in the WIPP Permit Part 5, Table 5.4.a, Indicator Parameters, and 5.4.b, Hazardous Constituents.
33. Concentration Limits, 40 CFR § 264.94 (20.4.1.500 NMAC)	*The Secretary will specify in the facility permit concentration limits in the groundwater for hazardous constituents.* The NMED has established concentration limits for groundwater in the WIPP Permit Part 5, Section 5.10.3, Determination of Contamination.

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
34. Point of Compliance, 40 CFR § 264.95 (20.4.1.500 NMAC)	*The Secretary will specify in the facility permit the point of compliance at which the groundwater protection standard applies and at which monitoring must be conducted.* The point of compliance is specified in the WIPP Permit Part 5, Section 5.2, Identification of Point of Compliance, as the vertical surface located perpendicular to the groundwater flow direction at the detection monitoring wells that extends into the Culebra Member of the Rustler Formation.
35. General Ground-water Monitoring Requirements, 40 CFR § 264.97 (20.4.1.500 NMAC)	*The groundwater monitoring program must include consistent sampling and analysis procedures. The groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents in groundwater samples.* The sampling and analysis procedures are specified in the WIPP Permit Part 5, Section 5.5, Sampling and Analysis Procedures, and WIPP Permit Attachment L, WIPP Groundwater Detection Monitoring Program Plan. These procedures are implemented at the WIPP.
	The groundwater monitoring program must include a determination of the groundwater surface elevation each time groundwater is sampled. Groundwater surface elevations are obtained before sampling activities occur, as specified in the WIPP Permit Part 5, Section 5.7, Groundwater Surface Elevation Determination, and WIPP Permit Attachment L, WIPP Groundwater Detection Monitoring Program Plan.
	Data on each hazardous constituent specified in the permit will be collected from background wells and wells at the compliance point(s). The number and kinds of samples collected to establish background shall be appropriate for the form of statistical test employed. Groundwater monitoring data, including actual levels of constituents must be maintained in the facility operating record. The Secretary will specify in the permit when the data must be submitted for review. Background groundwater quality samples were collected and the data submitted to the NMED prior to receipt of TRU mixed waste at the WIPP (WIPP Permit Table 5.6, WQSP Well Background Values). Through implementation of the WIPP Groundwater Detection Monitoring Program, the Permittees submit groundwater monitoring results to the NMED annually for required parameters and hazardous constituents. Monitoring data are maintained in the facility operating record in accordance with the WIPP Permit Part 5, Section 5.10.1, Operating Record Requirements.
36. Detection Monitoring Program, 40 CFR § 264.98 (20.4.1.500 NMAC)	*The Secretary will specify the parameters or constituents to be monitored in the facility permit.* The parameters and constituents monitored are listed in the WIPP Permit Part 5, Tables 5.4.a, Indicator Parameters, and 5.4.b, Hazardous Constituents, respectively. *The Secretary will specify the frequencies for collecting samples and conducting statistical tests to determine whether there is statistically significant evidence of contamination for any parameter or hazardous constituent specified in the permit.* The sampling frequency is specified in the WIPP Permit Part 5, Section 5.5.1, Sample Collection Procedures, and in WIPP Permit Attachment L, Table L-2, WIPP Groundwater Detection Monitoring Program Sample Collection and

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	Groundwater Surface Elevation Measurement Frequency. *The owner or operator must determine the groundwater flow rate and direction at least annually.* Groundwater flow rate and direction are determined at least annually as specified in the WIPP Permit Part 5, Section 5.8, Groundwater Flow Determination. *The owner or operator must determine whether there is statistically significant evidence of contamination for any chemical parameter or hazardous constituent specified in the permit.* Statistical analysis methods are specified in the WIPP Groundwater Detection Monitoring Plan. For each sampling event, comparisons are made between the groundwater quality and the baseline groundwater quality established from background sampling, using the specified statistical methods, in accordance with WIPP Permit Part 5, Section 5.9, Data Evaluation. *If the owner or operator determines there is statistically significant evidence of contamination, additional reporting and sampling are required. In addition, a permit modification to establish a compliance monitoring program and submittal of additional information are required.* The Permittees respond to statistically significant contamination events as specified in the WIPP Permit Part 5, Section 5.10.3, Determination of Contamination. No statistically significant contamination has been detected to date from the regulated unit and, therefore, no corrective action under 40 CFR § 264.100 (20.4.1.500 NMAC) is required.
37. Corrective Action for Solid Waste Management Units, 40 CFR § 264.101	*Corrective action will be specified in the permit in accordance with this section and subpart S of this part. The permit will contain schedules of compliance for such corrective action (where such corrective action cannot be completed prior to issuance of the permit) and assurances of financial responsibility for completing such corrective action.* The WIPP Permit, Attachment K, Table K-3, SWMUs & AOCs Requiring No Further Action, identifies the solid waste management units and AOCs that require no further action. No new solid waste management units were identified during this reporting period.
38. Closure and Post Closure, Applicability, 40 CFR § 264.110 (20.4.1.500 NMAC)	*Closure requirements apply to the owners and operators of hazardous waste facilities. Post-closure requirements apply to hazardous waste disposal facilities.* The Permittees have prepared a closure plan and a post-closure plan for the WIPP. These plans are included in the WIPP Permit (Attachment G, Closure Plan, and Attachment H, Post-Closure Plan). The Closure Plan contains three phases. The first is closure of each HWDU after the panel is filled. The second is closure of the parking area and WHB storage units. The third is sealing the shafts, which occurs at the end of the disposal phase. Both the second and third phases are part of the final closure. Final closure entails clean closure of the surface units and backfilling the vertical shafts in the repository. The Post-Closure Plan describes the active institutional controls, which limit access to the facility, and monitoring activities, which ensure that repository performance is protective of human health and the environment.

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
39. Closure Performance Standard, 40 CFR § 264.111 (20.4.1.500 NMAC)	*A closure performance standard is required to minimize the need for further maintenance; to control, minimize, or eliminate the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the environment; and to comply with the other closure requirements of this subpart.* In accordance with the WIPP Permit Attachment G, Closure Plan, closure is complete when hazardous waste and hazardous waste residues have been removed from the storage units, equipment and structures associated with the operation of the units have been decontaminated, the panels and facility are closed, and unit closure certification has been submitted to and approved by the NMED.
40. Closure Plan; Amendment of Plan, 40 CFR § 264.112 (20.4.1.500 NMAC)	*The owner/operator of a hazardous or mixed-waste management facility must have a written closure plan. The plan must identify the steps necessary to perform partial and/or final closure of the facility. The plan may be amended as needed. The owner or operator must notify the Regional Director in writing prior to the date on which closure will begin.* The Permittees have prepared a written closure plan to satisfy the RCRA closure requirements. The NMED has incorporated this plan into the WIPP Permit as Attachment G, Closure Plan. A Permit modification requiring prior agency approval (Class 1*) to revise Permit Attachment G, Section G-1d(1), Schedule for Panel Closure and Table G-1, Anticipated Earliest Closure Dates for the Underground HWDUs, was submitted to the NMED on December 30, 2015 (DOE, 2015o). This modification to revise the closure schedule for underground TRU mixed waste hazardous waste disposal units (Panels) was subsequently approved by the NMED on January 27, 2016 (NMED, 2016b).
41. Closure: Time Allowed for Closure, 40 CFR § 264.113 (20.4.1.500 NMAC)	*Within 90 days after receipt of the final volume of hazardous mixed waste at a hazardous waste management unit or facility, the owner or operator must treat, remove, or dispose of all hazardous/mixed wastes on-site in accordance with the approved closure plan. Partial or final closure activities must be complete in accordance with the approved closure plan within 180 days of receipt of the final volume of waste. An extension of time may be allowed if the owner/operator can demonstrate that the activities required will take longer than the allotted time period and has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed but nonoperational facility.* The time allowed for closure is addressed in the WIPP Permit Attachment G, Closure Plan.
42. Disposal or Decontamination of Equipment, Structures, and Soils, 40 CFR § 264.114 (204.1.500 NMAC)	*During the partial and final closure periods, contaminated equipment, structures, and soils must be properly disposed of or decontaminated. By removing the hazardous constituents during closure, the owner/operator may become a mixed or hazardous waste generator and must handle such waste in accordance with the requirements of 40 CFR Part 262.* The regulatory requirements for the disposal or decontamination of equipment, structures, and soils are addressed in Permittee procedures, and include the removal of hazardous waste residues; the decontamination of equipment, structures, and soils; personnel decontamination; and sampling and QA.

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
43. Certification of Closure, 40 CFR § 264.115 (20.4.1.500 NMAC)	*Within 60 days of the completion of closure of each landfill unit and within 60 days of completion of final closure, the owner/operator must submit a certification that the hazardous or mixed waste unit has been closed in accordance with the specifications in the approved closure plan. The certification must be sent to the Secretary by registered mail and must be signed by the owner/operator and by an independent registered professional engineer.* The DOE will submit the Certification of Closure to the Secretary of the NMED within 60 days of completion of panel closure and final closure activities.
44. Survey Plat, 40 CFR § 264.116 (20.4.1.500 NMAC)	*The owner/operator must submit a survey plat to the Secretary and the authority with jurisdiction over local land use no later than the submittal of the certification of closure. The survey plat must indicate the location and dimensions of landfill cells or other HWDUs with respect to permanently surveyed benchmarks. The plat must be prepared and certified by a professional land surveyor.* The survey plat will be submitted to the NMED following closure and will indicate the location and dimensions of HWDUs with respect to permanently surveyed benchmarks. The plat will be prepared and certified by a professional land surveyor and will contain a prominently displayed note that states the DOE obligation to restrict disturbance of the HWDU. No HWDU has been certified as closed to date. Survey plats for HWDUs will be submitted to the NMED upon certification of final closure of each HWDU.
45. Post-Closure Care and Use of Property, 40 CFR § 264.117 (20.4.1.500 NMAC)	*Post-closure care for each hazardous/mixed-waste unit must begin after completion of closure and continue for 30 years after that date. Post-closure care must be performed in accordance with the post-closure plan for the facility.* Post-closure care and use of property will be performed in accordance with WIPP Permit Attachment H, Post-Closure Plan.
46. Post-Closure Plan; Amendment of Plan, 40 CFR § 264.118 (20.4.1.500 NMAC)	*The owner/operator of a hazardous or mixed waste disposal unit must have a written post-closure plan. The plan, approved by the Secretary or designee, may be amended subject to the Secretary's approval.* The Post-Closure Plan is in the WIPP Permit Attachment H.
47. Post-Closure Notices, 40 CFR § 264.119 (20.4.1.500 NMAC)	*A record of the type, location, and quantity of hazardous/mixed wastes disposed of within each unit must be submitted to the NMED and the authority with jurisdiction over local land use no later than 60 days after submittal of the certification of closure. Within the same time frame, the owner/operator must also record a notation in the deed to the facility that the facility has been used to manage hazardous/mixed wastes and that the record of type, location, and quantity of waste disposal has been filed; the owner/operator must also certify that this notation has been recorded as required.* The DOE will submit to the NMED and to Eddy County within 60 days after certification of final closure, a registered professional engineer certification. The DOE will also ensure that this notification is recorded in the deed to the facility.
48. Certification of Completion	*Within 60 days of the completion of post-closure of each landfill*

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
of Post-Closure Care, 40 CFR § 264.120 (20.4.1.500 NMAC)	*unit and within 60 days of completion of final post-closure, the owner/operator must submit a certification that the hazardous or mixed-waste unit has been closed in accordance with the specifications in the approved post-closure plan. The certification must be sent to the NMED Secretary by registered mail and must be signed by the owner/operator and by an independent registered professional engineer.* The DOE will notify the NMED within 60 days after completion of post-closure care, and submit a registered professional engineer certification that the post-closure care period was performed in accordance with the WIPP Permit Attachment H, Post-Closure Plan.
49. Use and Management of Containers, (40 CFR §§ 264.171, 264.172, 264.173, 264.174, 264.175, 264.176, 264.177, 264.178 and 264.179) (20.4.1.500 NMAC)	*Subpart I of 40 CFR addresses the requirements for the use and management of containers at TSDFs. This section addresses container condition, compatibility of wastes with containers, management of containers to prevent releases, keeping the containers closed, weekly inspections, containment, requirements for ignitable or reactive wastes, special requirements for incompatible wastes, closure, and the air emission standards.* WIPP Permit Part 3, Container Storage, and Attachment A1, Container Storage, describe how the Permittees comply with the requirements for the use and management of containers. Waste is received in NRC Type B packages, which are stored in the Parking Area Unit and opened in the applicable WHB Unit. Waste containers meeting DOT 7A specifications are removed from the NRC Type B packages. The WIPP WAC and waste handling procedures are in place to ensure that waste is shipped to WIPP in DOT 7A waste containers that are in good condition. A compatibility study was conducted and submitted in Appendix C1 of the WIPP RCRA Part B Application (DOE, 1997c) to document that the containers used (steel construction, some containing polyethylene liners) meet the requirements of 40 CFR § 264.172. Containers are not opened at the WIPP and procedures are in place to minimize the potential for damaging a container. Inspections are conducted at least weekly as described in WIPP Permit Attachment E, Inspection Schedule, Process and Forms. Calculations demonstrating adequate secondary containment are included in WIPP Permit Attachment A1, Container Storage. Container storage areas will be closed as described in WIPP Permit, Attachments G, Closure Plan, and G3, Radiological Surveys to Indicate Potential Hazardous Waste Releases. The air emission standards for containers are not applicable to TRU mixed waste disposed at the WIPP. There were no exceptions to compliance with these requirements during the reporting period. Waste containers received, but not emplaced as of the February 2014 events continue to be stored in the WHB as authorized by NMED extensions of waste storage times. Weekly inspections of these containers have been conducted throughout this reporting period in accordance with WIPP procedures.
50. Miscellaneous Units, (40 CFR §§ 264.601, 264.602 and 264.603)	*A miscellaneous unit must be located, designed, and operated, maintained and closed in a manner that will ensure protection of human health and the environment. Monitoring, testing, analytical data, inspections, response and reporting procedures and frequencies must protect human health and the environment. A miscellaneous unit must be maintained in a manner that complies with the environmental performance standards during the post-closure care period.* The WIPP Permit Part 4, Geologic Repository Disposal, and Attachment A2, Geologic Repository, describe the location, design, operation, and

Table 26: Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance
	maintenance of the geologic repository and associated environmental monitoring. Monitoring and testing includes geomechanical, ventilation rate, and VOC monitoring. Reports are submitted to the NMED to demonstrate compliance with these requirements. Each underground HWDU will be closed in accordance with the Closure Plan (WIPP Permit Attachment G); Technical Specifications (WIPP Permit Attachment G1, Appendix G); and the final repository closure plan is incorporated into the WIPP Permit as Attachment G2, Waste Isolation Pilot Plant Shaft Sealing System Compliance Submittal Design Report. The Post-Closure Plan (WIPP Permit Attachment H) describes the activities required to maintain the WIPP after the completion of facility closure. Geotechnical monitoring of manually-read geomechanical instrumentation was suspended after the February 2014 events until habitability of the underground was re-established. Monitoring of the remotely accessible instrumentation, such as the borehole extensometers installed in the disposal panels, continued during this period. Monitoring of instrumentation that required underground access resumed on May 29, 2014, in areas of the underground that were accessible. These readings will be expanded as other areas of the underground become accessible. Monitoring of mine ventilation rate (required by Permit Part 4, Section 4.6.4 and associated requirements of Attachment O) are currently being performed. On February 14, 2014, the mine ventilation system was shifted to Filtration Mode and has remained in this mode with an average monthly underground ventilation rate of 60,000 standard cubic feet per minute. Because of this reduced flow rate, the Permittees are not able to maintain the minimum running annual average ventilation flow rate of 260,000 standard cubic feet per minute required by Permit Part 4, Section 4.5.3.2. Since February 5, 2014 (fire event), access to the active disposal rooms has been restricted and no waste handling has taken place. Thus no active disposal room measurements have been taken since February 5, 2014. VOC and, hydrogen and methane monitoring, as required by Permit Part 4 and Attachments N and N1, have not been conducted since early February 2014. The Permittees initiated post-event VOC sampling activities at surface locations at the WIPP on February 12, 2014. Surface VOC sampling is being used to evaluate the feasibility of using these data to identify VOC exposure to the non-waste surface workers at the WIPP Training Building. One location chosen for monitoring is near the Training Building and the other location was chosen to obtain a representative background sample.

25.2.4 Compliance with the Hazardous/Mixed Waste Permit Program, 40 CFR Part 270 (20.4.1.900 NMAC and 20.4.1.901 NMAC)

The requirements of 40 CFR Part 270 pertain to general hazardous waste facility permitting requirements for TSDFs and include provisions for submitting applications, standard permit conditions, monitoring and reporting requirements, and modifying permits. The compliance status of each applicable requirement is summarized in Table 27.

Table 27: Status of Compliance with the Hazardous/Mixed Waste Permit Program, 40 CFR Part 270 (20.4.1.900 NMAC and 20.4.1.901 NMAC)

Regulatory Requirement	WIPP Compliance
1. EPA Administered Permit Programs: Hazardous Waste Facility Permit Program Regulations, Purpose and Scope of these Regulations, 40 CFR § 270.1 (20.4.1.900 NMAC)	*The purpose and scope of the hazardous waste facility permit program regulations are defined, and the regulations are summarized.* The NMED has updated the WIPP Permit multiple times during this reporting period to incorporate Permittee requested permit modifications. The Permittees submitted thirteen Permit modifications to the NMED for this reporting period consisting of eleven Class 1, one Class 1*[1], and one Class 2 listed in Table 28. These changes were classified pursuant to 20.4.1.900 NMAC, incorporating 40 CFR 270.42.
2. Signatories to Permit Applications and Reports, 40 CFR § 270.11 (20.4.1.900 NMAC)	*Signatories to permit applications shall be by a senior executive officer with responsibility for overall operations for a federal agency and/or a responsible corporate officer for a corporation. Reports and plans required by permits (e.g., the annual waste minimization plan) and other information requested shall be signed by a duly authorized representative. Any person signing one of these documents is required to make the certification statement specified in 40 CFR § 270.11(d).* The requirement is incorporated into WIPP Permit Part 1, Section 1.9, Signatory Requirement. The manager of the DOE CBFO is a signatory, on behalf of the owner/operator DOE, and the Project Manager of NWP has signing authority as the co-operator and co-permittee.
3. Conditions Applicable to all Permits, 40 CFR § 270.30 (20.4.1.900 NMAC)	*Conditions applicable to all permits are specified and include duty to comply, duty to reapply, minimization of releases, proper operation and maintenance, permit actions, property rights, duty to provide information, inspection and entry, monitoring and records, signatory requirements, and reporting requirements.* The general permit conditions are incorporated into Permit Part 1, General Permit Conditions.
4. Requirements for Recording and Reporting of Monitoring Results, 40 CFR § 270.31 (20.4.1.900 NMAC)	*Requirements for recording and reporting monitoring results will be specified in the Permit.* The requirements for recording and reporting monitoring results are incorporated into the WIPP Permit, Part 1, Section 1.7.10, Monitoring and Records; and WIPP Permit, Part 1, Section 1.7.11, Reporting Requirements. The Permittees comply with these requirements by submitting WIPP Permit required reports such as the semi-annual groundwater monitoring reports, an annual mine ventilation rate report, and a semi-annual VOC, hydrogen, and methane monitoring report. There have been no changes to annual reporting requirements as a result of the events. The WIPP continues to comply by submitting required reports.

[1] A Class 1* Permit modification requires prior agency approval before a change may be made to the Permit, whereas a Class 1 Permit modification does not require prior agency approval for a change made to the Permit.

Table 27: Status of Compliance with the Hazardous/Mixed Waste Permit Program, 40 CFR Part 270 (20.4.1.900 NMAC and 20.4.1.901 NMAC)

Regulatory Requirement	WIPP Compliance
5. Permit Modification at the Request of the Permittee, 40 CFR § 270.42 (20.4.1.900 NMAC, and 20.5.1.901 NMAC)	*After a Permit has been finalized, the permittee may request that it be modified. Three classes of modifications are identified in Appendix I to 40 CFR § 270.42. Class 1, the least significant of the permit modifications, covers minor modifications such as the correction of typographical errors; changes to conform with agency guidelines or regulations; or procedural changes that increase the frequency of monitoring, reporting, sampling, or maintenance activities. Class 1 modifications may require approval of the Director prior to implementation (i.e., Class 1* permit modifications), or require notification of the Director within seven days after the change has been made. All persons on the facility mailing list must be notified within 90 calendar days after the change is put into effect or after the request, whichever applies.* *Class 2 modifications apply to changes needed to common variations in the types and quantities of wastes managed, technological advancements, and changes in the regulations (e.g., changes in emergency procedures or removal of equipment from the emergency equipment list). They require that the permittee submit a modification request to the Director, announce a 60-day comment period, notify all persons on the facility mailing list, publish the notice in a major local newspaper of general circulation, and hold a public meeting. Class 3 modifications are the most significant, have potential impacts, and substantially alter the facility or its operation (e.g., extending the closure period or a final compliance date; creating a new landfill or other type of unit or increasing the capacity of a preexisting one). The notification and other requirements are similar to those for Class 2 modifications.* The Permittees have notified the NMED of eleven Class 1 permit modification notifications, one Class 1*, and one Class 2 during this reporting period, as outlined in Table 28.

Table 28: Hazardous Waste Facility Permit Modifications Submitted During this Reporting Period (April 1, 2014, through March 31, 2016)

Class	Subject	Date
2014 Class 1 Permit Modification Notifications and Requests		
1	• Contingency Plan Update- Equipment used for Internal Communications • Contingency Plan Update Editorial Change in Attachment D, Section D 4d(10) • Contingency Plan Update- Contact Information Tables D-8 and D-9 • Editorial Change in Attachment C, Table C6-1, Item 28 • Contingency Plan Update- Resource Conservation Recovery Act (RCRA) Emergency Coordinator Clarification	11/7/2014
2015 Class 1 Permit Modification Notifications and Requests		

Table 28: Hazardous Waste Facility Permit Modifications Submitted During this Reporting Period (April 1, 2014, through March 31, 2016)

Class	Subject	Date
1	• Clarify the Date When Laboratory Procedures are Provided to NMED • Add New Emergency Response Equipment	2/13/15
1	• Update Co-Permittee Project Manager and the List of Active Environmental Permits	6/11/2015
1	• Change in the Department of Energy, Carlsbad Field Office Manager	6/29/2015
1	• Update Figure C-1 • Revise a Procedure Number in Table E-1 • Editorial Change in Permit Part 4 • Editorial Change in Attachment C3	8/17/2015
1	• Update Resource Conservation and Recovery Act Emergency Coordinator List	8/27/2015
1	• Revise Attachment A4, Figure A4-2 to Add the New East Gate • Revise Attachment A4, Section A4-2 to Describe the Purpose of the New East Gate	9/15/2015
1	• Clarifications to Inspections of Liquid-Fueled Vehicles in Attachment E • Addition of Automatic On-Board Fire Suppression Systems to Emergency Equipment in Attachment D and Attachment E • Enhancement of Inspection Frequency of Mine Pager Phones in Attachment E • Update Emergency Response Training in Attachment F1 • Update Chronology in Attachment A • Update Figures in Attachment D • Update Facsimile Number in Permit Part 1	9/30/15
1	• Change in the Department of Energy Carlsbad Field Office Manager	10/8/2015
1	• Remove Obsolete References to 40 CFR §264.56(i) and Related Text from Part 1, Section 1.7.13.4., Section 1.13 and Attachment D, RCRA Contingency Plan	12/30/2015
1 and 1*	• Revise Closure Schedule Dates in Attachment G, Section G-1d(1) and Table G-1	12/30/2015
2016 Class 1 Permit Modification Notifications and Requests		
1	• Technical Training Organizational Change • Descriptive Changes Regarding Ventilation Configurations • Update Resource Conservation and Recovery Act Emergency Coordinator List • Update Chronology in Attachment A • Revise a Procedure Number in Attachment E, Table E-1a • Update the Underground Ventilation System Description • Add New Emergency Equipment to Table D-6 Emergency Equipment and Table E-1, Inspection Schedule/Procedures	2/17/2016

Table 28: Hazardous Waste Facility Permit Modifications Submitted During this Reporting Period (April 1, 2014, through March 31, 2016)

Class	Subject	Date
2014 Class 2 Permit Modification Requests		
	None	
2015 Class 2 Permit Modification Requests		
2	• Revise Volatile Organic Compound Monitoring Procedures	9/8/2015
2016 Class 2 Permit Modification Requests		
	None	
2014 Class 3 Permit Modification Notifications and Requests		
	None	
2015 Class 3 Permit Modification Notifications and Requests		
	None	
2016 Class 3 Permit Modification Notifications and Requests		
	None	

25.2.5 Compliance with the Universal Waste Management Regulations Under 40 CFR Part 273 (20.4.1.1000 NMAC)

The Permittees manage nickel-cadmium, nickel-metal hydride, and lithium batteries, and used lamps at the WIPP under these regulations. The WIPP typically does not generate pesticide waste and rarely generates thermostat waste. Spent lead acid batteries are returned to the manufacturer for recycling and thus, are managed under the regulations at 40 CFR § 266.80 (20.4.1.700 NMAC) rather than 40 CFR Part 273. Compliance with the requirement is shown in Table 29.

Table 29: Status of Compliance with the Universal Waste Management Regulations Under 40 CFR Part 273 (20.4.1.1000 NMAC)

Regulatory Requirement	WIPP Compliance
1. Definitions, 40 CFR § 273.9 (20.4.1.1000 NMAC)	*Small-quantity handlers are those who accumulate less than 5,000 kg of universal waste at any one time.* The WIPP is a small-quantity handler of universal waste, as defined in 40 CFR § 273.9. The Permittees manage nickel-cadmium batteries, nickel-metal hydride batteries, lithium batteries, mercury-containing thermostats, and used lamps at the WIPP under the universal waste regulations.

Table 29: Status of Compliance with the Universal Waste Management Regulations Under 40 CFR Part 273 (20.4.1.1000 NMAC)

Regulatory Requirement	WIPP Compliance
2. Prohibitions, 40 CFR § 273.11 (20.4.1.1000 NMAC)	*Universal waste is not to be disposed of or diluted or treated to render it less hazardous except by responding to a release of universal waste or by managing the waste as provided in 40 CFR § 273.13.* Universal waste is not treated at the WIPP. Universal waste is handled in accordance with the requirements of 40 CFR Part 273, and is shipped off-site to a permitted TSDF.
3. Waste Management, 40 CFR § 273.13 (20.4.1.1000 NMAC)	*Universal waste must be properly contained to prevent releases and must lack evidence of leakage, spillage, etc.* Universal waste is managed in accordance with Permittee hazardous and universal waste management programs and procedures. It is contained, stored in the universal waste storage area, and inspected weekly for evidence of spillage or leakage. Compliance was maintained during the reporting period.
4. Labeling/Marking, 40 CFR § 273.14 (20.4.1.1000 NMAC)	*Universal waste must be labeled or marked appropriately (e.g., universal waste batteries).* Universal waste containers were labeled with the words "Universal Waste," a brief description of the contents, and the accumulation start date, in accordance with Permittee hazardous and universal waste management plans and procedures.
5. Accumulation Time Limits, 40 CFR § 273.15 (20.4.1.1000 NMAC)	*A small-quantity universal waste handler may accumulate universal waste for up to one year from the date the waste was generated. The handler must be able to demonstrate the length of time that the waste has been accumulated from the date it becomes a waste or is received.* In accordance with the Permittee hazardous waste management plans and procedures, the Permittee logs the date universal waste is generated at the WIPP and the date universal waste is shipped to an off-site TSDF for recycling. In accordance with inspection procedures, the accumulation date is checked during weekly inspections to ensure that the one-year storage limit is not exceeded. The Permittees are in compliance with these requirements.
6. Employee Training, 40 CFR § 273.16 (20.4.1.1000 NMAC)	*Employees who handle or are responsible for managing universal waste should be provided with the appropriate information needed with respect to proper handling and appropriate emergency procedures for the type of universal waste being managed at the facility.* The handlers of universal waste and those responsible for its management are trained hazardous waste workers. This training applies to universal waste handlers and managers.
7. Responses to Releases, 40 CFR § 273.17 (20.4.1.1000 NMAC)	*All releases of universal wastes and residues from such wastes must be contained immediately; any material resulting from the release must be assessed to determine if it is hazardous waste; if so, it must be managed in compliance with applicable RCRA regulations.* Releases of universal waste are characterized and managed in accordance with procedures and processes in place for hazardous and universal waste. There were no releases of universal waste during the reporting period.

Table 29: Status of Compliance with the Universal Waste Management Regulations Under 40 CFR Part 273 (20.4.1.1000 NMAC)

Regulatory Requirement	WIPP Compliance
8. Off-Site Shipments, 40 CFR § 273.18 (20.4.1.1000 NMAC)	*A small-quantity universal waste generator may send its universal waste only to another universal waste handler, a destination facility, or a foreign destination.* Universal waste was shipped to a permitted off-site TSDF during the reporting period.

25.2.6 Compliance with the Underground Storage Tank Regulatory Requirements Under 20.5 NMAC

This section of the report identifies the New Mexico UST requirements pertaining to WIPP. The WIPP compliance status is summarized in Table 30.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
1. Applicability, 20.5.1.2 NMAC (40 CFR § 280.10)	*Any owner or operator of an UST that contains a hazardous substance or petroleum product must meet the standards set by the New Mexico Environmental Improvement Board in the New Mexico UST regulations.* There are two 8,000-gallon USTs at the WIPP; one contains unleaded gasoline, and the other contains diesel fuel.
2. Existing Tanks, 20.5.2.8 NMAC	*The owner of any UST must register such tank or tanks with the NMED Petroleum Storage Tank Bureau within three months after April 14, 1988, the effective date of this Part II as first adopted, except that any owner who has filed the form of notice entitled "Notification for Underground Storage Tanks," prescribed by the EPA and described in 40 CFR Part 280, is not required to register a tank for which a notice has been filed, as long as that the information provided is still current.* Both USTs at the WIPP are registered with the NMED Petroleum Storage Tank Bureau.
3. Transfer of Ownership, 20.5.2.9 NMAC	*If ownership of a storage tank system changes, the new owner must re-register the tank with the NMED Petroleum Storage Tank Bureau within 30 days of ownership transfer, using a form provided by the NMED Petroleum Storage Tank Bureau.* This section is not applicable since ownership of the tanks has not been transferred.
4. New Storage Tank Systems, 20.5.2.10 NMAC	*The owner must notify the NMED Petroleum Storage Tank Bureau in writing at least 30 days before any new tank or UST system is installed and must register any new tank or UST system with the NMED Petroleum Storage Tank Bureau prior to placing it in service.* No new aboveground or UST systems were installed during this reporting period.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
5. Substantially Modified Storage Tank Systems, 20.5.2.11 NMAC	*When an existing storage tank system is substantially modified or replaced, the owner must notify the NMED Petroleum Storage Tank Bureau in writing of such modification or replacement at least 15 days prior to the modification or replacement. Emergency repairs or replacements are exempt from these notification requirements.* No UST systems were substantially modified during this reporting period.
6. Notification of Spill or Release, 20.5.2.12 NMAC	*Notice of any known or suspected release from a storage tank system, any spill, or any other emergency must be given to the NMED in accordance with 20.5.7 NMAC.* No releases from USTs occurred during this reporting period.
7. Emergency Repairs and Tank Replacement, 20.5.2.13 NMAC	*Immediate repairs or replacement of a storage tank system may be made in the event an emergency presents a threat to the public health, provided notice is given to the NMED.* No such emergency repair or replacement of a storage tank system was necessary during this reporting period.
8. Registration, 20.5.2.14 NMAC	*Storage tanks must be registered on application forms provided by the NMED unless the EPA form (Notification for Underground Storage Tanks) has been submitted to the NMED and information contained therein is still accurate. An application submitted by a municipal, state, or other public facility must be signed by either a principal executive officer, ranking elected official, or other duly authorized employee.* The New Mexico storage tank registration form was used to register the USTs at the WIPP.
9. Registration Certificate, 20.5.2.15 NMAC	*Upon submittal of a complete registration application or the EPA form and payment of the annual fee, the NMED shall issue a validated registration certificate which is current and valid and must be displayed on the premises of the storage tank system at all times. In the event that any information provided on the registration form or the EPA form changes or is no longer accurate, the change must be reported to the NMED on the appropriate form within 30 days.* The current registration certificate from the NMED is displayed in Facility Operations at the WIPP.
10. Payment of Fee, 20.5.3.8 NMAC	*An annual per-tank fee shall be paid to the NMED no later than July 1 for each current calendar year or portion of a year that a tank is in use. A tank shall be deemed "in use" until notice is received by the NMED that the tank has been removed or otherwise permanently closed in a manner acceptable to the division.* *The annual fee for a new tank placed in service after July 1 for any calendar year after 1989 shall be paid within 30 days after the tank is placed in service. The annual fees shall be designated to the Hazardous Waste and Underground Storage Tank Fund.* The annual WIPP storage tank fees were paid by July 1, 2014, and July 1, 2015.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
11. Amount of Fee, 20.5.3.9 NMAC	*The annual fee for each UST is $100.00 per tank.* The annual UST fee paid by the Permittees is $200 for the two storage tanks.
12. Timeliness and Late Fees, 20.5.3.10 NMAC	*In the event that the annual fee is not paid when due, a late fee of $25.00 or 25 percent of the unpaid fee, whichever is greater, shall be imposed and shall accumulate until the annual fee and accrued late fees and interest charges are paid.* No late payment penalties have been incurred.
13. General Performance Standards for UST Systems, 20.5.4.8 NMAC (40 CFR § 280.20)	*In order to prevent releases due to structural failure, corrosion or spills and overfills for as long as a UST system is used to store regulated substances, owners and operators of any UST system shall properly design, construct, and initially test each new UST system; provide project drawings; and ensure that any portion of a UST system that routinely contains regulated substances and is in contact with the ground or water shall be protected from corrosion, in accordance with the current edition of an industry standard or code of practice developed by a nationally recognized association or independent testing laboratory approved in advance by the department. Owners and operators shall ensure that the entire UST system is compatible with any regulated substance conveyed, as required by 20.5.5.16 NMAC.* The tanks are designed and constructed of fiberglass-reinforced plastic in accordance with the appropriate standards. The tanks are double walled and are compatible with gasoline and diesel.
14. Performance Standards for Fiberglass-Reinforced Plastic USTs, 20.5.4.9 NMAC (40 CFR § 280.20[a])	*If a UST is constructed of fiberglass-reinforced plastic, owners and operators shall comply with the requirements of the current edition of an industry standard or code of practice developed by a nationally recognized association or independent testing laboratory approved in advance by the department.* The piping is constructed of fiberglass-reinforced plastic in accordance with the appropriate standards.
15. Spill and Overfill Prevention 20.5.4.33 NMAC (40 CFR § 280.20[c][1][I])	*Owners and operators must use spill prevention equipment that will prevent release of regulated substances to the environment when the transfer hose is detached from the fill pipe (for example, a spill catchment basin).* The WIPP UST system uses a spill catchment basin at the fill port of each tank.
16. Spill and Overfill Prevention, Paragraph 2 of Subsection A of 20.5.4.33 NMAC (40 CFR § 280.20[c][4])	*Overfill-prevention equipment must be used that will automatically shut off flow into the tank when the tank is no more than 95 percent full and alert the transfer operator when the tank is no more than 90 percent full by restricting the flow into the tank or triggering a high-level alarm; Owners and operators may use alternative equipment if it is determined by the implementing agency to be no less protective of human health and the environment than the equipment specified or if the UST system is filled by transfers of no more than 25 gallons at one time.* A vent valve is used to automatically shut off the flow into each tank at the WIPP when the tank reaches the 95 percent full point. This valve is a permanent part of the system.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
17. Installation of UST Systems, Subsection A of 20.5.4.14 NMAC (40 CFR § 280.20[d])	*All tanks and piping must be properly installed in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and in accordance with the manufacture instructions.* The installer (Cline Pump Company) certified on the NMED application that the methods used to install the tanks and piping at the WIPP comply with the requirements. Cline Pump Company has supplied the DOE with copies of qualified certifications.
18. Required Certifications, Subsection C of 20.5.4.37 & Hydrocarbon Storage Facilities, 20.2.38 NMAC (40 CFR § 280.20[e])	*Owners and operators must ensure that one or more of the specified methods of certification, testing, or inspection was used to demonstrate compliance with Subsection 25.2.6.17 by providing a certification of compliance on the UST notification form required by 20.5.2 NMAC. The allowable methods of certification for the installer are certification by the tank and piping manufacturers; certification or licensing by the implementing agency; inspection and certification of the installation by a registered professional engineer with education and experience in UST system installation, inspection and approval by the implementing agency, or the presence of a representative from the UST Bureau of the NMED at the installation; completion of work listed on the manufacturer installation checklists; or compliance with another method for ensuring compliance with this section that is determined by the implementing agency to be no less protective of human health and the environment.* A certified tank installer was used to install the USTs at the WIPP. The installation of the new systems was inspected and approved by an NMED representative who was present during the installation.
19. Required Certifications , 20.5.4.37 NMAC (40 CFR § 280.22[e])	*Certification of compliance. Owners and operators of new storage tank systems shall certify in the registration form required by 20.5.2 NMAC with the following requirements:* *Installation of tanks and piping in 20.5.4.14 NMAC for UST systems, 20.5.4.19 NMAC for AST systems or 20.5.4.38 NMAC for either cathodic protection of steel tanks and piping in 20.5.4.10 NMAC and 20.5.4.22 NMAC for UST systems, or 20.5.4.12 NMAC for UST systems; or 20.5.4.16 and 24 NMAC for AST systems; financial responsibility under 20.5.9 NMAC; and release detection in 20.5.6 NMAC.* As identified in the registration form, the certification requirements were met. Cathodic protection requirements are not applicable since neither the tank nor the piping at the WIPP are made of steel. Financial responsibility requirements cited in 20.5.9.1.900.C NMAC are not applicable because the WIPP is a federal facility. Notification requirements apply only to the tank vendor who sold the tank to be used as an UST and do not apply to the facility.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
20. Operations and Maintenance Plan, 20.5.5.9 NMAC	*Owners and operators of storage tank systems shall adopt and implement a written operations and maintenance plan, which they shall keep at the facility for the life of the storage tank system. Owners and operators shall not implement the plan until it has been approved by the Department.* An operations and maintenance plan was approved by the NMED Petroleum Storage Tanks Bureau on October 29, 2009 (WIPP, 2009). The UST procedure WP 04-GC1605, Operation of Surface Fuel Station Storage Tanks (NWPk), guides the operators in performing daily, monthly, and annual inspections.
21. Operation and Maintenance of Spill and Overfill Prevention, Subsection A of 20.5.5.14 NMAC (40 CFR § 280.30)	*Owners and operators must ensure that any releases due to spilling or overfilling do not occur, that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made, and that the transfer operation is monitored constantly to prevent overfilling and spilling.* The tanks are equipped with spill and overfill protection equipment. Applicable DOE hazardous material spill and release response plans and procedures that govern the transfer of product to the tanks and that specify requirements for reporting, cleaning up, and investigating spills or overfills are in place.
22. Compatibility, 20.5.5.16 NMAC (40 CFR § 280.32)	*Owners and operators must use an UST system made of or lined with materials that are compatible with the substance stored in the UST system.* Fiberglass-reinforced plastic tanks at the WIPP are compatible with unleaded gasoline and diesel fuel.
23. Repairs, Replacements and Modifications, Subsection B of 20.5.5.17 NMAC (40 CFR § 280.33[a])	*Repairs to UST systems must be properly conducted in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.* No repairs were made to the WIPP UST system during this reporting period.
24. Repairs, Replacements and Modifications, 20.5.5.17 NMAC (40 CFR § 280.33[b])	*Repairs to fiberglass-reinforced plastic tanks may be made by the manufacturer authorized representatives or in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.* No repairs were made to the WIPP tanks during this reporting period.
25. Repairs, Replacements and Modifications, 20.5.5.17 NMAC (40 CFR § 280.33[c])	*Metal pipe sections and fittings that have released product as a result of corrosion or other damage must be replaced. Fiberglass pipes and fittings may be repaired in accordance with the manufacturer specifications.* No repairs were performed on pipes or fittings on the WIPP USTs during this reporting period.
26. Repairs, Replacements and Modifications, Subsection D of 20.5.5.17 NMAC (40 CFR § 280.33[d])	*Repaired tanks and piping must be tightness tested in accordance with Subsection C 20.5.6.603 NMAC, and Subsection B 20.5.6.604 NMAC, within 30 days after the date of the completion of the repair except as provided in this section.* No UST or piping repairs were required during this reporting period.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
27. Repairs, Replacements and Modifications, Subsection F of 20.5.5.17 NMAC (40 CFR § 280.33[g])	*UST system owners and operators must maintain records of each repair for the remaining operating life of the UST system to demonstrate compliance with the requirements of this section.* No UST system repairs were performed at the WIPP during this reporting period.
28. Reporting, 20.5.5.18 NMAC (40 CFR § 280.34[a])	*Owners and operators must submit the following information to the NMED: registration of all storage tank systems, including certification of installation for new UST systems (20.5.2 NMAC); reports of all releases (including suspected releases, spills, and overfills) and confirmed releases; corrective actions planned or taken; and a notification before permanent closure or change in service.* Registration and certification documentation has been submitted to NMED Petroleum Storage Tank Division. There has been no change in service and no permanent closure. The DOE has procedures in place to implement the notification requirements in the event of a release.
29. Record-Keeping, Subsection A of 20.5.5.19 NMAC (40 CFR § 280.34[b])	*Owners and operators must maintain the following information: a corrosion expert's analysis of site corrosion potential if corrosion protection equipment is not used, documentation of operation of corrosion protection equipment, documentation of storage tank system repairs, recent compliance with release detection requirements, and the results of the site investigation required prior to permanent closure.* The storage tank system is epoxy-coated fiberglass. Therefore, no corrosion expert analysis or corrosion protection equipment is required. There have been no repairs to the tank system nor have there been compliance issues regarding release detection. The DOE has a procedure that addresses the retention of monitoring results.
30. Record-Keeping , Subsection B of 20.5.5.19 NMAC (40 CFR § 280.34[c])	*The applicable records must be kept either at the storage tank site and immediately available for inspections by the NMED or at a readily available alternative site and be provided to the NMED upon request.* The UST records are maintained at the WIPP and are readily available to NMED inspectors.
31. Inspections, Monitoring, and Testing, Subsection A of 20.5.5.20 NMAC	*For the purpose of enforcing the provisions of these regulations, any owner and operator of a storage tank shall, upon the request of the Secretary or authorized department representatives, furnish information relating to such tanks, including tank equipment and contents, conduct monitoring or testing, and permit the department representative at all reasonable times to have access to, and to copy all records relating to such tanks. Owners and operators shall comply with applicable and appropriate Occupational Health and Safety Act requirements, NMSA 1978, Sections 50-9-1 through 50-9-25, so that storage tanks may be safely inspected. For the purpose of enforcing these regulations, department officers, employees, or representatives are authorized:* *(1) To enter at reasonable times any establishment or place where a storage tank is located;* *(2) To inspect the storage tank system and obtain samples of its*

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
	contents; and *(3) To conduct monitoring or testing of the tanks, associated equipment, contents, or surrounding soils, air, surface water, or groundwater.* NMED personnel inspect and sample the contents of the WIPP storage tank systems at any reasonable time. Monitoring or testing of tanks and associated equipment and contents of the surrounding soils, air, surface water, or groundwater may also be performed. Inspections were conducted by the NMED Petroleum Storage Tank Bureau on February 3, 2015. No violations were noted. Occupational safety and health requirements are met in accordance with the WIPP Integrated Safety Management System, which focuses on accomplishing work safely, and protecting workers, the public, and the environment.
32. Required Notification Prior to Replacement, Repair and Modification, Subsection B of 20.5.5.21 NMAC	*Owners, operators, and certified tank installers shall give at least 30 days written notice before the installation, modification or repair of a storage tank system. It may not be feasible for owners, operators, and certified tank installers to provide advance notice of emergency repairs; however, owners, operators, and certified tank installers shall provide notice of emergency repairs as soon as possible after completing emergency repairs. Owners, operators and certified tank installers shall give oral notice at least 24 hours in advance of the commencement of the procedure. If owners, operators, and certified tank installers are separate persons, only one person is required to comply with the notice requirements of this subsection; however, all parties are liable in the event of noncompliance.* There were no UST system installations, repairs, or modifications during this reporting period. In the event that an installation, repair, or modification to the WIPP UST system is planned, the NMED will be provided the appropriate notice.
33. Requirements and Deadlines for Release Detection for AST Systems, Subsection A of 20.5.6.9 NMAC (40 CFR § 280.40[a])	*Owners and operators of new and existing UST systems must provide a method, or combination of methods, of release detection that can detect a release from any portion of the tank and the connected underground piping that routinely contains product; is installed, calibrated, operated, and maintained in accordance with the manufacturer instructions, including routine maintenance and service checks for operability or running condition; meets the performance requirements; and must be capable of detecting the leak rate or quantity specified for that method in the corresponding section of the rule with a probability of detection of 0.95 and a probability of false alarm of 0.05.* The WIPP UST system uses interstitial monitoring to detect releases. There are sensors between the walls at the lowest end of the piping and tank. Interstitial monitoring can detect a release through the inner wall in any portion of the double-walled tank and/or piping that regularly contains product. The system is equipped with an alarm that will sound in the event of a leak into the interstitial area. In addition, personnel perform weekly documented leak detection testing to ensure correct operations of the leak detection system. Inspection and maintenance of the leak detection system is performed by a certified UST repairman.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
34. Requirements for UST Systems, Subsection B of 20.5.6.9 NMAC (40 CFR § 280.40[b])	*When a release detection method operated in accordance with the performance standards in 20.5.6.603 NMAC and 20.5.6.604 NMAC indicate that a release may have occurred, owners and operators must notify the NMED in accordance with 20.5.2.204 NMAC and 20.5.7 NMAC.* No releases or suspected releases occurred from the UST system at the WIPP during this reporting period.
35. Requirements for UST Systems, Subsection C of 20.5.6.9 NMAC (40 CFR § 280.40[c])	*Owners and operators of UST systems must comply with the release-detection requirements of this part by December 22 of the year listed in the schedule in 40 CFR § 280.40(c).* The UST system at the WIPP was installed on February 10, 1992. The system meets the release-detection requirements of this part.
36. Requirements for UST Systems, Subsection A of 20.5.6.9 NMAC (40 CFR § 280.41[a])	*Owners and operators of new and existing UST systems shall provide a method or combination of methods, of release detection that:* *(1) Can detect a release from any portion of the tank, connected piping and ancillary equipment that routinely contains a regulated substance;* *(2) Is installed, calibrated, operated and maintained in accordance with the manufacturer instructions, including routine maintenance and service checks for proper operating condition; and* *(3) Meets the applicable performance requirements in 20.5.6 NMAC with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer, following the current edition of an industry standard or code of practice developed by a nationally recognized association or independent testing laboratory approved in advance by the department; in addition, methods for USTs used after December 22, 1990, except for methods permanently installed prior to that date, shall be capable of detecting the leak rate or quantity specified for that method in 20.5.6 NMAC with a probability of detection of 0.95 and a probability of false alarm of 0.05.* The interstitial monitoring system of WIPP UST system meets the release-detection requirement. Should the interstitial system become inoperable, monthly inventory controls will be used. In this contingency situation, tank tightness testing will be performed every five years.
37. Requirements for Piping, Subsection A of 20.5.6. 11 NMAC (40 CFR § 280.41[b])	*Underground piping that routinely contains regulated substances must be monitored for releases in a manner that meets the requirements for pressurized or suction piping.* The WIPP UST system meets the requirements for suction piping.
38. Requirements for Piping, Paragraph (1) of Subsection A of 20.5.6.11 NMAC (40 CFR § 280.41[b][1])	*Underground piping that conveys regulated substances under pressure must be equipped with an automatic line leak detector and have an annual line-tightness test or have monthly monitoring conducted.* This requirement is not applicable since the UST system at the WIPP operates under suction piping.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
39. Requirements for Piping, Paragraph 2 of Subsection B of 20.5.6.11 NMAC (40 CFR § 280.41[b][1][i])	*Underground piping that conveys regulated substances under suction must either have a line tightness test conducted at least every three years in accordance with 20.5.6.604.B NMAC, or use a monthly monitoring method conducted in accordance with 20.5.6.604.C NMAC. No release detection is required for suction piping that is designed and constructed to meet the following standards: the below-grade piping operates at less than atmospheric pressure; the below-grade piping is sloped so that the contents of the pipe will drain back into the storage tank if the suction is released; only one check valve is included in each suction line; the check valve is located directly below and as close as practical to the suction pump; and a method is provided that allows compliance with this section to be readily determined.* The below-grade piping will drain back into a foot valve within the storage tank and is compliant with suction piping requirements.
40. Requirements for Hazardous Substance UST Systems, 20.5.6.12 NMAC (40 CFR § 280.42)	*A number of release-detection requirements are specified for UST systems that contain hazardous substances.* The tanks in the UST system are double lined with interstitial monitoring to detect leaks from the inner wall. The outer wall will contain leaks from the inner wall.
41. Inventory Control With Tank Tightness Testing Requirements For USTs and Other Methods of Release Detection for Tanks, 20.5.6.13 through 20.5.6.19 NMAC (40 CFR § 280.43)	*A number of requirements for the acceptable release-detection methods are specified. The release-detection methods described are inventory control, manual tank gauging, tank-tightness testing, automatic tank gauging, vapor monitoring, groundwater monitoring, interstitial monitoring, and other methods.* The WIPP USTs use interstitial monitoring to meet this requirement.
42. Inventory Control With Tank Tightness Testing Requirements For USTs, Subsection A of 20.5.6.13 NMAC (40 CFR § 280.43[a])	*Product inventory control (or another test of equivalent performance) must be conducted monthly to detect a release of at least 1.0 percent of flow-through plus 130 gallons on a monthly basis in the following manner: inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank are recorded each operating day; the equipment used is capable of measuring the level of product over the full range of the tank height to the nearest one-eighth of an inch; the regulated substance inputs are reconciled with delivery receipts by measurement of the tank inventory volume before and after delivery; deliveries are made through a drop tube that extends to within one foot of the tank bottom; product dispensing is metered and recorded within the local standards for meter calibration or an accuracy of six cubic inches for every five gallons of product withdrawn; and the measurement of any water level in the bottom of the tank is made to the nearest one-eighth of an inch at least once a month.* Inventory control is the contingency method used if the interstitial monitoring system fails. The DOE underground fuel station operation procedure addresses the requirements for using this method if this situation arises. Compliance with the requirement for a drop tube extending to within 1 foot of the tank bottom has been verified with the installing organization. The stick reading can measure to the nearest one-eighth of an inch.
43. Interstitial Monitoring	*Interstitial monitoring between the UST system and a secondary*

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
Requirements for USTs, 20.5.6.19 NMAC (40 CFR § 280.43[g])	*barrier immediately around or beneath it may be used, but only if the system is designed, constructed, and installed to detect a leak from any portion of the tank that routinely contains product and also meets one of the following requirements: for double-walled UST systems, the sampling or testing method can detect a release through the inner wall in any portion of the tank that routinely contains product; for UST systems with a secondary barrier within the excavation zone, the sampling or testing method used can detect a release between the UST system and the secondary barrier; the secondary barrier around or beneath the UST system consists of artificially constructed material that is sufficiently thick and impermeable (at least 10^{-6} cm/sec for the regulated substance stored) to direct a release to the monitoring point and permit its detection; the barrier is compatible with the regulated substance stored so that a release from the UST system will not cause a deterioration of the barrier, allowing a release to pass through undetected; for cathodically protected tanks, the secondary barrier must be installed so that it does not interfere with the proper operation of the cathodic protection system; the groundwater, soil moisture, or rainfall will not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 days; the site is assessed to ensure that the secondary barrier is always above the groundwater and is not located in a 25-year flood plain, unless the barrier and monitoring designs are for use under such conditions; monitoring wells are clearly marked and secured to avoid unauthorized access and tampering; and, for tanks with an internally fitted liner, an automated device can detect a release between the inner wall of the tank and the liner, and the liner is compatible with the substance stored.* The interstitial monitoring system is the primary method of release detection for the UST system at the WIPP. The as-built engineering drawings provide evidence that this method can detect a release through the inner wall in any portion of the tank that routinely contains product.
44. Methods of Release Detection of Piping, 20.5.6.23 NMAC (40 CFR § 280.44)	*Each method of release detection for piping used to meet the requirements of 20.5.6.601 NMAC must be conducted in accordance with specific requirements for automatic line leak detectors, line tightness testing, or applicable tank methods, or interstitial monitoring.* The interstitial monitoring system meets the release-detection requirement. Should the interstitial system become inoperable, monthly inventory controls will be used until the system is repaired or replaced. In this contingency situation, tank tightness testing will be performed every five years.
45. Alternative Methods, 20.5.6.24 NMAC (40 CFR § 280.43[h])	*Any other method may be used if it can detect a 0.2 gallon-per-hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95, and a probability of false alarm of 0.05, and it has been approved by the NMED.* The DOE does not use other methods of release detection.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
46. Release Detection Recordkeeping, 20.5.6.25 NMAC (40 CFR § 280.45)	*All storage tank system owners and operators shall maintain records in accordance with 20.5.5.504 NMAC, which demonstrate compliance with applicable requirements in 20.5.6 NMAC. Written performance claims pertaining to any release detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for five years, or for another reasonable period of time determined by the NMED, from the date of installation. The results of any sampling, testing, or monitoring must be maintained for at least one year, or for any reasonable period of time determined by the NMED, except that the results of tank tightness testing conducted in accordance with 20.5.6.603.C NMAC, must be retained until the next test is conducted. Written documentation of calibration, maintenance, and repair of release-detection equipment permanently located on-site must be maintained for at least one year after the servicing work has been completed or for any reasonable time period determined by the NMED. Any schedules of required calibration and maintenance provided by the release-detection equipment manufacturer must be retained for five years from the date of installation.* The NWP purchasing group maintains manufacturer equipment and performance claim records. The DOE records management program discusses the maintenance of records. The NWP purchasing group Records Inventory and Disposition Schedule adequately addresses the record retention requirements of this section. According to the manufacturer of the tanks, no calibration or maintenance is required for the current configuration. If modifications are made, these functions will be performed.
47. Suspected Releases, 20.5.7.9 NMAC (40 CFR § 280.50)	*Owners and operators of storage tank systems must report suspected releases to the NMED within 24 hours in accordance with 20.5.7.700 NMAC, and follow the procedures in 20.5.7.703 NMAC for any of the following conditions:* *A. Evidence of released regulated substances in the vicinity of the storage tank site, including but not limited to, the presence of non-aqueous phase liquid or vapors in soils, basements, sewer and utility lines, groundwater, drinking water or nearby surface water;* *B. Unusual operating conditions such as, but not limited to, the erratic function of product dispensing equipment, the sudden loss of regulated substance from the storage tank system, an unexplained presence of water in the tank, the presence of a regulated substance in the annular or interstitial space of double-walled tanks or piping, anything other than a "pass" result from any release detection method in 20.5.6 NMAC, unless system equipment is found to be defective but not leaking and is immediately repaired or replaced;* *C. Monitoring results from a release detection method described under 20.5.6.601, 602, 603 and 604 NMAC that indicate a release may have occurred.* The DOE fuel station operation procedure outlines the required steps in the event of a suspected release. No releases or suspected releases occurred from the UST system at the WIPP during this reporting period.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
48. Confirmed Releases, 20.5.7.10 NMAC (40 CFR § 280.51)	*When required by the NMED, owners and operators of storage tank systems must follow the procedures in 20.5.7.700 NMAC regarding any unexpected or confirmed release.* The NMED has not requested off-site impact information and there has been no evidence of a release of regulated substances during this reporting period.
49. Suspected Releases, Subsection B, 20.5.7.9 NMAC (40 CFR § 280.52)	*Owners and operators shall immediately investigate suspected releases of regulated substances requiring reporting under 20.5.7.701 NMAC within 14 days. Owners and operators shall conduct a system test, monitoring result check, site check or another procedure approved by the Department.* The DOE fuel station operation procedure describes the appropriate testing, investigating, reporting, and corrective action to be taken if a release of regulated substances is suspected. There were no leaks in the WIPP USTs during this reporting period.
50. Spills and Overfills, Subsection C of 20.5.7.11 NMAC (40 CFR § 280.53[a])	*Owners and operators of storage tank systems must contain and immediately clean up a spill or overfill and report it to the NMED within 24 hours in accordance with 20.5.7.700 NMAC. If a spill or overfill of a petroleum product results in a release to the environment that exceeds 25 gallons, or a hazardous substance spill results in a release to the environment that equals or exceeds its RQ under CERCLA (40 CFR Part 302), corrective action must be initiated in accordance with 20.5.12 NMAC and 20.5.13 NMAC.* The DOE fuel station operation procedure addresses requirements with respect to petroleum UST systems (i.e., as specified in 20.5.12 NMAC). There were no spills or overfills exceeding 25 gallons from the WIPP USTs during this reporting period. WIPP USTs contain only petroleum products.
51. Spills and Overfills, Subsection B of 20.5.7.11 NMAC (40 CFR § 280.53[b])	*Owners and operators of storage tank systems must contain and immediately clean up a spill or overfill of a petroleum product that is less than 25 gallons and a spill or overfill of a hazardous substance that is less than the RQ. If cleanup cannot be accomplished within 24 hours, owners and operators must immediately notify the implementing agency.* DOE procedures address the requirement with respect to petroleum UST systems and releases that exceed an RQ under the CERCLA. Small spills and overfills have been properly contained and cleaned up. There were no significant spills or overfills from the WIPP USTs during this reporting period. No UST system is used to contain hazardous substances at the WIPP.
52. Temporary Closure and Return to Service, 20.5.8.9 NMAC (40 CFR § 280.70)	*When a storage tank system is temporarily closed, owners and operators must continue operation and maintenance of corrosion protection in accordance with 20.5.5.501 NMAC, and any release detection in accordance with 20.5.6 NMAC. Owners and operators shall also comply with 20.5.7 NMAC, 20.5.12 NMAC, and 20.5.13 NMAC. However, release detection is not required as long as the storage tank system is empty. When a storage tank system is temporarily closed for three months or more, the vent lines must be left open and functioning, and all other lines, pumps, manways, and ancillary equipment must be capped and secured.* No temporary closures have taken place during this reporting period.

Table 30: Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance
53. Assessing the Site at Closure or Change-in-Service, Subsection B of 20.5.8.12 NMAC (40 CFR § 280.72[b])	*If contaminated soils, contaminated groundwater, or free product as a liquid or vapor are discovered, owners and operators must begin corrective action in accordance with 20.5.12 NMAC or 20.5.13 NMAC.* No releases or suspected releases occurred at the WIPP during this reporting period.
54. Financial Responsibility, Applicability, 20.5.9.900 NMAC (40 CFR § 280.90)	*State and federal government entities whose debts and liabilities are the debts and liabilities of a state or the United States are exempt from the requirements of 20.5.9 NMAC, Financial Responsibility.* As the owner of the WIPP, the DOE is exempt from the financial responsibility requirements of this part.
55. Corrective Actions for Storage Tank Systems Containing Petroleum Products, General, Subsection A of 20.5.12.8 NMAC	*All releases must be cleaned up through soil remediation, ground and surface-water remediation, and any other appropriate procedures in a manner protective of health, public welfare, and the environment.* No releases occurred from the WIPP USTs during this reporting period.

26.0 NEW MEXICO SOLID WASTE ACT

26.1 Summary of the Law

With the enactment of the New Mexico *Solid Waste Act* (§§ 74-9-1 through 74-9-43 NMSA) in 1978, the New Mexico Legislature authorized and directed the establishment of a comprehensive and integrated solid waste management program at both the state and local levels. This legislation directed the planning and regulation of the reduction, storage, collection, transportation, and disposal of solid waste and authorizes the establishment of a system of permits for the construction, operation and, if applicable, closure and post-closure maintenance of solid waste facilities.

The *New Mexico Solid Waste Act* is implemented by the New Mexico Solid Waste Management Regulations (SWMRs) contained within 20.9 NMAC. These regulations are applicable because infectious wastes are generated at the WIPP, soil(s) may become contaminated from unintentional releases of petroleum products, and the WIPP receives asbestos wastes for disposal. A construction debris landfill is operational at the site, but is exempt under 20.9 NMAC § 108 of the SWMRs.

26.2 Status of Compliance with the Regulatory Requirements

Table 31 summarizes the applicable requirements and compliance status under the *New Mexico Sold Waste Act*.

Table 31: Status of Compliance with the Regulatory Requirements of the *New Mexico Solid Waste Act*

Regulatory Requirement	WIPP Compliance
1. General Requirements, 20.9.2.8 NMAC	*Generators of solid waste must provide containers for the solid waste except for construction and demolition debris, yard refuse, and appliances.* A construction debris landfill is operational at the WIPP. The construction landfill is on property owned by the DOE and receives nonhazardous material generated from WIPP construction activities. No hazardous wastes or materials are allowed in the landfill. The landfill is covered by the exemption found in 20.9 NMAC § 108. The requirements and rules of operation for the landfill are described in a WIPP procedure. Use of this procedure ensures operation of the construction landfill in a manner that is protective of human health and the environment and in compliance with applicable local, state, and federal laws and regulations. Infectious wastes are generated at the WIPP and are managed in accordance with the applicable requirements of 20.9 NMAC § 700F. Infectious wastes generated are shipped off-site for disposal. Petroleum-contaminated soils generated at the WIPP are managed in accordance with the applicable requirements of 20.9 NMAC § 700H. Petroleum-contaminated soil is shipped off-site for disposal or remediation. The WIPP provides containers for solid waste in accordance with the applicable requirements.
2. Prohibited Acts, 20.9.2.10 NMAC	*Section 20.9.2.10 NMAC specifies prohibited acts including the following: disposal of solid waste in places other than a permitted solid waste facility; disposal of regulated waste such as special waste, hazardous waste, radioactive materials, and petroleum waste at a facility not permitted for that kind of waste disposal of bulk liquids; and disposal of any solid wastes that are known to be harmful to the environment or hazardous to public health or safety.* The following wastes are excluded from disposal in the WIPP construction landfill: • Radioactive materials • Hazardous or other regulated materials, including petroleum products • Liquids, or containers that contain liquids • Any recyclable materials as determined by the DOE • Municipal solid waste Construction debris that may be disposed of in the landfill is material generally considered to be non-water-soluble and nonhazardous in nature and includes timbers, pipes, excavation soil (if not contaminated with hazardous materials/wastes), concrete, packing materials, sheet metal, glass, and wood. Site-generated wastes subject to these prohibitions are sent to licensed, off-site facilities for disposal.
3. Exceptions, 20.9.2.11 NMAC	*This part does not apply to disposal of construction and demolition debris or yard refuse by a person in possession of property if the material was generated on the property and if the disposal of the solid waste does not violate any provision of 20.9.2 through 20.9.10 NMAC.* The WIPP construction landfill falls within this exemption. The DOE is not required to obtain a landfill permit for construction debris generated and disposed of at the WIPP.

Table 31: Status of Compliance with the Regulatory Requirements of the *New Mexico Solid Waste Act*

Regulatory Requirement	WIPP Compliance
4. Record Keeping and Annual Reports, 20.9.5.16 NMAC	*Operators of solid waste facilities shall make and maintain records during the active life of the facility. Operators shall submit annual reports to the Secretary of the NMED within 45 days after each calendar year.* The construction landfill is exempt from this requirement as identified in the SWMR, 20.9.2.11C NMAC. Although exempt from recordkeeping requirements, records for the landfill are maintained. The DOE construction debris disposal form is used to record the name, company, date, description, and estimated volume of debris, and signatures of the landfill user and of the landfill custodian. No permit is required; therefore, no annual report is generated.
5. Solid Waste Facilities, Entry by Department, Availability of Records to Department, 20.9.2.12 NMAC	*The Secretary or any authorized representative, employee or agent of the Department may enter any solid waste facility at any reasonable times for the purpose of making an inspection.* The NMED personnel are provided access to the WIPP during normal business hours to conduct an inspection.
6. Permit Applicable Requirements, 20.9.3.8 NMAC	*Any person seeking a permit to construct, operate, or modify a solid waste facility must file an application.* In accordance with 20.9.2.11 NMAC, the WIPP construction landfill is exempt from this requirement. The regulations do not apply to disposal of construction and demolition debris if the material is generated on the property, and the disposal of the solid waste does not violate any provision of the regulations. The WIPP construction landfill is exempted from permit application requirements because it only receives construction debris and because it is located at the same site where the construction debris is generated.
7. Registration of Commercial Haulers and Haulers of Special Waste, 20.9.3.31 NMAC	*Transporters of special waste shall register with the NMED, submit a description of the solid waste facilities used, submit a contingency plan to the Secretary, and carry a copy of the plan and appropriate cleanup kits in the vehicle.* Transportation of special waste generated at the WIPP is accomplished by a registered off-site contractor that meets the requirements.
8. General Operating Requirements for Solid Waste Facilities and Commercial Haulers, 20.9.5.8 NMAC	*A solid waste facility must be located and operated so that it does not cause a public nuisance or create a potential hazard to public health or welfare.* The WIPP construction landfill is covered by the 20.9.2.11C NMAC exemption contained in the SWMR. In order to ensure compliance with the SWMR, the WIPP construction landfill is operated according to DOE procedures that ensure protection of public health and welfare.
9. General Requirements for Closure and Post-Closure Care, 20.9.6.8 NMAC	*Section 20.9 NMAC specifies a number of solid waste facility closure and post-closure requirements including the installation of a final cover, preparing and implementing a land-use plan, a schedule for completing closure work, an approved post-closure care and monitoring plan, and annual reports.* The WIPP construction landfill is exempt from these requirements because it only receives construction debris and because it is located at the same site where the construction debris is generated. Closure and post-closure requirements are not applicable.

Table 31: Status of Compliance with the Regulatory Requirements of the *New Mexico Solid Waste Act*

Regulatory Requirement	WIPP Compliance
10. General Provisions, Paragraph B, 20.9.7.8 NMAC	*Section 20.9.7.8 NMAC provides requirements for operator certification. The amount and type of personnel training and experience are specified for landfills and for other types of facilities.* The WIPP construction landfill is exempted from these requirements because it only receives construction debris and because it is located at the same site where the construction debris is generated. Operator certification is not required.
11. Asbestos Waste, 20.9.8.12 NMAC	*This section specifies a number of requirements for transportation and disposal of asbestos waste, including transporter and labeling requirements.* These requirements are addressed in the WIPP Permit. In a letter from the NMED dated July 14, 2000 (NMED, 2000), the NMED stated that the standards for the management, storage, and disposal of waste in the WIPP Permit exceed the standards specified for asbestos in 20.9.8.12 NMAC; therefore, no additional conditions are necessary for disposal of TRU waste containing asbestos at the WIPP. No evidence of asbestos has been found at the WIPP except in the friction linings of the braking system for the Air Intake Shaft hoist. Compliance with the WIPP asbestos management program ensures that asbestos-containing materials are handled properly.There was no disposal of site-generated, asbestos-containing material during the reporting period.
12. Infectious Waste, 20.9.8.13 NMAC	*Section 20.9.8.13 NMAC specifies infectious waste storage and containment requirements, including waste segregation; specifications for container integrity; container labeling and marking; and storage and containment area access, integrity, and marking.* The following practices are ongoing at the WIPP: • Access to the infectious waste collection and storage area is limited to trained and inoculated medical and waste management personnel. • Special containers are easily identifiable through the use of internal red biohazard bags and external biohazard labels. • Sharps are sealed in containers that are leak-proof, puncture-proof, and tamper-proof. These containers are then placed in properly labeled, rigid, plastic containers. • Containment bags are red to ensure that they are clearly identifiable as specified by 29 CFR § 1910.145. • No infectious waste containers are reused. • Storage and containment areas are in an enclosed, clearly marked environment. • No compaction or grinding devices are used to reduce the volume of infectious waste. No inspections of the infectious waste storage area and the medical clinics at the WIPP and the Skeen-Whitlock Building were conducted by regulatory agencies during this reporting period.

Table 31: Status of Compliance with the Regulatory Requirements of the *New Mexico Solid Waste Act*

Regulatory Requirement	WIPP Compliance
13. Infectious Waste, 20.9.8.13E NMAC	*This section specifies operational requirements for infectious waste treatment, storage, and disposal facilities. Included is a requirement for the preparation and maintenance of a management plan that identifies the type of waste generated or handled; the segregation, packaging, labeling, collection, storage, and transportation procedures to be implemented; the treatment or disposal methods to be used; the transporter and disposal facility to be used; and the person responsible for the management of the infectious waste.* The WIPP transportation manual, special waste management plan, and the occupational health manual address the operational requirements for infectious waste as specified in this part. The transporter used for shipment of infectious waste during the reporting period was Advanced Chemical Transport. The disposal facility used for the infectious waste was Stericycle.
14. Infectious Waste, 20.9.8.13F-G NMAC	*Several methods are specified for the treatment and disposal of infectious waste. These methods include controlled incineration, heat sterilization, discharge to a sewage treatment system, or other methods as approved by the NMED.* Infectious waste is sent to an off-site facility for incineration or autoclaving.
15. Petroleum Contaminated Soil, 20.9.8.15 NMAC	*Section 20.9.8.15 NMAC specifies sampling requirements, disposal prohibitions, storage requirements, and remediation allowances for petroleum contaminated soils.* Petroleum-contaminated soils at the WIPP are sampled and analyzed for total petroleum hydrocarbons and other constituents as required by 20.9.8 NMAC and the DOE. Petroleum-contaminated soils are sent to an off-site facility for disposal or remediation.
16. Manifest Requirements, 20.9.8.19 NMAC	*A manifest must accompany each shipment of special waste. Each manifest must include information on the waste generator, transporter, waste treatment facility, the type of waste, and any special instructions.* Special waste shipments are accompanied by a standardized EPA shipment manifest that includes the required information.

27.0 NEW MEXICO GROUND WATER PROTECTION ACT

27.1 Summary of the Law

The New Mexico GWPA was enacted in 1990 in response to the threat facing public health, safety, and the environment from pollution of groundwater resources from leaking USTs. The Act allows the State of New Mexico to take corrective action at sites contaminated by leakage from USTs.

The GWPA is implemented by the regulations in 20.5 NMAC, Petroleum Storage Tanks, discussed in Section 25.0. These regulations provide guidelines for the payment or reimbursement of the costs of a minimum site assessment and corrective action and specify the

requirements for owners or operators of leaking storage tank systems. The GWPA prohibits expenditures from the Corrective Action Fund (20.5.17 NMAC) for federally owned and operated sites.

The WIPP has two USTs that meet the state standards and requirements for USTs. Procedures are in place for routine operations regarding the tanks and for mitigating spills or releases from the UST system.

27.2 Status of Compliance with the Regulatory Requirements

Table 32 provides compliance status with the New Mexico GWPA.

Table 32: Status of Compliance with the Regulatory Requirements of the *New Mexico Ground Water Protection Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements	*The owners or operators of USTs that release a regulated substance must take appropriate corrective action. The NMED will reimburse certain costs associated with performing a minimum site assessment and other corrective actions taken for spills or releases from USTs.* There were no releases from USTs at the WIPP during this reporting period.

28.0 NEW MEXICO AIR QUALITY CONTROL ACT

28.1 Summary of the Law

In 1978, the New Mexico *Air Quality Control Act* (§§ 74-2-1 through 74-2-17 NMSA 1978) was enacted. The NMED implements the New Mexico *Air Quality Control Act* under 20.2 NMAC. The New Mexico *Air Quality Control Act* and 20.2 NMAC are based primarily on the CAA (see Section 6.0), with the New Mexico Act as stringent as the CAA.

Under 40 CFR Part 70, operating permits are required for both area and major sources. The NMED implements the federal requirements under 20.2.70 NMAC, which describe the operating permit program, and 20.2.71 NMAC, which describes the fee and structure for the operating permit program.

28.2 Status of Compliance with the Regulatory Requirements

Table 33 summarizes DOE compliance with the applicable requirements of 20.2 NMAC. The WIPP has no sources of air emissions that require a permit under 20.2.70 NMAC. However, although not required, the DOE obtained a permit (Permit No. 310-M-2) in December 1993 for two emergency backup diesel generators (NMED, 1993). Section 20.2.72.202 NMAC exempts standby generators from an air quality permit provided that they are (1) operated only during the unavoidable loss of power; (2) operated less than 500 hours per year; and (3) either are the only source of air emissions at the site or are accompanied by sufficient record keeping to verify that the standby generator is operated less than 500 hours per year.

Table 33: Status of Compliance with the Regulatory Requirements of the New Mexico *Air Quality Control Act*

Regulatory Requirement	WIPP Compliance
1. Sampling Equipment, 20.2.1.113 NMAC	*Sampling equipment on stacks or other openings through which emissions are released to the atmosphere will be used as required.* The sampling equipment required for measuring emissions from the WIPP backup diesel generators was specified by the NMED in § 3(b) of the permit. Sampling ports, safe sampling platforms, safe access to sampling platforms, and utilities for sampling and testing equipment have been provided. A 0.25-inch stainless steel sampling line adjacent to the sampling ports, which extends down to within 4 feet above ground level, has been installed as required by the permit. This sampling line provides access for sampling by the NMED.
2. Excess Emissions, 20.2.7 NMAC	*Excess emissions during malfunction, start-up, shutdown, or scheduled maintenance must be minimized.* Special attention is paid during start-up, shutdown, scheduled maintenance, and any malfunction of the generators to ensure that emissions are minimized. Excess emissions are unlikely. However, a redundant system is in place, and the second backup generator will be used, as appropriate, to reduce potential emissions. If excess emissions occur, reporting will be performed as required by 20.2.7 NMAC. No excess emissions or generator malfunctions were detected during this reporting period.
3. Emissions Leaving New Mexico, 20.2.8 NMAC	*Emissions leaving New Mexico must not exceed the standards and regulations of the receiving state.* Title 40 CFR Part 70 and 20.2.8 NMAC apply to major sources, HAPs, acid rain, and other sources designated by the Administrator. The WIPP is not subject to these requirements based on the current air emissions inventory.
4. Oil Burning Equipment-Particulate Matter, 20.2.18 NMAC	*Standards have been established for particulate-matter emissions from oil-burning equipment with a rated heat capacity exceeding 250 million British thermal units (BTUs) per hour.* No oil-burning equipment at the WIPP exceeds this rated heat capacity. The rated heat capacity of each generators is 139.6 million BTUs per hour.
5. Oil Burning Equipment-Nitrogen Dioxide, 20.2.34 NMAC	*Standards have been established for nitrogen dioxide emissions from oil-burning equipment with a rated heat capacity of 1,000,000 million BTUs per hour.* No oil-burning equipment at the WIPP exceeds this rated heat capacity.
6. Regulations to Control Open Burning, 20.2.60 NMAC	*Open burning is allowed for the instruction and training of firefighting and rescue personnel when a permit is obtained from the NMED.* Firefighting training involving open burning was not conducted at the WIPP during this reporting period; therefore, no open-burning permit was required.

Table 33: Status of Compliance with the Regulatory Requirements of the New Mexico *Air Quality Control Act*

Regulatory Requirement	WIPP Compliance
7. Smoke and Visible Emissions, 20.2.61 NMAC	*No person owning or operating stationary combustion equipment shall permit, cause, or allow visible emissions from stationary combustion equipment to equal or exceed an opacity of 20 percent. No emissions of smoke with an opacity greater than 30 percent shall be released into the open air for any period greater than 10 seconds from any diesel-powered vehicle operating below 8,000 feet mean sea level. Opacity emissions shall be determined using Method 9 described in Appendix A of 40 CFR Part 60 (minimum time period for taking opacity reading: 10 minutes).* Opacity measurements are not required for the backup diesel generators because no opacity measurements are required under the permit. Other diesel equipment is present on-site that does not require a permit under 20.2.72 NMAC because this equipment represents such a small source of emissions. The inventory on the equipment was submitted to the NMED with the permit application for the backup generators. The emissions from the diesel equipment fall well below the permit thresholds.
8. Permit Applications, 20.2.70.300 NMAC	*Submittal of a compliance plan is required as part of the operating permit application for 40 CFR Part 70 sources.* No operating permit is required for the WIPP. The WIPP does not have processes that result in the emissions of HAPs to the atmosphere, other than those that are exempt from permitting and listed on the NMED List of Trivial Activities. Examples include paint dispensed from aerosol cans of 16 ounces or less, or routine calibration of laboratory equipment or other analytical instruments.
9. Permit Applications, 20.2.70.300 NMAC	*Semi-annual operating permit reports and progress reports on the compliance plan will be filed, if applicable.* The only reporting requirement under the permit for the backup diesel generators is an annual air emissions inventory upon request by the NMED. The NMED last requested the DOE to submit an air emissions inventory in 2003 (WRES, 2003) for CY 2002.
10. Construction Permits, 20.2.72 NMAC	*A permit is required for facilities that emit criteria pollutants or toxic air pollutants at rates that meet or exceed the threshold levels specified in 20.2.72 NMAC.* The WIPP has no sources of air emissions that require a permit under 20.2.72 NMAC. Although not required, the WIPP obtained a permit (Permit No. 310-M-2) in December 1993 for two emergency backup diesel generators (NMED, 1993). The permit remains in effect and requires that the sum of the hours of operation for both generators shall not exceed 480 hours per year. In 2005, an inventory of fugitive dust emissions from salt mining and handling activities was conducted to evaluate increased emissions that would result from the construction of a new haul road to transport salt tailings and provide access to a new salt storage area (SSA). The Air Quality Board was contacted to determine if any permits would be necessary for fugitive emissions from WIPP material handling processes. On March 31, 2006, the AQB issued a determination that no permit was required.
11. Construction Permit Fees, 20.2.75 NMAC	*Permit fees must be paid with the submittal of a permit application.* The permit fee for the diesel generators ($10,100) was submitted with the permit application in July 1993.

Table 33: Status of Compliance with the Regulatory Requirements of the New Mexico *Air Quality Control Act*

Regulatory Requirement	WIPP Compliance
12. Stack Heights, 20.2.80 NMAC	*Stack height requirements must be met.* The WIPP meets the requirement for stack height. The NMED approved the Permittees' calculations and modeling with the issuance of Air Quality Permit No. 310-M-2 (NMED, 1993).

28.3 Status of Compliance with the Permit Conditions

The permit for the backup diesel generators, which was issued to DOE on December 7, 1993, is the only permit issued under the authority of 20.2 NMAC. The permit conditions and compliance status of each regulatory requirement are provided in Table 34.

28.3.1 Permit for Backup Diesel Generators, Permit No. 310-M-2

The conditions specified by Air Quality Permit No. 310-M-2 (NMED, 1993) for the backup diesel generators at the WIPP are described in Table 34.

Table 34: Status of Compliance with the Permit Conditions for the Permit for Backup Diesel Generators, Permit No. 310-M-2

Regulatory Requirement	WIPP Compliance
1. Construction and Operation, Condition 1	*The plant (i.e., the diesel generators) shall be constructed and operated as described in the permit application dated June 18, 1993, and with the air quality modeling information that was submitted on September 22, 1993, unless modified by the conditions of this permit. The facility consists of two Caterpillar diesel generators with a rated capacity of 1,500 horsepower. Only one Caterpillar diesel generator is authorized to operate at a time for 20 hours per month and 12 months per year, each for a total of 240 hours per year. The sum of hours of operation for both generators shall not exceed 480 hours per year. Changes in plans, specifications, and other representations provided in the application documents shall not be made if they cause a change in the method of control of emissions or in the character of the emissions, or will increase the discharge of emissions. Any such proposed change must be submitted as a revision or modification of the permit in accordance with the condition.* The equipment described in the permit is operated in accordance with the terms and conditions of the permit and the manufacturer specifications, and is maintained in accordance with the manufacturer specifications. Each diesel generator at the WIPP operated less than 20 hours per year during this reporting period.

Table 34: Status of Compliance with the Permit Conditions for the Permit for Backup Diesel Generators, Permit No. 310-M-2

Regulatory Requirement	WIPP Compliance
2. Emission Rates, Condition 2	*The NMED has specified maximal emission rates for nitrogen dioxide, carbon monoxide, sulfur dioxide, and particulate matter. The rates specified are in terms of pounds per hour and tons per year from each engine and from the facility (i.e., both engines).* The emissions were established during emissions testing in 1992. The permit specifies that equipment is operated less than 480 hours per year. The limit on operating hours for the diesel generators is a control to limit the emissions to the rates specified in the permit. Each generator operated less than 20 hours per year during this reporting period.
3. Compliance Test Methods, Conditions 3-4	*Initial compliance tests for four pollutants described for Condition 2 are required for one of the diesel generators. Compliance tests may be reimposed if noncompliance is indicated or if the tests were technically unsatisfactory. The tests shall be conducted within 60 days after achieving the maximal production rate at which the generator will normally be operated. If the maximal production rate does not occur within 120 days of source start-up, the tests must be conducted no later than 180 days after the initial start-up of the source.* *The tests shall be conducted in accordance with EPA Reference Methods 1-4, Method 5 (particulate matter), Method 6 (sulfur dioxide), Method 7 (A-E) (nitrogen dioxide), and Method 10 (carbon monoxide) contained in 40 CFR Part 60, Appendix A, and with the requirements of 40 CFR § 60.8(f). The oxygen in the stack gas shall be determined by using EPA Method 3.* *The NMED shall be notified of the date and time of compliance testing at least 30 days before the planned test date so the NMED may have an observer present during testing. The permittee will arrange a pretest meeting with the NMED at least 30 days prior to the anticipated test date and shall observe the pretesting and testing procedures described in detail under this condition. These requirements include submitting a written test protocol to the NMED at least one week prior to the testing date for approval and providing appropriate equipment and access to the NMED observer for sampling. Several parameters (i.e., engine revolutions per minute, exhaust static pressure, exhaust manifold temperature, fuel consumption, and horsepower as indicated by kilowatt output) shall be monitored and recorded during the compliance testing and the results will be included in the test report submitted to NMED. Flow straighteners shall be installed where necessary to prevent cyclonic flow in the stack. The tests shall be conducted at 90 percent of full load or greater and at additional loads as specified by NMED personnel at the test or pretest meeting.* *Two copies of the compliance test report must be submitted to the NMED within 30 days after completion of testing.* Compliance with these conditions was achieved and reported in the compliance test report, *Emission Sampling Report, Backup Diesel Generator* (IT Corporation, 1994), which was submitted to the NMED AQB on March 6, 1994, and approved on May 12, 1994.

Table 34: Status of Compliance with the Permit Conditions for the Permit for Backup Diesel Generators, Permit No. 310-M-2

Regulatory Requirement	WIPP Compliance
4. Revisions and Modifications, Condition 5	*Any future changes shall be preceded by the submittal of a permit application to the NMED in accordance with 20.2.72 NMAC. No modifications shall be made prior to the issuance of the revised permit.* There have been no revisions or modifications to the equipment or operation during this reporting period.
5. Notification to Subsequent Owners, Condition 6	*If there is any change in control or ownership of the facility, the permittee shall notify the succeeding owner of the permit and its conditions and shall notify the NMED of the change in ownership within 15 days of the change.* There has been no change in ownership or control of the permitted equipment during this reporting period.
6. Right to Access Property and Review Records, Condition 7	*The NMED will be given the right to enter the facility at all reasonable times to verify the terms and conditions of the permit. Upon receipt of a verbal or written request from any authorized representative of the NMED, the company will produce any records or information necessary to demonstrate that the terms and conditions of the permit are being met.* Upon request, NMED representatives enter the WIPP and are provided with requested records and information. No NMED personnel requested entry to the site to verify the terms and conditions of the permit for the diesel generators during this reporting period.
7. Posting of the Permit, Condition 8	*A copy of the permit will be posted and in view of the plant site at all times. It will be made available to NMED personnel for inspection upon request.* A copy of the permit is posted at the WIPP.
8. Recordkeeping, Condition 9	*The DOE will maintain an operational log in which the date, time, and hours of operation will be recorded for each engine. The records will be maintained on-site for at least two years from the time of recording and will be made available to NMED personnel upon request.* Completion and maintenance of operational logs are conducted as prescribed by Permittee procedures. CMR logs contain information about the diesel generators. The run times for the generators are recorded automatically by the Central Monitoring System. The records are maintained on-site for at least two years.
9. Reporting, Condition 10	*The permittee will notify the NMED in writing or provide the NMED with the following information:* - *The anticipated date of the initial start-up of each new or modified emission source at least 30 days prior to that date* - *The actual date of the initial start-up of each new or modified source within 15 days after the start-up date* - *The date when each new or modified emission source reaches the maximal production rate at which it will operate within 15 days after that date* - *Any change of operators within 15 days after the change* - *Any necessary update or correction no more than 60 days after the operator knows or should have known of the*

Table 34: Status of Compliance with the Permit Conditions for the Permit for Backup Diesel Generators, Permit No. 310-M-2

Regulatory Requirement	WIPP Compliance
	condition necessitating the update or correction of the permit. Notice of the initial start-up of each source was submitted to the AQB in December 1993. No modifications necessitating reporting to the state were made during this reporting period.
10. Permit Cancellations (Permit)	*The NMED will cancel the permit automatically if any source ceases operation for at least five years or if the construction or modification of a source is not initiated within two years from the date of issuance if work on construction or modification is suspended for a total of one year.* The NMED did not cancel the permit.
11. Notice of Intent and Emission Inventory (Permit)	*Requirements related to Notice of Intent (NOI) and emission inventory are contained in 20.2.73 NMAC which states, an annual emission inventory is required annually for any stationary source permitted under 20.2.72 NMAC (except for those sources that are permitted only for toxic air pollutant emissions). Other sources that are required to file an annual emission inventory are those that must file a NOI under 20.2.73 NMAC or that emit in excess of one ton of lead or ten tons of total suspended particulates, particulate matter with an aerodynamic diameter of 10 µm or less (i.e., PM_{10}), sulfur dioxide, nitrogen dioxide, carbon monoxide, or Volatile Organic Compounds in any calendar year including and subsequent to 1990.* Because Air Quality Permit Number 310-M-2 (NMED, 1993) applies to the operation of two standby diesel generators that are not required to have a permit, annual inventories are not required. However, the NMED has the authority to request an annual inventory from facilities pursuant to 20.2.73.300 NMAC. The last NMED request for an annual inventory was for CY 2002 (WRES, 2003).

29.0 NEW MEXICO WATER QUALITY ACT

29.1 Summary of the Law

The *New Mexico Water Quality Act* (§§ 74-6-1 through 74-6-17 NMSA 1978) created the New Mexico Water Quality Control Commission that is tasked with the development of regulations to protect New Mexico ground and surface water. New Mexico water quality regulations for ground and surface water protection are contained in 20.6.2 NMAC, Ground and Surface Water Protection. The Ground and Surface Water Protection Regulations, 20.6.2 NMAC, include water quality standards for groundwater and surface water and regulations regarding discharges that may impact groundwater. The WIPP does not discharge to surface water, but does have a discharge permit (DP-831) for Effluent Lagoons B and C, to prevent impacts to groundwater from the sewage treatment system; for the H-19 Evaporation Pond and two other storm-water ponds, used to manage miscellaneous nonhazardous wastewaters; and three salt-storage cells, to minimize impacts to groundwater from the management of salt tailings generated from the construction and maintenance of the geologic repository.

On January 16, 1992, the NMED issued the original DP-831 for the WIPP sewage treatment facility (NMED, 1992a). The discharge permit is renewed every five years, and several discharge permit modifications have been submitted. In 1997, DP-831 was renewed and modified to add authorization for the disposal of up to 8,000 gallons per day (gpd) of nonhazardous wastewater to the synthetically lined H-19 evaporation pond. The 1997 discharge permit renewal also authorized the discharge of up to 2,000 gpd of nonhazardous wastewater to Effluent Lagoon B in the sewage treatment system. The last discharge permit renewal was on July 29, 2014 (NMED, 2014).

The most significant modification to the discharge permit was issued December 2003 (NMED, 2003), and was the result of the notice of intent (NOI) submitted in October 2002 describing an anthropogenic lens of shallow subsurface water beneath the WIPP at a depth of less than 100 feet below ground surface. This water was not present when the shafts for the repository were constructed and is believed to have originated from the management of storm water run-off in unlined evaporation ponds. Water in the northern portion of this shallow water lens contains total dissolved solids (TDS) above 100,000 milligrams per liter (mg/L), which is believed to be the result of storm water infiltrating the salt pile just north of the Property Protection Area. Based on the NOI, the Ground Water Quality Bureau determined that a modified discharge permit was necessary. The modification included a groundwater quality and groundwater level monitoring program as well as the construction of controls to minimize the infiltration of storm water to the subsurface.

The infiltration controls proposed by the DOE and incorporated by the NMED in the April 5, 2010, discharge permit to minimize recharge of the subsurface shallow are as follows.

- The existing 18-acre Salt Cell (SC) 1 was graded with a 2 percent slope from the center, capped with an high-density polyethylene liner, 2 feet of soil, and seeded with a BLM-approved seed mix to establish native vegetation. The SC 1 was graded such that water would drain to the Salt Pile run-off ditch and the Salt Storage Pond 1, which was lined with a 60-mil high-density polyethylene liner.

- A new SC, called the SC 2 & 3, was constructed north of the SC 1. The SC 2&3 was constructed with a prepared subgrade and 2 percent slope to the center, which contains a perforated pipe that conveys storm water from the SC 2&3 area west to a double-lined pond, Salt Storage Pond 1, with a leak detection system.

- Due to a large amount of storm water, in excess of the design capacity of Salt Storage Pond 1, Salt Storage Pond 3 was constructed to contain overflow of the Salt Storage Pond 2. Storm water runoff to the interconnected Salt Storage Pond 2 and Salt Storage Pond 3 is 2,752,831 gpd based on a 25-year/24-hour storm event (3.90 inches). The Salt Storage Pond 3 was completed and added to the discharge permit in 2010.

Currently, the discharge permit authorizes the following activities:

- The discharge of up to 23,000 gpd of domestic wastewater and non-hazardous industrial wastewater from two compressed air systems to the sewage lagoon system.

- The effluent lagoons B, C, and H-19 are permitted for the discharge of up to 50,000 gpd into each pond of miscellaneous nonhazardous wastewater for evaporation as long as a minimum of 1 foot of freeboard is maintained.

- The water depth of the Salt Storage Pond 3 shall be measured monthly to the nearest tenth of a foot (0.1 foot).

- A permit renewal by the NMED – Ground Water Quality Bureau was granted to the WIPP on July 29, 2014 (NMED, 2014f). The current Discharge Permit authorizes the following activities: monitoring and reporting, recordkeeping, inspection and entry, duty to provide information, spills, leaks and other unauthorized discharges, retention of records, enforcement, and modification and/or amendments.

The impoundments and storage cells listed above reflect new nomenclature in the July 29, 2014, renewal for the existing impoundments and storage cells.

29.2 Status of Compliance with the Regulatory Requirements

Table 35 provides the regulatory requirements and the compliance status under the *New Mexico Water Quality Act*.

Table 35: Status of Compliance with the Regulatory Requirements of the *New Mexico Water Quality Act*

Regulatory Requirement	WIPP Compliance
1. Notice of Intent to Discharge, 20.6.2.1201 NMAC	*Any party intending to make a new water contaminant discharge or to alter the character or location of an existing water contaminant discharge, unless the discharge is being made or will be made into a community sewer system or subject to the Liquid Waste Disposal Regulations adopted by the New Mexico Environmental Improvement Board, shall file a notice with the Ground Water Quality Bureau of the NMED for discharges that may affect groundwater, and/or the Surface Water Quality Bureau of the department for discharges that may affect surface water.* The initial NOI for the WIPP sewage treatment system was submitted in 1983; a discharge plan or permit was not required at that time. A revised NOI was submitted in 1989 that resulted in the determination that a discharge plan was required. In October 2002, an NOI was submitted as a result of the formation of anthropogenic shallow subsurface water beneath the WIPP. This resulted in a modified discharge permit issued in December 2003 (NMED, 2003), which incorporated the infiltration controls into the permit and groundwater monitoring program for the shallow subsurface anthropogenic water.
2. Filing of Plans and Specifications - Sewerage Systems, 20.6.2.1202 NMAC	*Any party proposing to construct a sewerage system or proposing to modify any sewerage system in a manner that will change the quantity or quality of the discharge from the system substantially must file plans and specifications for the construction or modification with the Ground Water Quality Bureau of the NMED for discharges that may affect groundwater, and/or the Surface Water Quality Bureau of the department for discharges that may affect surface water.* Plans and specifications for the sewage treatment system, the H-19 Evaporation Pond and the infiltration controls were included in the Discharge Permit Renewal Application submitted to the NMED on May 9, 2013, as well as in previous discharge permit modifications and renewals. The NMED – Ground Water Quality Bureau granted the permit renewal on July 29 , 2014.
3. Notification of Discharge - Removal,	*Requirements for reporting, notifications, and corrective action with respect to any discharge from any facility of oil or other water*

Table 35: Status of Compliance with the Regulatory Requirements of the *New Mexico Water Quality Act*

Regulatory Requirement	WIPP Compliance
20.6.2.1203 NMAC	*contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property are specified.* In the event of an unauthorized discharge of oil or other potentially harmful water contaminants, notification, reporting, and corrective action are performed in accordance with the WIPP environmental incident reporting procedure. No unauthorized discharge requiring notification occurred during this BECR reporting period.
4. General Requirements, 20.6.2.2101 NMAC	*General discharge limitations and sampling/analytical requirements for the discharge of effluents to a watercourse must be met.* WIPP wastewater and storm water management facilities do not discharge to a watercourse; therefore, this regulation is not applicable to the WIPP.
5. Discharge Permit Required, 20.6.2.3104 NMAC	*No person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into groundwater unless he is discharging pursuant to a discharge permit issued by the Secretary. When a permit has been issued, discharges must be consistent with the terms and conditions of the permit.* The DOE proposed conservative and robust mitigative infiltration controls in the December 2003 modification to DP-831 to meet this requirement when the DOE and the Permittees became aware that the most likely source of subsurface shallow groundwater containing elevated TDS was the salt stockpile and infiltration from other storm water discharges. The DOE has continued to comply with this requirement through the 2013 Discharge Permit Renewal Application process, which was approved by the NMED – Ground Water Quality Bureau on July 29, 2014.
6. Application for Discharge Permits and Renewals, 20.6.2.3106 NMAC	*Any person who intends to begin discharging any listed water contaminants or any toxic pollutant so that they may move directly or indirectly into groundwater must have a discharge permit as required.* Discharges at the WIPP are consistent with the terms and conditions of DP-831.
7. Monitoring, Reporting, and Other Requirements, 20.6.2.3107 NMAC	*Requirements include periodic reporting to the Secretary of any information that may be required as set forth in the discharge permit, and notifying the NMED of any facility expansion, production increase, or process modifications that would result in the discharge of water contaminants.* The DOE submits semi-annual discharge monitoring reports to the NMED to demonstrate compliance with the inspection, monitoring, and reporting requirements identified in the discharge permit by July 31 and January 31 of each year. The discharge permit requires semi-annual sampling and analysis of the sewage system influent for nitrate, total Kjeldahl nitrogen (TKN), TDS, chlorides, and sulfate. The sewage lagoons north effluent lagoon, south effluent lagoon, and the H-19 evaporation pond are sampled semi-annually for TDS, chloride, and sulfate. The volume of water discharged to the sewage lagoons and evaporation ponds is also monitored and reported as required by the discharge permit. The Storm Water Ponds 1, 2, and 3, and the Salt Storage Ponds 1, 2, and 3 are sampled annually for TDS, nitrate, sulfate, and chlorides. The water level in 20 shallow water monitoring wells or piezometers

Table 35: Status of Compliance with the Regulatory Requirements of the *New Mexico Water Quality Act*

Regulatory Requirement	WIPP Compliance
	are monitored for depth to groundwater to the nearest hundredth of a foot quarterly and sampled for TDS, chlorides, sulfate and field parameters (temperature, conductivity and pH) semi-annually in 11 shallow water monitoring wells as designated in the discharge permit. One well, Water Quality Sampling Program (WQSP) 6A, is also sampled semi-annually for nitrates and TKN. The results of monitoring and analysis are reported in the semi-annual discharge monitoring report for the period within which samples are collected. The April 4, 2010, modified discharge permit added the operation of a new pond, Salt Storage Pond 3, along with the requirement to measure the Salt Storage Pond 3 to the nearest tenth of a foot (0.1 ft) and report the approximate volume of storm water calculated annually (NMED, 2010b). Monitoring requirements of the July 29, 2014 discharge permit remain the same as in the 2008 Permit.
8. Public Notice and Participation, 20.6.2.3108 NMAC	*Within 15 days of receipt of an application for a discharge permit, modification or renewal, the NMED shall review the application for administrative completeness. When the application is deemed administratively complete, the NMED shall notify the applicant in writing. Within 30 days of notification of a proposed discharge permit, or modification or renewal of an approved discharge permit, the applicant must ensure that the public and affected governmental agencies are notified.* Public notices have been provided in accordance with NMED protocols for discharge permit applications, modifications, and renewals. Public notices for the May 9, 2013, discharge permit renewal were posted by NMED on June 3, 2013. On June 9, 2013, a public notice was printed in the Carlsbad Current-Argus newspaper, and the adjacent land owners were notified by mail.
9. Secretary Approval, Disapproval, Modification, or Termination of Discharge Permits and Requirements for Abatement Plans, 20.6.2.3109 NMAC	*If the monitoring data submitted indicate that these regulations are being or may be violated or that the standards in 20.6.2.3103 NMAC, "Standards for Ground Water of 10,000 mg/L [milligrams/liter] TDS [total dissolved solids] Concentration or Less," are being or will be exceeded in groundwater at any place of withdrawal for the present or reasonably foreseeable future due to the discharge, it may be necessary to modify the discharge permit.* There were no discharges from the WIPP that exceeded the standards of 20.6.2.3103 NMAC during this reporting period.
10. Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC	*The state has set a number of water quality standards for interstate and intrastate surface waters in New Mexico.* The water quality standards for interstate and intrastate surface waters in New Mexico do not apply to the WIPP because there are no surface waters, either intermittent or permanent, that will be affected.
11. Utility Operator Certification, 20.7.4 NMAC	*The state requires that operators of public water supply systems and public wastewater facilities are certified to the educational and experience requirements of 20.7.4 NMAC.* Under these regulations, the WIPP water supply system is classified as a Class 2 public water supply system because of the population served (501 to 5,000). See Section 30.0 for more information. The WIPP wastewater treatment facility is considered a Class 1 facility because of the population served and because the treatment process

Table 35: Status of Compliance with the Regulatory Requirements of the *New Mexico Water Quality Act*

Regulatory Requirement	WIPP Compliance
	comprises a facultative settling and evaporative effluent lagoon system. Since these systems require certified operators, the DOE employs operators and supervisors certified to the applicable requirements. Operators undergo recertification and training every three years; training and certification records are maintained by the DOE at the WIPP.

29.3 Status of Compliance with the Permit Requirements

Table 36 summarizes the requirements in discharge permit DP-831 and compliance status.

Table 36: Status of Compliance with the Discharge Permit Requirements

Regulatory Requirement	*WIPP Compliance*
1. Section III – Authorization to Discharge (July 29, 2014, Discharge Permit Renewal)	*The permittee is authorized to discharge up to 23,000 gpd of domestic wastewater to a synthetically-lined facultative impoundment system for disposal by evaporation.* The design capacity of 23,000 gpd, authorized in the discharge permit, has not been exceeded.
2. Section III – Authorization to Discharge (July 29, 2014, Discharge Permit Renewal)	*Up to 50,000 gpd of brine, purge waters, and miscellaneous non-hazardous process waters are permitted to be discharged into to the Evaporation Pond H-I9, up to the capacity of the pond with one foot of freeboard.* DOE operating procedures require that a Request for Disposal form be filled out and approved before discharging water into the H-19 Evaporation Pond. No exceedances of the permitted 50,000 gpd have occurred. No exceedances of the one foot of freeboard have occurred.
3. Section III – Authorization to Discharge (July 29, 2014, Discharge Permit Renewal)	*Up to 50,000 gpd of brine, purge waters, and miscellaneous non-hazardous process waters are permitted to be discharged into Effluent Lagoons B and C of the Facultative Lagoon System, up to the capacity of the ponds with one foot of freeboard.* No discharges of any water to Effluent Lagoons B and C occurred during this reporting period. No exceedances have occurred.
4. Section III – Authorization to Discharge (July 29, 2014, Discharge Permit Renewal)	*The permittee is also authorized to discharge up to 4,224,835 gpd of runoff in contact with salt stockpiles to three synthetically-lined impoundments for disposal by evaporation.* No exceedances to the discharge permit occurred for these three Salt Storage Ponds.
5. Operational Plan – Condition 3 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall maintain the impoundment liner(s) conditions which could affect the structural integrity impoundment liner(s). Such conditions include the following:* • *erosion damage;* • *animal burrows or other damage;* • *the presence of vegetation including aquatic plants, weeds, woody shrubs or trees growing within five-feet of the top inside edge of a sub-grade impoundment, within five feet of the toe of the outside berm of an above-grade impoundment or within the*

	impoundment itself; • *the presence of large debris or large quantities of debris in the impoundment;* • *evidence of seepage; and* • *evidence of berm subsidence.* Inspections are performed on impoundments monthly and after a significant rainfall. If repairs are determined to be necessary, an action request followed by a work order is issued to perform repairs.
6. Operational Plan – Condition 4 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall preserve a minimum of one foot of freeboard between the liquid level in the impoundments and the elevation of the top of the impoundment liners. In the event that the permittee determines that one foot of freeboard cannot be preserved in any impoundment, the permittee shall enact the contingency plan set forth in this Discharge Permit.* Except for one occasion in October 2014 and one occasion in October 2015, the one-foot freeboard was maintained in all impoundments. On these two occasions, WIPP received above normal rainfall events that caused the Storm Water Ponds to exceed the one-foot freeboard. Both times, the NMED was verbally notified and a plan to pump water from the Storm Water Ponds to the Salt Storage Ponds was submitted to and approved by the NMED's Ground Water Quality Bureau. One-foot freeboards were achieved after pumping was completed.
7. Facultative Lagoon System – Condition 5 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall maintain fences around the Facultative Lagoon System to control access by the general public and animals. The fences shall consist of a minimum of six foot chain link or field fencing and locking gates. Fences shall be maintained throughout the term of this Discharge Permit.* Facility Operations performs weekly inspections of the Facultative Lagoon System. No disrepair of the fence was noted during these inspections.
8. Facultative Lagoon System – Condition 6 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall maintain signs indicating that the wastewater at the facility is not potable. Signs shall be posted at the Facultative Lagoon System's entrance and other areas where there is potential for public contact with wastewater. Signs shall be printed in English and Spanish remain visible and legible for the term of this Discharge Permit.* Signs indicating non-potable water and authorized personnel only are written in English and Spanish. These signs are posted every 100 feet around the fencing and on each gate leading into the lagoon area.
9. Facultative Lagoon System – Condition 7 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall utilize operators, certified by the State of New Mexico at the appropriate level, to operate the wastewater collection, treatment and disposal systems. The operations and maintenance of all or any part of the wastewater system shall be performed by, or under the direct supervision of, a certified operator.* Facility Shift Managers have certifications in wastewater systems operations issued by the NMED.
10. Facultative Lagoon System – Condition 8 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall measure the thickness of the sludge blanket in each pond of the Facultative Lagoon System once within the effective term of this Discharge Permit, but before the end of 2018.* Sludge blanket measurements are scheduled for 2018.
11. Salt Storage Ponds and Salt Cells – Condition 9 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall measure the thickness of the solids blanket in each impoundment once within the effective term of this Discharge Permit, but before the end of 2018.* Solids blanket measurements are scheduled for 2018.

12. Salt Storage Ponds and Salt Cells – Condition 10 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall inspect the leak detection systems for Salt Storage Ponds 2 and 3 on a monthly basis for the presence of liquid. The permittee shall keep a log of the inspection findings and repairs made.* Leak detection system inspections for Salt Storage Ponds 2 and 3 are performed monthly, as required by the permit. A log of the inspections is kept.
13. Salt Storage Ponds and Salt Cells – Condition 11 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall conduct regular maintenance of the earthen cover on the Salt Cell I and the SPDV material pile. Inspections shall be conducted monthly and after storm events of 2 inches or greater in a 24-hour period to evaluate potential erosion and vegetation success of the cover. In the event of significant erosion or failure of vegetative success, the permittee shall provide a plan and schedule for repair within 90 days of discovery. General observations and cover repairs shall be reported to the NMED.* Inspections of the cover for Salt Cell 1 and the SPDV material pile are conducted monthly and after a significant storm event. Excessive erosion was discovered on both piles after the large rainfall event in October 2015. Repairs are being scheduled and conducted as required by the permit.
14. Salt Storage Ponds and Salt Cells – Condition 13 (July 29, 2014, Discharge Permit Renewal)	*METHODOLOGY - Unless otherwise approved in writing by the NMED, the permittee shall conduct sampling and analysis in accordance with the most recent edition of the following documents:* *a) American Public Health Association, Standard Methods for the Examination of Water and Wastewater (18th, l9th or current)* *b) U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste* *c) U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey* *d) American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water* *e) U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition* *f) Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations* *g) Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy* *h) New Mexico Environment Department, Hazardous Waste Bureau Position Paper, Use of Low-Flow and Other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring.* Sampling and analysis at the WIPP are conducted in accordance with standard practices that are approved by the NMED. These practices are integrated in the WIPP sampling and analysis procedures.
15. Salt Storage Ponds and Salt Cells – Condition 14 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall submit semi-annual monitoring reports to NMED for the most recently completed semi-annual period by the 1st of February and August each year. Semi-annual monitoring shall be performed during the following periods and submitted as follows:* • *January 1st through June 30th (first half) - due by August 1st* • *July 1st through December 3lst (second half) - due by February 1st* Semi-annual reports are generated and submitted to the NMED by February 1 and August 1 of each year. The reports cover activities performed during the prior six-month period. These reports can be found online at http://www.wipp.energy.gov/Documents_Environmental.htm.
16. Salt Storage Ponds and Salt	*The volume of domestic influent discharged to the Facultative*

Cells – Condition 15 (July 29, 2014, Discharge Permit Renewal)	*Lagoon System shall be measured monthly using a totalizing flow meter on the influent line to the system or the totalizing meter that measures total domestic water usage. Volumes of other authorized discharges to the Facultative Lagoon System shall be calculated by a time/volume method or volumetric measurement of the transport container(s).* Facility Operations records the reading from a totalizing flow meter on the influent line to the WIPP system weekly. These readings are used to determine volumes discharged to the Facultative Lagoon System.
17. Salt Storage Ponds and Salt Cells – Condition 16 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall collect a wastewater sample on a semi-annual basis (once every six months) from the influent to the Facultative Lagoon System. The grab sample shall be analyzed for TKN, NO_3-N, SO_4, TDS and Cl.* Samples of the influent to the Facultative Lagoon System are taken semi-annually and analyzed for total Kjeldahl nitrogen, nitrate, sulfate, TDS and chloride. The results are included in each semi-annual report to the NMED.
18. H-19 and Storm Water Ponds – Condition 17 (July 29, 2014, Discharge Permit Renewal)	*The volume and origin of wastewater discharged to the Evaporation Pond H-19 that is derived from miscellaneous non-hazardous sources shall be measured monthly and reported to the NMED. Discharge volumes to the Evaporation Pond H-19 shall be calculated by a time/volume method or volumetric measurement of the transport container(s).* Water discharged into Evaporation Pond H-19 is recorded on a Request for Disposal form prior to discharge. Discharge volumes are calculated using the Request for Disposal (NWPI).
19. H-19 and Storm Water Ponds – Condition 18 (July 29, 2014, Discharge Permit Renewal)	*A sample shall be collected semi-annual from the Evaporation Pond H-19 and analyzed for SO_4, Cl, and TDS. Samples shall be collected annually after a significant storm event from each of the storm water ponds, Storm Water Ponds I, 2, and 3 and analyzed for SO_4, Cl, and TDS.* Samples from the Evaporation Pond H-19 are taken semi-annually and analyzed for SO_4, Cl, and TDS. Samples from Storm Water Ponds 1, 2, and 3 were also collected after storm events and analyzed for SO_4, Cl, and TDS. The results are included in each semi-annual report to the NMED.
20. H-19 and Storm Water Ponds – Condition 19 (July 29, 2014, Discharge Permit Renewal)	*The water depth shall be measured monthly to the nearest tenth of a foot (0.1 ft) in the Storm Water Ponds 1, 2, and 3. The approximate volume of storm water shall be calculated and submitted to the NMED in the semi-annual monitoring reports.* Water depth of the Storm Water Ponds 1, 2, and 3 are measured to the nearest tenth of a foot during the monthly inspections. Water volumes are calculated using engineering calculations for each pond. The volumes are reported to the NMED in each semi-annual report.
21. Salt Storage Ponds and Salt Cells – Condition 20 (July 29, 2014, Discharge Permit Renewal)	*A sample shall be collected annually after a significant storm event from each of the Salt Storage Cells 1, 2, and 3 and analyzed for SO_4, Cl, and TDS.* Samples are taken from Salt Storage Pond 1, 2, and 3 annually after a significant storm event and analyzed for SO_4, Cl, and TDS. The results are included in the semi-annual report for that period and submitted to the NMED.
22. Salt Storage Ponds and Salt Cells – Condition 21 (July 29, 2014, Discharge Permit Renewal)	*The water depth shall be measured monthly to the nearest tenth of a foot (0.1 ft) in the Salt Storage Ponds 1, 2, and 3. The approximate volume of storm water shall be calculated and submitted to the NMED in the semi-annual monitoring reports.* Water depth of the Salt Storage Ponds 1, 2, and 3 are measured to the nearest tenth of a foot during the monthly inspections. Water volumes are calculated using engineering calculations for each pond. The volumes are reported to the NMED in each semi-annual report.

23. Ground Water Monitoring – Condition 22 (July 29, 2014, Discharge Permit Renewal)	*Depth to the water table shall be measured to the nearest hundredth of a foot (0.01 ft) quarterly in piezometers/monitoring wells:* • *PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, PZ-6, PZ-7, PZ-8, PZ-9, PZ-10, PZ-11, PZ-12, PZ-13, PZ-14, and PZ-15* • *C-2505, C-2506, C-2507, C-2811, and WQSP-6A* Depth to water table is measured in each piezometer/monitoring well to the nearest hundredth of a foot quarterly.
24. Ground Water Monitoring – Condition 23 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall perform semi-annual ground water sampling in the following piezometers/monitoring wells and analyze the samples for temperature, pH, specific conductance, SO_4, TDS, and Cl:* • *Piezometers: PZ-1, PZ-2, PZ-6, PZ-7, PZ-9, PZ-10, PA-11, PZ-12, and PZ-13* • *Monitoring Wells: C-2507, C-2811, and WQSP-6A* Samples are taken from piezometer/monitoring wells semi-annually and analyzed for temperature, pH, specific conductance, SO_4, TDS, and Cl. The results are included in the semi-annual report and submitted to the NMED.
25. Ground Water Monitoring – Condition 24 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall perform semi-annual ground water sampling from monitoring well WQSP-6A and analyzed for TKN and NO_3. Samples shall be properly prepared, preserved, transported and analyzed in accordance with the methods authorized in this Discharge Permit.* Samples are taken from monitoring well WQSP-6A semi-annually and analyzed for TKN and nitrate (NO_3). The samples are prepared, preserved, transported and analyzed in accordance with standard methods. The results are included in the semi-annual report and submitted to the NMED.
26. Ground Water Monitoring – Condition 25 (July 29, 2014, Discharge Permit Renewal)	*Hydrographs shall be submitted annually for monitoring wells and piezometers covered under Condition 22 of this Discharge Permit. At a minimum, graphs shall include the previous five years of water level data or for recently installed wells, and data since the well was installed.* Hydrographs for monitoring wells and piezometer wells are submitted to the NMED in the second semi-annual report for each calendar year. These hydrographs include data for five years or since the well was completed.
27. Ground Water Monitoring – Condition 26 (July 29, 2014, Discharge Permit Renewal)	*A potentiometric map for facility area shall be submitted annually. The map shall incorporate the most recent water level data for monitoring wells and piezometers installed in the shallow subsurface water (SSW).* A potentiometric map of the WIPP incorporating the most recent water level data from the wells is submitted to the NMED in the second semi-annual report for each calendar year.
28. Contingency Plan – Condition 29 (July 29, 2014, Discharge Permit Renewal)	*In the event that ground water monitoring indicates that a ground water quality standard identified in Section 20.6.2.3103 NMAC is exceeded; the total nitrogen concentration in ground water is greater than l0 mg/L; or a toxic pollutant (defined in Subsection WW of 2A.6-2.7 NMAC) is present in a ground water sample and in any subsequent ground water sample collected from a monitoring well required by this Discharge Permit, the permittee shall enact the contingency plan.* No exceedances of 20.6.2.3103 NMAC or Subsection WW of 2A.6-2.7 NMAC have been detected in the monitoring wells or piezometer wells.
29. Contingency Plan – Condition 30 (July 29, 2014, Discharge Permit Renewal)	*In the event that inspection findings reveal significant damage likely to affect the structural integrity of the lined impoundment(s) or its ability to contain contaminants, the Permittee shall propose the*

	repair or replacement of the impoundment liner(s) by submitting a corrective action plan to NMED for approval. The plan shall be submitted to NMED within 30 days after discovery by the permittee or following notification from NMED that significant liner damage is evident. The corrective action plan shall include a schedule for completion of corrective actions and the permittee shall initiate implementation of the plan following approval by NMED. No significant damage to the structural integrity of the lined impoundments has occurred during this reporting period.
30. Contingency Plan – Condition 31 (July 29, 2014, Discharge Permit Renewal)	*In the event that a minimum of one foot of freeboard cannot be preserved in the impoundment(s), the permittee shall take actions authorized by this Discharge Permit and applicable local, state, and federal regulations to restore the required freeboard. In the event that one foot of freeboard cannot be restored within a period of 72 hours following discovery, the Permittee shall propose actions to be immediately implemented to restore one foot of freeboard by submitting a short-term corrective action plan to NMED for approval.* In October 2014 and October 2015, freeboard was exceeded. Notification was given to NMED to pump water from the Storm Water Ponds to the Salt Storage Ponds to gain freeboard in the Storm Water Ponds. The NMED concurred with these plans.
31. Contingency Plan – Condition 32 (July 29, 2014, Discharge Permit Renewal)	*In the event that a release (commonly known as a "spill") occurs that is not authorized under this Discharge Permit, the permittee shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in Section 20.6.2.1203 NMAC.* No releases occurred during this reporting period.
32. Contingency Plan – Condition 33 (July 29, 2014, Discharge Permit Renewal)	*In the event that NMED or the permittee identifies any failures of the discharge plan or this Discharge Permit not specifically noted herein, NMED may require the permittee to submit a corrective action plan and a schedule for completion of corrective actions to address the failure(s). Additionally, NMED may require a Discharge Permit modification to achieve compliance with 20.6.2 NMAC.* No failures to the discharge plan or the Discharge Permit were noticed during this reporting period.
33. Contingency Plan – Condition 34 (July 29, 2014, Discharge Permit Renewal)	*In the event of a pipeline break, pump failure, pond overflow or other system failure at the facility, discharged water shall be contained, pumped and transferred to area of the facility that impose minimal impacts to ground water quality. Failed components shall be repaired or replaced as soon as possible and no later than 72 hours from the time of failure. For good cause demonstrated, the permittee may request NMED approval of an extension of the schedule for the repair or replacement of a failed component.* No pipeline breaks or other system failure occurred during this reporting period.
34. Closure Plan – Condition 35 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall close the facilities covered under this Discharge Permit in accordance with the closure plan in the March 4, 2005 discharge permit application, the closure plan in the WIPP Hazardous Waste Facility Permit (HWFP) dated November 1, 2012, and the WIPP Land Management Plan.* The Discharge Permit is still in effect for the WIPP.
35. Closure Plan – Condition 36 (July 29, 2014, Discharge Permit Renewal)	*The permittee shall continue ground water monitoring until the requirements of this condition have been met and ground water monitoring confirms for a minimum of two years of consecutive ground water sampling events that the standards of Section 20.6.2.3103 NMAC are not exceeded and toxic pollutants*

	are not present in ground water. The Discharge Permit is still in effect for the WIPP.

30.0 NEW MEXICO DRINKING WATER REGULATIONS

30.1 Summary of the Regulations

Section 20.7.10 of the NMAC contains the regulations for protecting public water-supply systems within the state. This section identifies the various categories of water-supply systems and establishes operating requirements for each system. It also establishes the maximum contaminant levels for water-supply systems and monitoring and analytical requirements for each system. The regulations adopt, by reference, 40 CFR Part 141, National Primary Drinking Water Regulations, and 40 CFR Part 143, National Secondary Drinking Water Regulations. The remaining NMAC text applicable to WIPP, and not referenced in the CFR text, addresses the prevention of contamination and the authority to require additional sampling.

30.2 Status of Compliance with the Regulatory Requirements

The NMED notified the DOE on September 9, 1992 (NMED, 1992b), that the WIPP water supply system is considered a public water supply and classified the system as a nontransient, noncommunity water supply for reporting and testing under the requirements of the New Mexico safe drinking water regulations. The DOE subsequently corresponded with the NMED to obtain a determination of the specific water sampling requirements for the WIPP water supply system. This direction was requested because the DOE obtains water from the Double Eagle Water Line, which is owned and operated by the City of Carlsbad.

On March 11, 1994, the NMED Carlsbad Field Office provided specific direction on the type of source sampling required for the WIPP water supply system (NMED, 1994). The NMED determined that "since the Carlsbad Municipal Public Water Supply (WSS206-08) provides WIPP with its water and since Carlsbad already tests the various constituents at each Double Eagle well field source, WIPP is exempted from taking these samples." In addition, the NMED determined that DOE is required to obtain point-of-use system samples, including lead, copper, and total coliform. The NMED requirements were updated in a letter to DOE dated March 4, 2004 (NMED, 2004), specifying requirements for trihalomethanes sampling, chlorine residual monitoring, and frequency of coliform bacteria sampling.

The specific requirements under 20.7.10 NMAC that are applicable to the WIPP and the compliance status of each are provided in Table 37. Federal regulatory references are listed first, along with the title of the requirements.

Table 37: Status of Compliance with the Regulatory Requirements of the New Mexico Drinking Water Regulations

Regulatory Requirement	WIPP Compliance
1. Coliform Sampling, 40 CFR § 141.21	*Title 40 CFR § 141.21(a)(2) requires collection of a minimum of one total coliform sample per month.* Coliform samples are collected monthly and are analyzed by a State of New Mexico certified laboratory.

Table 37: Status of Compliance with the Regulatory Requirements of the New Mexico Drinking Water Regulations

Regulatory Requirement	WIPP Compliance
2. Inorganic Chemical Sampling and Analytical Requirements, 40 CFR § 141.23; Organic Chemicals, Sampling and Analytical Requirements, 40 CFR § 141.24; Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Systems, 40 CFR § 141.26; Monitoring of Consecutive Public Water Systems, 40 CFR § 141.29	*Title 40 CFR § 141.23 addresses the monitoring requirements for inorganic chemicals to determine compliance with the maximum contaminant levels. Title 40 CFR § 141.24 addresses the analyses for the organic chemical contaminants. Title 40 CFR § 141.26 addresses monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium. However, 40 CFR § 141.29, Monitoring of Consecutive Public Water Systems, allows the NMED to modify sampling requirements of interconnected public water systems as justified.* Based on 40 CFR § 141.29, the NMED does not require the DOE to sample under 40 CFR §§ 141.23, 141.24, and 141.26, because the source of the WIPP water is a well field owned and operated by the City of Carlsbad.
3. Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors, Monitoring Requirements, 40 CFR § 141.132	*Systems must take samples during normal operating conditions. Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of trihalomethanes and haloacetic acid (HAA5) samples required, with State approval in accordance with criteria developed under 40 CFR § 142.16(h)(5) of this section.* Trihalomethane and haloacetic acid samples are taken from the treated drinking water system in September of every year.
4. Monitoring Requirements for Lead and Copper in Tap Water, 40 CFR § 141.86	*Title 40 CFR §141.86 requires periodic sampling for lead and copper at representative taps. The frequency of sampling is based on concentrations of lead and copper found.* The WIPP qualifies for a reduced monitoring schedule under 40 CFR § 141.86(d)(4), and is required to sample for lead and copper every three years. The most recent sampling was conducted in August 2014, with results below action levels.
5. General Operating Requirements, 20.7.10.400 NMAC	General performance requirements applicable to the WIPP include: • Prevention of contamination of water in the system while undergoing routine maintenance or replacement of electrical or mechanical equipment. • Prevention of unauthorized entry to, and contamination of, the water supply. • Protection of finished water facilities from flooding, infiltration, entry of birds, insects, rodents, and other vermin. This includes provision of pipe and vent screening, and watertight covers. • Notification to the NMED and implementation of corrective measures, should measures to prevent contamination and unauthorized entry be found inadequate or compromised. • Disinfection following construction or modification. • Coatings shall be suitable for contact with potable water. Structures shall be flushed, then disinfected subsequent to maintenance or recoating. • Prohibition of iodine as disinfectant. • Additives to water must be ANSI/National Sanitation Foundation certified or compliant with the most recent applicable safety standards. • Cross-connections must have backflow prevention. The DOE documents compliance with these requirements as part of the work

Table 37: Status of Compliance with the Regulatory Requirements of the New Mexico Drinking Water Regulations

Regulatory Requirement	WIPP Compliance
	package process for performing maintenance and modifications to the WIPP water infrastructure.
6. Monitoring Requirements, 20.7.10.500 NMAC	*Section 20.7.10.500 NMAC gives the NMED the discretion to order sampling over and above that required by 40 CFR Part 141.* To date, the NMED has not required sampling beyond that mandated by 40 CFR Part 141.

31.0 NEW MEXICO HAZARDOUS CHEMICALS INFORMATION ACT

31.1 Summary of the Law

The New Mexico *Hazardous Chemicals Information Act* (HCIA) (§§ 74-4E-1 through 74-4E-9 NMSA 1978) was enacted to ensure that current information on the nature and location of hazardous chemicals is available to LEPCs, emergency responders, and the public as required by SARA Title III. The HCIA created the SERC and directs facility owners or operators to notify the New Mexico Department of Public Safety under certain conditions, including the presence of extremely hazardous substances at or above a specified quantity at a facility, and the release of any chemical substance that has occurred at or above RQs determined by the state. The HCIA specifies reports to be submitted to the state, including toxic chemical release and hazardous material inventory reports.

31.2 Status of Compliance with the Regulatory Requirements

Table 38 provides more detail for each applicable requirement and its compliance status under the HCIA.

Table 38: Status of Compliance with the Regulatory Requirements of the New Mexico *Hazardous Chemicals Information Act*

Regulatory Requirement	WIPP Compliance
1. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, Section 74-4E-5(A)(1) (40 CFR § 355, Subpart B)	*Facility owners or operators must notify the public safety department that an extremely hazardous substance, at or above the TPQ, is present at a facility.* The DOE submits a list of hazardous chemicals to the SERC, the LEPC, and local fire departments with whom the DOE maintains an MOU whenever additional substances are received above the TPQ, or 500 pounds, or if significant new information is received about an item for which a list was provided. A revised list of hazardous chemicals was submitted to these organizations in August 1999 (Westinghouse Electric Corporation, Waste Isolation Division, 1999). The listing comprised extremely hazardous substances present in amounts equal to or greater than the TPQ, or 500 pounds, whichever is less, and chemicals classified as hazardous under the Occupational Safety and Health Act Hazard Communication Standard, with site inventories equal to or greater than 10,000 pounds. No additional reporting has been required since the 1999 submission.

Table 38: Status of Compliance with the Regulatory Requirements of the New Mexico *Hazardous Chemicals Information Act*

Regulatory Requirement	WIPP Compliance
2. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, Section 74-4E-5(A)(2) (40 CFR § 355, Subpart C)	*Facility owners or operators must notify the public safety department of the release of a chemical substance when the release is at or above the RQ of the substance.* There were no releases in excess of an RQ during this reporting period.
3. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, Section, § 74-4E-5(A)(3) (40 CFR § 370)	*Facility owners or operators must submit to the state an inventory form containing Tier II information on or before March 1 of each year.* The DOE submitted the Emergency and Hazardous Chemical Inventory Report in February 2015 (DOE, 2015f) and February 2016 (DOE, 2016b) to the SERC, the LEPC, and local fire departments.
4. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, Section 74-4E-5(A)(4) (40 CFR § 372)	*Facility owners or operators employing at least 10 employees and with a covered Standard Industrial Classification code must submit a toxic chemical release form on or before July 1 of each year to the public safety department.* The DOE and NWP submitted Toxic Chemical Release Inventory Form R reports for the WIPP to the EPA and the NMED. The CY 2014 reports were submitted prior to July 1, 2015 (DOE, 2015p). The reports for CY 2015 were submitted prior to July 1, 2016 (DOE, 2016h; DOE, 2016i).

32.0 NEW MEXICO EMERGENCY MANAGEMENT ACT

32.1 Summary of the Law

The *New Mexico Emergency Management Act* (§§ 74-4B-1 through 74-4B-14 NMSA 1978) was enacted to ensure the adequacy of hazardous material emergency management capabilities to protect the health and safety of New Mexico citizens and the environment. The Act delineates those state agencies that are responsible for responding to hazardous material accidents and providing control and management of such accidents. The Act also provides for the formulation of a comprehensive hazardous materials emergency management plan.

32.2 Status of Compliance with the Regulatory Requirements

Table 39 provides a summary of the compliance status of each requirement under the *New Mexico Emergency Management Act*.

Table 39: Status of Compliance with the Regulatory Requirements of the *New Mexico Emergency Management Act*

Regulatory Requirement	WIPP Compliance
1. State Police Emergency Response Officer; Procedure for Notification; Cooperation of Other State Agencies and Local Governments, Section 12-12-21 NMSA 1978	*Any driver of a vehicle carrying hazardous materials involved in an accident which may cause injury to persons or property or any owner, shipper, or carrier of hazardous materials involved in an accident who has knowledge of such accident or any owner or person in charge of any building, premises, or facility where such*

Table 39: Status of Compliance with the Regulatory Requirements of the *New Mexico Emergency Management Act*

Regulatory Requirement	WIPP Compliance
	an accident occurs shall immediately notify the New Mexico State Police Division of the Public Safety Department by the quickest means of communication available. Should an accident involving a shipment of TRU waste to the WIPP occur, the New Mexico State Police Division of the Public Safety Department will be notified by the CMR operator, as outlined in a Permittee's procedure and the Carrier Management Plan. In the event of an accident involving a TRU Type B package, contact with the CMR operator will be made through the TRANSCOM. Indication of an accident may also be by satellite phone, cell phone, or lack of an expected communication from in-transit shipment personnel. The CMR operator will then contact the state police and other appropriate agencies. There were no traffic accidents involving shipments of TRU mixed waste in New Mexico during this reporting period. DOE will contact the SERC in the event of a spill that could endanger human health or the environment. The SERC will, in turn, contact the NMED for assistance, if needed.
2. Clean-Up, Section 12-12-27 NMSA 1978	*Nothing in the New Mexico Emergency Management Act shall be construed to relieve hazardous materials owners, shippers, or carriers of responsibilities and liability in the event of an accident. Such persons shall assist the state as requested in responding to an accident and are responsible for restoring the scene of the accident to the satisfaction of the state.* The selected carrier for the shipment is responsible for providing emergency response and recovery/restoration assistance, if required. The CBFO Incident/Accident Response Team is available to provide technical advice and assistance to local authorities, and the National Nuclear Security Administration Radiological Assistance Program teams are available to assist in the assessment of a radiological release. No cleanup activity was conducted during this reporting period.

33.0 NEW MEXICO PREHISTORIC AND HISTORIC SITES PRESERVATION ACT

33.1 Summary of the Law

The provisions of the federal NHPA are further advanced in the State of New Mexico through the *New Mexico Prehistoric and Historic Sites Preservation Act* (§§ 18-8-1 through 18-8-8 NMSA 1978). The purpose of this Act is the acquisition, stabilization, restoration, or protection of significant prehistoric and historic sites by the State of New Mexico and corporations. This Act is administered by the SHPO in consultation with the Cultural Properties Review Committee.

The *Prehistoric and Historic Sites Preservation Act* is implemented by 4.10.12 NMAC, Implementation of the Prehistoric and Historic Sites Preservation Act, which established procedures for acquiring, stabilizing, restoring, or protecting significant prehistoric and historic sites. Section 4.10.12 NMAC established procedures and guidelines to evaluate alternatives to programs and projects requiring the use of land from significant prehistoric and historic sites and to determine whether all possible planning has been implemented to preserve and protect such

sites. Detailed requirements for a long-term management plan for any site acquired, stabilized, restored, or protected are included under this rule.

33.2 Status of Compliance with the Regulatory Requirements

Table 40 provides more detail on compliance status under the New Mexico *Prehistoric and Historic Sites Preservation Act*.

Table 40: Status of Compliance with the Regulatory Requirements of the New Mexico *Prehistoric and Historic Sites Preservation Act*

Regulatory Requirement	WIPP Compliance
1. Prehistoric and Historic Site Preservation, Sections 18-8-1 through 18-8-8 NMSA 1978	The DOE complies with the New Mexico statutes and regulations regarding cultural properties in accordance with edicts provided by the SHPO. The DOE contracts for archeological surveys and consults with the SHPO each time an action is proposed that would impact a previously undisturbed area. Detailed instructions for compliance with applicable cultural resource management requirements are contained in the LMP. Prior to the issuance of the LWA, the BLM was responsible for archaeological resource management at the WIPP and served as the DOE liaison with the SHPO. Following the issuance of the LWA, the BLM continued to serve in this capacity until July 19, 1994, when the MOU between the DOE and the DOI was finalized. At that time, the DOE began communicating directly with the SHPO regarding archeological concerns at the WIPP. There were no archaeological clearances required or conducted, and no requests for mitigation submitted to the SHPO during this reporting period.

34.0 NEW MEXICO STATE TRUST LANDS

34.1 Summary of the Law

The purpose of the FLPMA is to protect and preserve the quality of public lands and is furthered by law in the State of New Mexico. In 1912, the New Mexico Legislature created the State Land Office and directed that the Office executive officer, the Commissioner of Public Lands (the Commissioner), execute jurisdiction over, and provide for the management, care, control, and disposition of, public lands owned and subsequently acquired by the state. The Commissioner was authorized to grant rights-of-way and easements over, upon, or across state lands for highways, power lines, mining, or other purposes.

The regulation of rights-of-way and easement grants is addressed in 19.2.10 NMAC, Easements and Rights-of-Way.

34.2 Status of Compliance with the Regulatory Requirements

Table 41 provides more detail on compliance status under the New Mexico State Trust Lands.

Table 41: Status of Compliance with the Regulatory Requirements of the New Mexico State Trust Lands

Regulatory Requirement	WIPP Compliance
1. Easements and Rights of Way, 19.2.10 NMAC	The DOE continues to comply with standard stipulations regarding survey plat, easement or rights-of-way dimension, construction reports, and affidavits of completion, and will comply with those regarding renewal, reclamation, and restoration when required.

35.0 NEW MEXICO STATE IMPLEMENTATION OF THE BALD AND GOLDEN EAGLE PROTECTION ACT

35.1 Summary of the Law

The *Bald and Golden Eagle Protection Act* makes it unlawful to take (i.e., capture, kill, or destroy), possess, molest, or disturb living or dead bald eagles or golden eagles, their parts, their nests, or their eggs anywhere in the United States. A permit must be obtained from the DOI to relocate any nest that interferes with resource development or recovery operations. In addition, a permit may be obtained that authorizes taking, possessing, or transporting eagles or their parts, nests, or eggs.

Chapter 17 of the New Mexico statutes establishes rules and regulations to protect raptors. In particular, § 17-2-14 NMSA,1978 "Hawks, vultures and owls, taking, possessing, trapping, destroying, maiming or selling prohibited; exception by permit; penalty," authorizes the Director of the New Mexico Department of Game and Fish (NMDG&F) to issue permits to allow any person to take, possess, trap, ensnare, or destroy any bird protected by this section. Permits may be granted for several purposes, including scientific purposes, in accordance with the law and the State Game Commission regulations. In addition, §§ 17-2-37 through 17-2-46 of the *Wildlife Conservation Act* further the purpose of the *Bald and Golden Eagle Protection Act* with respect to the bald eagle as an endangered species.

35.2 Status of Compliance with the Regulatory Requirements

Table 42 provides more detail on compliance status under the New Mexico State implementation of the *Bald and Golden Eagle Protection Act*.

Table 42: Status of Compliance with the Regulatory Requirements of the New Mexico State Implementation of the *Bald and Golden Eagle Protection Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements Chapter 17 NMSA 1978	At present, no bald or golden eagles are nesting within the WIPP land withdrawal area; however, individual eagles may, at times, overwinter in the WIPP area. No permit regarding bald or golden eagles is required. If it becomes necessary, a permit application will be submitted, and applicable permit requirements will be met. For any affecting construction activities, a typical NEPA Mitigation Plan would require that: *…surveys for raptor nests, including burrows, and nesting structures are performed by the BLM CFO multiple times before and throughout the project. A 100-meter avoidance buffer will be employed around inactive raptor nests and a 200- meter buffer will be employed around active raptor nests. Portions of the project within these distances can be either delayed until the nest fledges or up to 90 days.* No qualifying construction activities occurred during this reporting period.

36.0 NEW MEXICO WILDLIFE CONSERVATION ACT, SUPPLEMENTING THE ENDANGERED SPECIES ACT

36.1 Summary of the Law

The federal ESA was enacted in 1973 to prevent the extinction of many species of animals and plants. The Act provides strong measures to help alleviate the loss of species and habitats. It places restrictions on a wide range of activities impacting endangered and threatened animals and plants to help ensure continued survival. With limited exceptions, the Act prohibits activities impacting these protected species unless authorized by a permit from the USFWS.

The intent of the Congressional endangered species legislation is further advanced in the New Mexico *Wildlife Conservation Act*, which was enacted to protect the state's rare animals in 1974 (the *New Mexico Endangered Plant Species Act* (75-6-1 NMSA 1978) protects rare plants). The current sections of the state *Wildlife Conservation Act* reside in §§ 17-2-37 through 17-2-46 NMSA 1978. The *Wildlife Conservation Act* directs that endangered species of wildlife that are indigenous to New Mexico should be managed and maintained and, to the extent possible, their numbers enhanced within the carrying capacity of the habitat. The state is directed to assist in the management of endangered and threatened species of wildlife, including those that are federally listed.

Protection under the *Wildlife Conservation Act* extends to native species of crustaceans, mollusks, fish, amphibians, reptiles, birds, and mammals that are listed by the State Game Commission in 19.33.6 NMAC.

Section 17-2-41 NMSA 1978, Endangered Species, states that "except as otherwise provided in this Act, it is unlawful to take, possess, transport, export, process, sell or offer for sale, or ship" any species or subspecies of wildlife that appears on the following lists: (1) wildlife indigenous to the state determined to be endangered within the state as set forth by regulations of the Game Commission of the State of New Mexico (the Commission) and (2) the federal lists of

endangered species as set forth in the ESA to the extent that such lists are adopted by regulations of the Commission. Section 17-2-38L NMSA 1978 defines "take" to include harass, hunt, capture, or kill.

In Section 17-2-42 NMSA 1978, Management Programs, the Director of the NMDG&F is directed to perform the following: (1) establish programs deemed necessary by the Commission for the management of endangered species; (2) work with federal and state entities or with private individuals in the administration and management of programs for the management of endangered species; (3) authorize by permit the taking, possession, transportation, or shipment of species or subspecies deemed to need management for purposes including scientific, zoological, or educational; and (4) authorize by permit the removal, capture, and destruction of endangered species where necessary to prevent damage to property or to protect human health.

The intent of the congressional legislation protecting migratory birds under the *Migratory Bird Treaty Act* is addressed in Chapter 17 of the New Mexico statutes. In particular, Section 17-2-3 NMSA 1978, Protected Wildlife Species and Game Fish Defined, specifies that the migratory bird family Anatidae (waterfowl) is protected. Section 17-2-14 NMSA addresses the protection of hawks, vultures, and owls. Section 17-2-13 NMSA 1978 protects many species of songbirds. The hunting, taking, capturing, killing, or possession or the attempt to hunt, take, capture, or kill these species is regulated by the Commission.

Section 19.33.2 NMAC, Removal, Capture or Destruction of Endangered Species, was adopted in 1975. This regulation specifies that any person who does not possess a permit and who removes, captures, or destroys any wildlife species classified as threatened or endangered by Commission regulations, must report any such incident to the NMDG&F.

Section 19.33.6 NMAC, List of Threatened and Endangered Species, lists threatened and endangered wildlife. The regulation was last amended in 2006. The 2006 changes down-listed two species from endangered to threatened and up-listed four species from threatened to endangered.

The amended listing of threatened and endangered wildlife in New Mexico added a number of endangered or threatened species that could be found at the WIPP and were specified in the FEIS (DOE, 1980) or the SEIS-I (DOE, 1990a). These include two species of reptiles (western ribbon snake, sand dune lizard) and five species of birds (aplomado falcon, peregrine falcon, bald eagle, Baird's sparrow, varied bunting).

Section 19.35.6 NMAC, Educational Use of Wildlife, contains the requirements for obtaining and using state permits and authorizations for taking and possessing wildlife for scientific and educational purposes. Permits and authorizations are issued to individuals rather than to parties or organizations; however, a permittee may have qualified subpermittees

36.2 Status of Compliance with the Regulatory Requirements

Table 43 provides more detail on compliance status under the New Mexico *Wildlife Conservation Act*, supplementing the ESA.

Table 43: Status of Compliance with the Regulatory Requirements of the New Mexico *Wildlife Conservation Act*, Supplementing the *Endangered Species Act*

Regulatory Requirement	WIPP Compliance
1. Status of Compliance with the Regulatory Requirements	In 1989, the DOE consulted with the NMDG&F regarding the state-listed endangered species in the vicinity of the WIPP. At that time, the department communicated to the DOE its opinion that state-listed endangered species occur or are likely to occur at the WIPP. The NMDG&F subsequently concurred that proposed WIPP activities would probably have no significant impacts on state-listed species in the area. To ensure that WIPP environmental protection programs were current in consideration of sensitive and protected species, the *WIPP Plant Threatened and Endangered Species Survey* (DOE, 1996b) was conducted from August to November 1996. No threatened or endangered species were found within the WIPP land withdrawal area boundaries during the 1996 survey. Consequently, no current activities impacting endangered species are conducted at the WIPP. No permits, biological assessments, or formal consultations are required. The WIPP Land Management Plan update of 2015 included an exhaustive review and expanded tabulation of threatened and endangered species listed in the State of New Mexico counties where WIPP is located (Lea and Eddy). In addition, there have been no known habitat changes within the WIPP land withdrawal area through the first quarter of CY 2016 that would indicate a need for a separate updated review for threatened or endangered species on WIPP lands.

37.0 NEW MEXICO PESTICIDE CONTROL ACT

37.1 Summary of the Law

The *Pesticide Control Act* (§§ 76-4-1 through 76-4-39 NMSA 1978) is administered and enforced by the New Mexico State Department of Agriculture under the direction of the Board of Regents of New Mexico State University, Las Cruces, New Mexico. This Act provides for the registration, labeling, distribution, storage, transportation, application, use, and disposal of pesticides and pesticide-related devices in order to protect the environment and the public health and welfare. It provides for the licensing of pesticide dealers, consultants, applicators, and operators of pesticide apparatus and allows for penalties for noncompliance with requirements.

The New Mexico *Pesticide Control Act* is implemented through 21.17.50 NMAC. The regulations establish requirements for licensing and for applying pesticides in New Mexico.

37.2 Status of Compliance with the Regulatory Requirements

Table 44 provides more detail on compliance status under the New Mexico *Pesticide Control Act.*

Table 44: Status of Compliance with the Regulatory Requirements of the New Mexico *Pesticide Control Act*

Regulatory Requirement	WIPP Compliance
1. Pesticides, 21.17.50 NMAC	*There are 17 categories of licenses granted by the state of New Mexico. Each one establishes the scope of the certification examinations that must be taken by commercial, noncommercial, and public applicators and by pest-management consultants for licenses to apply specific types of pesticides.* The WIPP is not a commercial, noncommercial or public applicator, or a pest-management consultant. Licensed, certified applicators are contracted to apply pesticides at the WIPP and are required to produce proof of licensing as part of the procurement process. The DOE reviews the pesticides to be applied by the subcontractor before the application to ensure that such application is according to the applicator's license. A copy of the subcontractor license is maintained by the DOE. The WIPP may be inspected periodically by the New Mexico Department of Agriculture, division of Agriculture and Environmental Services Bureau of Pesticide Management, to determine compliance with this Act. There were no inspections during the reporting period.

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Appendix A – Calendar Year (CY) 2014 and CY 2015 WIPP Confirmatory Measurement Compliance Reports (Title 40 CFR Part 191, Subpart A, Environmental Standards for Management and Storage)

CY 2014 WIPP Confirmatory Measurement Compliance Report

CY 2014 Report Summary

CY 2014 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (650 meters WNW)

CY 2014 CAP88-PC Output Data for the Maximum Exposed Off-Site Individual at the DOE WIPP Maximum Residential Location (8,800 meters WNW)

CY 2015 WIPP Confirmatory Measurement Compliance Report

CY 2015 Report Summary

CY 2015 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (650 meters WNW)

CY 2015 CAP88-PC Output Data for the Maximum Exposed Off-Site Individual at the DOE WIPP Maximum Residential Location (8,850 meters WNW)

Annual Periodic Confirmatory Measurement Compliance Report for the U.S. Department of Energy Waste Isolation Pilot Plant - Emended

For Calendar Year 2014

As Required By 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage"

CY 2014 ANNUAL PERIODIC CONFIRMATORY MEASUREMENT COMPLIANCE REPORT SUMMARY

This report satisfies the reporting requirements established by 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage." Emission monitoring and compliance procedures for U.S. Department of Energy (DOE) facilities require the use of CAP88-PC (Clean Air Act Assessment Package - 1988) or AIRDOS-PC computer models, or other approved procedures, to calculate effective dose equivalent values to members of the public (DOE 1995).

The CAP88-PC computer model is a set of computer programs, databases and associated utility programs for estimation of dose and risk from radionuclide emissions to air. The CAP88-PC, Version 4.0 (Trinity 2014) dose assessment computer model was used to estimate the dose(s) documented in this report. Copies of the output data from CAP88-PC are attached. There are some notable differences from the Annual Periodic Confirmatory Measurement Compliance report filed in CY 2015 using CAP88-PC Version 3.0. The reported doses for Version 4.0 are about 60 percent less than those reported using Version 3.0. Although the input values are the same, the isotopic dose conversions and vegetation uptake factors have been updated in the new code, and for these specific conditions are less than estimated using the earlier version. This change is noted in the EPA'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 (EPA 2014a).

Year of Reporting Period: CY 2014

SUMMARY OF SOURCE TERM AND CALCULATED EFFECTIVE DOSE EQUIVALENT

Calculations made using the above referenced code indicate that the effective dose equivalent (EDE) value to the maximally exposed individual resulting from normal operations conducted at this facility is about 1.49×10^{-01} millirem (mrem) per year whole body and $6.09 \times 10^{+00}$ mrem per year to the critical organ at the Exclusive Use Area fence line (DOE 2015a) 650 meters west-northwest from the WIPP facility. At the residence 8,800 meters west-northwest from the WIPP facility, the EDE value to the maximally exposed individual is 2.90×10^{-03} mrem per year whole body and 1.18×10^{-01} mrem per year to the critical organ. Note that the distance to the fence line has been updated to reflect the measured distance from the Station B exhaust to the centerline of each of sixteen radial sectors. A similar update was conducted in early CY 2015 to update the measured distances to the nearest local residents within about a ten-mile radius. These more accurate updated values differ from those used in previous years.

These EDE values are in compliance with the standard from 40 CFR Part 191, Subpart A, which states that management and storage of spent nuclear fuel or high-level or transuranic radioactive wastes at all facilities for the disposal of such fuel or waste that are operated by the Department of Energy shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management and storage shall not exceed 25 millirem to the whole body and 75 millirem to any critical organ.

1.0 FACILITY NAME AND LOCATION

Facility: Waste Isolation Pilot Plant

34 Louis Whitlock Road
PO Box 2078
Carlsbad, New Mexico 88221

Facility Location: 26 miles (42 km) east of Carlsbad, New Mexico
Lat. 32.372, Long. -103.792

2.0 RADIOACTIVE MATERIALS USED

The waste managed at the WIPP facility contains contact-handled (CH) and remote-handled (RH) transuranic (TRU) radionuclides. TRU waste is radioactive waste that contains alpha-emitting radionuclides of atomic numbers greater than 92, with half-lives longer than 20 years, and which are present in concentrations greater than 100 nanocuries per gram of waste.

During 2014, the WIPP radionuclides of interest are ^{238}Pu, $^{239/240}$Pu, ^{241}Am, ^{90}Sr, ^{137}Cs, $^{233/234}$U, and ^{238}U, as indicated in Tables A-1 and A-2. Normal operations at the WIPP facility did not involve handling any uncontained radioactive material, although recovery operations after February 14, 2014, did involve management of radionuclide-contaminated equipment and materials. During normal operations, waste containers are closed at the waste-generating facilities and remain closed at the WIPP facility. Removable contamination on the exterior surfaces of containers is restricted to minimal levels in accordance with DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, (DOE 2013b) and does not present a significant source of radionuclides that would be subject to release in airborne effluents. During normal operating conditions, there is essentially no potential for airborne emissions of radionuclides contained in the TRU waste managed at the WIPP facility.

Since an autonomous release on February 14, 2014, from an emplaced radioactive waste container, however, contamination in the repository underground has been significant, requiring radiological controls for access, and continuous high-efficiency particulate air (HEPA) filtration of the underground ventilation exhaust. Reduction of loose contaminants in the underground continues, and waste emplacement has been halted pending completion of recovery and restart processes.

Table A-1. Summary of Radionuclide Effluents from Underground Storage Areas: Calendar Year 2014

Station	Radionuclide	Activity Released (Ci/Yr)	Particle Size (µm)[1]	Type (F, M, S)[2]
A	^{238}Pu	7.45E-09	1	M
A	$^{239/240}$Pu	6.43E-09	1	M
A	^{241}Am	1.80E-08	1	M
A	^{90}Sr	6.51E-07	1	M
A	^{137}Cs	8.36E-06	1	F
A	$^{233/234}$U	1.19E-08	1	M
A	^{238}U	1.14E-08	1	M
B	^{238}Pu	4.82E-06	1	M
B	$^{239/240}$Pu	9.43E-05	1	M
B	^{241}Am	1.67E-03	1	M

Station	Radionuclide	Activity Released (Ci/Yr)	Particle Size (μm)[1]	Type (F, M, S)[2]
B	^{90}Sr	6.88E-07	1	M
B	^{137}Cs	7.64E-06	1	F
B	$^{233/234}U$	5.04E-08	1	M
B	^{238}U	1.69E-08	1	M

1 The default particle size in micrometers (μm) for inhaled particles.

2 Absorption Type: These are established to describe the absorption type of the materials from the respiratory tract into the blood for inhaled particles. The absorption types are F (fast), M (moderate), and S (slow), as defined in International Commission on Radiological Protection (ICRP) Publication 66 (ICRP 1994). Federal Guidance Report No. 13, Table 2.1 default radionuclide class types are used (EPA 1999).

Table A-2. Summary of Radionuclide Effluents from the Waste Handling Building: Calendar Year 2014

Station	Radionuclide	Activity Released (Ci/Yr)	Particle Size (μm)[1]	Type (F, M, S)[2]
C	^{238}Pu	7.22E-09	1	M
C	$^{239/240}Pu$	5.32E-09	1	M
C	^{241}Am	1.03E-08	1	M
C	^{90}Sr	4.21E-07	1	M
C	^{137}Cs	7.33E-06	1	F
C	$^{233/234}U$	8.93E-09	1	M
C	^{238}U	8.71E-09	1	M

1 The default particle size in μm for inhaled particles.

2 Absorption Type: These are established to describe the absorption type of the materials from the respiratory tract into the blood for inhaled particles. The absorption types are F (fast), M (moderate), and S (slow), as defined in International Commission on Radiological Protection (ICRP) Publication 66 (ICRP 1994). Federal Guidance Report No. 13, Table 2.1 default radionuclide class types are used (EPA 1999).

Limited-activity radioactive materials (sealed sources and plated sources) are used at the WIPP facility to calibrate and verify the operation of various radiation detection instruments, and to perform quality assurance checks on the method of analysis. Some consumable, radioactive standards are stored at the WIPP facility. These standards are used to make the laboratory control standards for isotopic analysis of samples. All are stored in a locked safe in a posted, access-controlled Radioactive Materials Area. This source of radioactive material does not have the potential to result in measurable off-site dose consequences.

Sample filters, protective clothing, plastic barrier materials, and cleaning supplies, which have the potential to contain trace radiological contaminants, are managed in sealed plastic containers aboveground and are periodically shipped off-site to an approved disposal facility. Contaminated materials in the repository that remain underground are managed within the HEPA-ventilated space.

3.0 DESCRIPTION OF OPERATIONS

The WIPP facility is a TRU waste disposal facility owned by the DOE, and managed and operated by Nuclear Waste Partnership LLC (NWP). The principal operation of the WIPP facility involves the receipt of CH-TRU and RH-TRU waste and disposal in the underground repository. Only waste that conforms to the requirements of DOE/WIPP-02-3122 is accepted for management in the WIPP facility. Administrative controls prohibit the waste containers from being opened once they are accepted at WIPP facility.

DOE radioactive waste is handled and processed in a manner that is protective of workers, public health and safety, and the environment. The receipt and emplacement of TRU waste are safely performed and implemented by NWP personnel through approved and controlled waste management procedures, waste handling procedures, and by the engineering design of the Waste Handling Building (WHB) and equipment, and the underground disposal panel and room configurations.

As of February 5, 2014, normal operations were suspended due to a non-waste related equipment fire in the underground. On February 14, 2014, there was an exothermic reaction in a recently emplaced radioactive waste container, resulting in an airborne radioactive material contamination event underground. Detectable radioactivity, mostly consisting of airborne particulate ^{241}Am, was emitted to the environment via leakage from the filtered mine exhaust system, and the event was subsequently characterized, in conjunction with the Consequence Assessment team, to determine the extent and dose effects of the release. Recovery operations have been underway throughout CY 2014 since shortly after the conditions were stabilized. Waste emplacement activities were not resumed in CY 2014.

4.0 EMISSION POINTS

The WIPP facility has three effluent air monitoring stations known as Stations A, B, and C. Stations A and B, when in use, measure the total exhaust from the underground and Station C measures all exhaust from the WHB. Immediately after passing Station A, unfiltered air is exhausted from the repository. Prior to Station B, high-efficiency particulate air (HEPA) filters are first used to filter the exhaust from the repository. Both Stations A and B sample the same air when operated in the maintenance bypass, reduced, or minimum mode. Station C is used to sample the exhaust from the WHB. Prior to sampling activities at Station C, and then venting to the atmosphere, the collective air passes through the HEPA filters. Characteristics of WIPP emission points for CY 2014 are provided in Table A-3.

A fixed air sampler unit located in the underground repository is Station D, which was designed according to the methodology specified by the ANSI N13.1-1999 Standard. Station D samples the exhaust air from the waste disposal area. The filter samples collected from this location are counted for gross alpha/beta activity and submitted for isotopic composite analysis as required. Radiochemistry results of Station D sampling activities would be used for confirmation (affirmation) only in the event of a release at any of the three effluent air monitoring stations.

As of the radiological emissions event of February 14, 2014, Station D sampler became, and has remained, inaccessible for use as a monitoring point. The Station A sampler is no longer representative of the emissions to the environment, since the Station A airstream continues through HEPA filtration before being released through the Station B exhaust duct. Station B sampler, since the radiological emissions event, is the sampler-of-record emissions point for the underground repository ventilation. Station C was not affected by the emissions event since

contaminated exhaust did not enter the WHB, and it continued to operate routinely during CY 2014.

5.0 EFFLUENT CONTROLS

Continuous air monitors are maintained at strategic locations in the WHB and in the underground repository to monitor the real-time levels of airborne radioactivity. Readouts from the underground air monitors are displayed in the Central Monitoring Room (CMR), a continuously occupied location from which WIPP facility operations are monitored. During normal conditions, the underground repository effluent does not pass through HEPA filtration units before being discharged to the atmosphere. The WHB effluent, generated by surface waste handling operations, is subject to continuous HEPA filtration before being discharged to the environment. Underground ventilation and WHB HEPA filtration units are polyalphaolefin-tested annually and exhibit a minimum efficiency of 99.97 percent.

The WHB ventilation system maintains the interior of the WHB at a negative pressure relative to the outside environment. This provides a secondary confinement barrier against the release of radionuclides to the environment, where the waste containers themselves are considered the primary barrier. A negative pressure differential ensures that any leaks in the WHB structure will result in an in-leakage of outside air, which precludes the release of airborne contamination to the environment. WIPP's primary mitigation for failure of a waste container is HEPA filtration for the surface and automatic shift to filtration for the underground facility.

The WIPP facility uses fixed air samplers (FAS) at each effluent air monitoring station (Stations A, B, and C) to collect representative samples of airborne particulates. Each FAS has two independent vacuum pumps; one vacuum pump supplies the vacuum and the other functions as a backup unit. In the event of an external power failure, an uninterruptible power supply provides sufficient power to all FAS units for approximately 30 minutes. Diesel generators are available to supply electrical power should the electrical outage last longer than 30 minutes.

Approved and controlled operating procedures are used at the WIPP facility to ensure uniform methods are used to collect, package, and transport FAS filter samples. The use of such procedures provides a means for demonstrating quality assurance of air emission data. Station A FAS filter samples are collected as needed each working shift in order to assure a representative sample. Station B FAS filter samples were collected weekly and at the end of each underground effluent filtration event before the unplanned event. Since Station B is now the primary underground effluent exhaust sample point of record, filters are collected daily and composited monthly. Station C FAS filters are collected weekly and composited quarterly, as had been the pre-event protocol.

Filter samples from all three effluent air monitoring stations were analyzed for ^{238}Pu, $^{239/240}$Pu[2], ^{241}Am, ^{90}Sr, ^{137}Cs, $^{233/234}$U[3], and ^{238}U, during CY 2014 for TRU waste activities. The radionuclide

[2] The main alpha peaks for ^{239}Pu and ^{240}Pu differ by less than 0.02 megaelectron-volt (MeV). Spectral resolution of these peaks is insufficient to discriminate individual isotopic contributions. Therefore, these two radionuclides are reported as $^{239/240}$Pu.

[3] The ^{233}U and ^{234}U spectral peaks are separated by less than 0.05 MeV. Resolution of these peaks is insufficient to discriminate the individual isotopic contributions. Results are reported as $^{233/234}$U.

^{242}Pu is used as a tracer in the WIPP Laboratories. These results, which represent potential and actual emissions from TRU waste, were obtained from all three effluent air monitoring stations (Stations A, B, and C).

After screening for gross radioactivity indication, the daily Station A samples and post-event daily Station B samples were each assembled into a monthly composite for radioanalysis. The total volume of the sample collected in a composite set is compared to the total volume exhausted at Station A or Station B from the underground during the same period. That ratio is multiplied by the activity of each radionuclide detected in the composite samples, or the critical detection level value (set at two times the standard deviation of the total propagated radioanalytical uncertainty), whichever is the highest, to give the activity released from that emission point during that time period. The same process is followed for each of the remaining two emission points (Station B for filtered underground air (pre-event) and Station C for the filtered WHB air), to assemble a quarterly composite from weekly air filter samples for radioanalysis.

In addition to the number of additional samples collected on a more frequent schedule from Station B during the assessment phase in February 2014, many of these samples were individually analyzed sequentially (to develop a time series) without compositing, and only the radionuclides of primary concern (^{241}Am, ^{238}Pu, and $^{239/240}$Pu) were reported. For these samples, scaling[4] of those nuclides not reported was accomplished using ratios from more complete sample analyses to estimate the amount of radioactivity from radionuclides of lesser abundance and concern at WIPP for this event (e.g., ^{90}Sr, ^{137}Cs, $^{233/234}$U, and ^{238}U).

The annual (calendar year) total activity released for each radionuclide at each of the three emission points is summed to yield a source term matrix (see Tables A-1 and A-2), which is input into the EPA's CAP88-PC dose estimation model along with physical characteristics of the emission points, listed in Table A-3, to demonstrate WIPP compliance with the respective regulations. Table A-4 lists the meteorological, population, and agricultural inputs used.

6.0 DISTANCES TO NEAREST RECEPTORS FROM RELEASE POINTS

The WIPP facility is located in an area of low population density that has fewer than 30 permanent residents living within a 10-mile (16-km) radius (DOE 2013a). The area surrounding the WIPP facility is used primarily for livestock grazing and development of potash, oil, and gas resources. Land within the WIPP site boundary up to the "Exclusive Use Area" is leased for livestock grazing, which is the only significant agricultural activity in the vicinity of the WIPP facility. Development of the natural resources results in a transient (nonpermanent) population consisting primarily of workers at two local potash mines and numerous oil and gas wells located within 10 miles (16 km) of the WIPP facility.

In compliance with 40 CFR Part 191, Subpart A, the location of the maximally exposed individual is the location where an actual individual lives or works who receives the maximum annual radiation dose from the source. The document*, Guidance for Implementation of EPA's Standards for Management and Storage of Transuranic Waste (40 CFR Part 191, Subpart A) at the Waste Isolation Pilot Plant,* EPA 402-R-97-001 (EPA 1997), states, "The U.S. Environmental

[4] Scaling is accomplished by using common values from a given pair of samples to develop a ratio. This ratio can then be multiplied by the more complete dataset sample result to estimate the missing analyte values for the second set (IAEA 2009).

Protection Agency expects the DOE to examine radiation doses to individuals at any off-site point where there is a residence, school, business or office. At WIPP, consideration of business should include activities such as grazing, mining, or oil drilling in the vicinity of the site."

Based on this EPA guidance document and the WIPP facility's meteorological condition (i.e., the prevailing wind direction), the receptors historically selected were individuals at the WIPP fence line located at 350 meters in the maximum concentration direction (usually northwest), and at a residence nominally 7500 meters in the west-northwest sector from the WIPP facility. These receptor locations had been selected as the location for the maximally exposed individual, both at the fence line and at the residence.

In late CY 2013, an initiative to update those distances with more accurate information was started, with updated measurements available in March 2015, and final documentation in September 2015. The distance from Station B exhaust duct to the Exclusive Use Area fence line varies with direction, from 351 meters south to 822 meters northwest. The nearest residence is 5,100 meters south, and the maximally exposed residence location (typically) is 8,850 (nominal 8,800) meters west-northwest.

For CY 2014, the complete set of dose and risk factors used in CAP88-PC Version 4.0 to calculate the EDE resulted in less than $1.49x10^{-01}$ mrem per year whole body and $6.09x10^{-00}$ mrem per year to the critical organ at the fence line 652 meters west-northwest from the WIPP facility underground exhaust emission point.

EPA 402-R-97-001 further states:

> *In implementing Subpart A at the WIPP, the EPA expects the DOE to analyze potential exposure pathways and then examine demographic information and conduct field investigations to identify the locations of actual individuals who could be exposed via those pathways. As a conservative simplifying assumption, the DOE could conduct separate analyses of potential doses received from each exposure pathway, then assume that a member of the public resides at the single geographical point on the surface where the maximum dose would be received. This dose can be calculated by summing the dose from all pathways to calculate the maximum dose to a member of the public at the single geographic point.*

Based on the above-referenced EPA guidance document, demographic information, and the WIPP facility's meteorological condition (i.e., the prevailing wind direction), the receptor selected at the maximally exposed residence is an individual at the Smith Ranch located approximately 8,800 meters from the WIPP facility, in the west-northwest sector. The calculated EDE value to the resident maximally exposed individual using CAP88-PC Version 4.0 is $2.90x10^{-03}$ mrem per year whole body and $1.18x10^{-01}$ mrem per year to the critical organ.

Dose and risk factors used in CAP88-PC, Version 4.0 to calculate the effective dose equivalent values to members of the public are provided in the subsequent CAP88-PC output data.

7.0 INPUT DATA FOR CAP88-PC DOSE ASSESSMENT COMPUTER MODEL

Table A-3. Characteristics of WIPP's Emission Points - Calendar Year 2014

Characteristics	Station A	Station B	Station C[5]
Effective Station Height (m)	7.7	6.7	20.0
Effective Station Diameter (m)	5.2	1.8	2.6
Station Area (m^2)	21.2	2.6	6.8
Flow Rate (ft^3/min) English equivalent	4.25×10^5	6.0×10^4	4.7×10^4 (top-end) 2.0×10^4 (low-end)
Flow Rate (m^3/min)	1.2×10^4	1699	1331 (top-end) 566 (low-end)
Exit Velocity (m/sec)	9.4	10.8	3.3 (top-end) 1.4 (low-end)
Effective Exit Velocity (m/sec)	6.7	NA	NA
Orientation	45E Angle	Vertical	Vertical
Shape	Rectangle	Round	Square
HEPA filtered	No	Yes	Yes

[5] For Station C, when a portion of the air in the Waste Handling Building is being recirculated, it will yield a lower effluent flow rate and exit velocity. Although a range of flow rates and exit velocities are provided, the top-end values are provided as input into the CAP88-PC Version 4.0 source data.

Table A-4. Meteorological and Population Input Data for CAP88-PC Dose Assessment Computer Model

Wind Direction and Stability Data Fil	WIPP_14A.WND (CY 2014 average)
Population Data File (used for WIPP ASER reporting)	WIPP2016.pop (population data for WIPP region, modified for CAP88-PC Version 4 use)
Annual precipitation	53.24 cm/year (CY 2014)
Annual ambient temperature	24.20°C (CY 2014)
Lid height	1,000 m (default)
Agricultural Scenario	Local
Absolute Humidity	8 grams/m^3 (default)

8.0 DESCRIPTION OF CONSTRUCTION AND MODIFICATIONS COMPLETED DURING REPORTING PERIOD

During CY 2014, no construction or modifications, other than routine maintenance, were undertaken that would affect the operation of any of the three air emissions systems or the associated monitoring stations (Stations A, B, and C). The operational configuration of the underground ventilation system exhaust was, however, significantly changed after the unplanned release event of February 14, 2014.

8.1 Description of an Unplanned Release Event During the Reporting Period

8.1.1 Event Description

On the evening of February 14, 2014, an airborne radioactive materials release was indicated on the underground continuous air monitors, initiating the shift of underground ventilation into the filtration mode. This configuration reduces underground ventilation exhaust flow from normal flow rate (nominally 425,000 cubic feet per minute) to a lower flow rate (nominally 60,000 cubic feet per minute), and shifts the flow through installed HEPA filtration banks. The location of the exhaust point to the atmosphere, and emissions sample point, also shifts from Station A to Station B. On the morning of February 15, 2014, a gross radioactivity screen of the Station B filters confirmed that radioactive contaminants had been emitted from the ventilation system to the environment. Analysis of air sample filters upstream of the HEPA filtration banks indicated that a substantial release had occurred underground. Since the underground was unoccupied because of an earlier truck fire, no mine evacuations were necessary; however, aboveground personnel were not immediately made aware of the emissions levels, and on-site workers were exposed to radioactive contamination by inhalation, albeit at levels well below federal guidelines.

Subsequent screening of the emissions sample filter at Station A in-place at the onset of the event indicated that the released airborne radioactive particulate from the underground had been redirected to the HEPA filtration train. Notwithstanding a slight leakage through a filtration bypass damper, almost all of the released material was intercepted by the HEPA filters, and, although detected in a near-site air sampler, did not measurably impact the environment or the public.

8.2 Consequence Assessment

The amount of material that passed through or around the HEPA filters was accounted for by the Station B air particulate sampler from which filter analyses the initial released radioactivity amounts were estimated. The effects were estimated using both the Consequence Assessment (a process that used the Lawrence Livermore National Laboratory National Atmospheric Release Advisory Center [NARAC] model), and an ad hoc EPA CAP88-PC code run (which was set up to use a release period of a single week instead of the usual calendar year period). The CAP88-PC estimated dose effect results were compared to regulatory compliance limits for the WIPP facility. Estimates of the dose effects at WIPP compliance points for both the initial radiological release event assessment and the annual total are shown in Table A-5. A comparison of CAP88-PC Version 3.0 and Version 4.0 results is also provided.

The on-site 10-meter elevation wind data during the release period (from 23:14 on February 14 through 16:00 on February 17, 2014) indicated that the wind was from predominantly the south to southeast at between 2 and 4 meters per second until the morning of the February 15. At that point, the wind shifted to come from the northwest at about 2 to 3 meters per second for the remainder of the day of February 15. The bulk of the release occurred from the evening of February 14 through 14:45 on February 15, resulting in a plume predominantly to the north-northwest from the point of release.

Using the Lawrence Livermore National Laboratory NARAC airborne release assessment model (and the more limiting isotope ^{239}Pu), the initial aerosol dispersion models indicated a dose of approximately 3 mrem to a person at the boundary of the facility Exclusive Use Area, and a dose of about 0.3 mrem to the maximally exposed off-site resident individual for the event and the three subsequent days in the period for which the analysis was run (Hayes 2014).

8.3 Determination of the Source Term

A single emissions air sample filter, the first removed after the event, was immediately processed for radioisotopic quantitation. The high level of ^{241}Am and the absence of beta-gamma emitters identified this release to be limited to a select group of waste containers recently received from a Los Alamos National Laboratory cleanup project. The values from this filter analysis were used to scale gross alpha-beta radioactivity readings from a subsequent time series of air sample filters from the Station B emissions sampler, and to develop an isotopic source term for an evaluation of compliance with public dose.

The scaled isotopic ratios were applied to the gross alpha values obtained over roughly the same period of the NARAC assessment, and a week's worth of validated meteorological data bracketing the release period was used to estimate dose to the public using the CAP-88 Version 3.0, February 2013 (Trinity 2013) model. It was determined, by using the CAP88-PC code output, that over 90 percent of the estimated dose was from ^{241}Am, the predominant radionuclide in the characterized contents of a specific waste container that was later observed to be breached. The estimate at both the Exclusive Use Area fence line and at the residence of the maximally exposed off-site individual showed that the doses, given in Table A-5, were well below the regulatory limits of 25 mrem and 10 mrem to the whole body of a member of the public given in 40 CFR 191 Subpart A and 40 CFR 61 Subpart H, respectively (DOE 2014).

8.4 Environmental Measurements

A radiological assessment team surveyed the aboveground areas most likely to be affected, including on-site structures, areas, and precipitation runoff. Although extensive sampling and direct surveys were conducted, surface-deposited alpha-emitters were detected above background levels in only one instance of runoff from a facility building roof near the release point. On-site air samplers within the highest plume concentrations had measurable ^{241}Am on the first set of filters removed, but there was no detectable deposition outside the Exclusive Use Area either on vegetation or soil surfaces. Twenty-two additional ambient air samplers were deployed over the next several weeks and months at key on-site locations, and at off-site locations used during the initial WIPP site characterization. All results from the ambient air particulate monitoring network have been at background levels throughout the remainder of CY 2014.

These results are separately reported in the WIPP CY 2014 Annual Site Environmental Report (DOE 2015a).

8.5 Determination of Additional Sources

Subsequent photographic and radioanalytical evidence, coupled with a matching container content characterization ratio, gave strong evidence that this single container had ruptured and released much of its contents as aerosolized airborne contamination. Follow-on videography of the entire container set within the contaminated chamber underground in February 2015 confirmed this initial evidence. All indications pointed to a single container failure as the source of the underground release, the conclusion reached by an independent DOE Technical Assessment Team investigating the event in a report released in March 2015 (DOE 2015b).

8.6 Independent Assessments

The Carlsbad Environmental Monitoring & Research Center (CEMRC), which has co-located samplers at the repository effluent point (Stations A and B) and at several locations around the WIPP facility, conducted an independent assessment of the unplanned release effects. Based on the analyses conducted by the CEMRC scientific staff, measured releases were determined to be low and localized, and no negative radiation-related health effects among local workers or the public should be expected (CEMRC 2014).

The EPA's Radiation Protection Division staff provided on-site staff, process review, and ambient air monitoring in addition to being involved in review of initial off-site dose assessment documentation. Several improvement opportunities such as standardizing ambient air sampler installation physical characteristics and improving siting locales were noted, and acted upon by WIPP staff. EPA findings confirmed that the exposure from the February 2014 release was well below the EPA Clean Air Act regulatory limit of 10 mrem annual dose (40 CFR 61 Subpart H) and that the radiation release from the WIPP did not pose a public health or environmental hazard above ground. Therefore, these findings are consistent with the WIPP determination that DOE was in compliance with EPA standards.

In addition, EPA found that DOE's dose modeling and effluent monitoring for demonstrating regulatory compliance with public dose standards remain appropriate for that purpose. However, EPA reviews and inspections showed several areas where response and communications improvements would enhance DOE's ability to provide the best possible information to the public and its partner agencies during a release (EPA 2014b).

8.7 Present Conditions

The ventilation configuration remained in filtration mode after the event for the balance of CY 2014 and Station A was no longer used as the emissions sampler-of-record from the underground. Station B is the sole sampler-of-record for underground repository emissions during filtration mode and remained so for the balance of CY 2014. Immediately after the event, the frequency of Station B filter change was changed to once per shift (three times daily); by June 2014, the frequency was stabilized at once daily, which had been the previous Station A filter change frequency. Station B samples were initially individually analyzed sequentially in order to provide a time series through the end of February, then composited monthly or more often over the period of March through December 2014 for radioisotopic analysis. Several later samples were analyzed individually to assess specific recovery situations that had the potential for disturbance of deposited contamination. All sample data were compiled into a single source term for input into the CY 2014 CAP88-PC code runs. Where only screening data (non-isotopic gross measurements) or limited radioisotopic data were available, bracketing radioanalytical data were used to scale (ratio) the gross or limited measurements into estimated isotopic amounts.

A near real-time airborne radioactivity monitor was installed in one sample leg at Station B to indicate, both locally and remotely, any developing release or trend in airborne radioactivity downstream of the HEPA filters. The indication and alarms were remotely tied to the Central Monitoring System in the Central Monitoring Room, a continuously manned facility.

Routine operations in the repository, including waste emplacement, were suspended on February 5, 2014, due to a non-radioactive underground equipment fire, and had not been re-started at the time of the radiological event on February 14, 2014. The entire WIPP site remained in recovery mode for the balance of CY 2014, with very little work activity in the WHB.

The WHB Station C emissions sampler operated normally during CY 2014.

8.8 Calendar Year 2014 Emissions Summary and Conclusions

The CY 2014 emissions filters from the underground (Station A and B) were analyzed for the appropriate radionuclides (see Table A-1) and the proportioned amounts released from WIPP to the environment summed for both the event release period (i.e., from 23:14 February 14 through approximately 16:00 February 17) and the balance of the CY 2014 period. These summed amounts, including the Station C emissions from the WHB, were used as input to the CAP88-PC model to determine dose at the Exclusive Use Area fence line, and to the maximally exposed off-site individual during CY 2014. All dose estimates were well below the regulatory limits.

Table A-5. Summary of Dose Effects from Underground Repository Unplanned Release Event of February 14, 2014

Process	Am-241 reference (curies)	Dose at Exclusive Use Area Fenceline[1] (mrem)	Dose to Maximally Exposed Off-Site Individual (mrem)	Comments
Station A pre-Event (Jan-Feb 2014)[2]	1.80E-08			From source term calculations. Station A only
Station B post-Event (Feb Dec 2014)[2]	1.67E-03			From source term calculations. Station B only
Event Onsite/NARAC Initial Estimate	NA	~3E+00	3E-01	From Response Synopsis
Event Onsite CAP88-PC Estimate[2]	1.69E-03	3.1E-01	4.9E-03	From CAP88 Synopsis
Total Year Routine CAP88-PC Estimate[2]	1.67E-03	2.4E-01	5.9E-03	From CAP88 Synopsis
Maximally Exposed Off-Site Individual at **7,500** meters west-northwest (mrem) CY 2014 Sum Total[2]	Nominal Distance		**5.9E-03**	From CAP88 Dose & Risk Equivalent Summaries, Version 3.0, as reported in *Annual Periodic Confirmatory Measurement Compliance Report for the U.S. Department of Energy Waste Isolation Pilot Plant, Calendar Year 2014*
Maximally Exposed Off-Site Individual at **7,500** meters west-northwest (mrem) CY 2014 Sum Total[3]	Nominal Distance		**3.7E-03**	From CAP88 Dose & Risk Equivalent Summaries, Version 4.0, using same distance and input factors as for Version 3.0
Maximally Exposed Off-Site Individual at **8,800** meters west-northwest (mrem) CY 2014 Sum Total[3]	Measured Distance		**2.9E-03**	From CAP88 Dose & Risk Equivalent Summaries, Version 4.0, using updated distance , same input factors as for Version 3.0

1 Initial CAP88 model fence line dose derived from closest (S) point at 350 m, but highest dose occurred at that distance in the northwest sector well inside the Exclusive Use Area fence. Calculated highest fence line dose for CY 2014 is west-northwest at about 650 m.

2 Dose presented is from the CAP88-PC Version 3.0, using nominal resident distances as given in CY 2014 reporting.

3 Dose presented is from the CAP88-PC Version 4.0, using both nominal, for direct comparison, and measured resident distances updated in CY 2015 (rounded down distance conservatively to account for partial year Station A emissions).

9.0 SELECTED REFERENCES

40 CFR 61 Subpart H. National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities.

40 CFR 191 Subpart A. Environmental Standards for Management and Storage.

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10.0 OATH AND SIGNATURE

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment (see 18 U.S.C. 1001).

Signed: _____ Date: _____

Title: Todd Shrader, Manager
U.S. Department of Energy Carlsbad Field Office

CY 2014 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (650 meters WNW)

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Tue Mar 08 14:07:13 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014
DOSE Age Group: Adult

Comments: CY 2014 emiss Ind NESHAP, fence, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Committed Effective Dose Equivalent (mrem)
1.49E-01

At This Location: 652 Meters West Northwest

Dataset Name: B_Ind14r_f.
Dataset Date: Mar 8, 2016 02:07 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

Tue Mar 08 14:07:13 2016 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 652 Meters West Northwest
Lifetime Fatal Cancer Risk: 1.13E-08

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	1.09E-02
UB_Wall	1.10E-02
Bone_Sur	6.09E+00
Brain	1.09E-02
Breasts	1.13E-02
St_Wall	1.10E-02
SI_Wall	1.09E-02
ULI_Wall	1.13E-02
LLI_Wall	1.22E-02
Kidneys	3.15E-02
Liver	4.20E-01
Muscle	1.12E-02
Ovaries	1.17E-01
Pancreas	1.09E-02
R_Marrow	2.12E-01
Skin	1.24E-02
Spleen	1.10E-02
Testes	1.16E-01
Thymus	1.10E-02
Thyroid	1.11E-02
GB_Wall	1.09E-02
Ht_Wall	1.09E-02
Uterus	1.09E-02
ET_Reg	2.90E-02
Lung_66	1.03E-01
Effectiv	1.49E-01

RADIONUCLIDE EMISSIONS DURING THE YEAR 2014

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Am-241	M	1.000	1.8E-08	1.7E-03	1.0E-08	1.7E-03
Pu-238	M	1.000	7.5E-09	4.8E-06	7.2E-09	4.8E-06
Pu-239	M	1.000	6.4E-09	9.4E-05	5.3E-09	9.4E-05
Sr-90	M	1.000	6.5E-07	6.9E-07	4.2E-07	1.8E-06
Cs-137	F	1.000	8.4E-06	7.6E-06	7.3E-06	2.3E-05
U-233	M	1.000	1.2E-08	5.0E-08	8.9E-09	7.1E-08
U-238	M	1.000	1.1E-08	1.7E-08	8.7E-09	3.7E-08

SITE INFORMATION

Temperature: 24.210 degrees C
Precipitation: 53.240 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 652 meters

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.70	6.70	20.00
Diameter (m):	5.20	1.80	2.60
Plume Rise Momentum (m/s): (Exit Velocity)	6.70	10.80	3.30

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

347	490	539	592	652	707	822
860	945	5100	5250	5400	7500	8800
11520	15610	16670	47000	70000	79700	

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Tue Mar 08 14:07:13 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP, fence, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_f.
Dataset Date: Mar 8, 2016 02:07 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Am-241	M	1.000	5.32E-06	1.80E-03
Pu-238	M	1.000	5.32E-06	1.80E-03
Pu-239	M	1.000	5.32E-06	1.80E-03
Sr-90	M	1.000	5.32E-06	1.80E-03
Cs-137	F	1.000	5.32E-06	1.80E-03
U-233	M	1.000	5.32E-06	1.80E-03
U-238	M	1.000	5.32E-06	1.80E-03

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
Nuclide	Radio-active	Surface	Water	Milk (1)	Meat (2)
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Pu-239	7.87E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Sr-90	6.59E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Cs-137	6.29E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
U-233	1.19E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic meters/yr	5.26E+03
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight)	
(Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass	
when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	1.00E+00
Meat	1.00E+00
Milk	1.00E+00
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA (Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	7.62E+01
Milk ingestion (L/y)	5.30E+01
Meat ingestion (kg/y)	8.40E+01
Leafy vegetable ingestion (kg/y)	7.79E+00
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Tue Mar 08 14:07:13 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014
DOSE Age Group: Adult

Comments: CY 2014 emiss Ind NESHAP, fence, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_f.
Dataset Date: Mar 8, 2016 02:07 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

Tue Mar 08 14:07:13 2016 SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.09E-02
UB_Wall	1.10E-02
Bone_Sur	6.09E+00
Brain	1.09E-02
Breasts	1.13E-02
St_Wall	1.10E-02
SI_Wall	1.09E-02
ULI_Wall	1.13E-02
LLI_Wall	1.22E-02
Kidneys	3.15E-02
Liver	4.20E-01
Muscle	1.12E-02
Ovaries	1.17E-01
Pancreas	1.09E-02
R_Marrow	2.12E-01
Skin	1.24E-02
Spleen	1.10E-02
Testes	1.16E-01
Thymus	1.10E-02
Thyroid	1.11E-02
GB_Wall	1.09E-02
Ht_Wall	1.09E-02
Uterus	1.09E-02
ET_Reg	2.90E-02
Lung_66	1.03E-01
Effectiv	1.49E-01

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	4.33E-03
INHALATION	1.44E-01
AIR IMMERSION	1.67E-08
GROUND SURFACE	6.63E-04
INTERNAL	1.48E-01
EXTERNAL	6.63E-04
TOTAL	1.49E-01

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Am-241	1.39E-01
Np-237	7.14E-09
Pa-233	5.89E-08
U-233	4.13E-07
Th-229	2.73E-10
Pu-238	4.44E-04
U-234	3.69E-12
Th-230	1.05E-15
Ra-226	1.07E-16
Rn-222	5.93E-18
Pu-239	9.44E-03
U-235m	0.00E+00
U-235	7.82E-12
Th-231	7.98E-13
Pa-231	1.05E-15
Sr-90	1.04E-05
Y-90	1.40E-06
Cs-137	9.74E-05
Ba-137m	9.20E-05
Ra-225	3.86E-11
Ac-225	4.63E-11
Fr-221	9.43E-11
U-238	1.62E-07
Th-234	4.30E-09
Pa-234m	5.88E-08
Pa-234	1.16E-09
TOTAL	1.49E-01

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.51E-10
INHALATION	1.06E-08
AIR IMMERSION	8.37E-15
GROUND SURFACE	3.29E-10
INTERNAL	1.10E-08
EXTERNAL	3.29E-10
TOTAL	1.13E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Am-241	1.05E-08
Np-237	3.51E-15
Pa-233	3.18E-14
U-233	1.41E-13
Th-229	1.44E-16
Pu-238	3.80E-11
U-234	1.27E-18
Th-230	4.45E-22
Ra-226	5.79E-23
Rn-222	3.24E-24
Pu-239	6.99E-10
U-235m	0.00E+00
U-235	4.24E-18
Th-231	3.64E-19
Pa-231	5.47E-22
Sr-90	2.22E-13
Y-90	1.67E-13
Cs-137	1.62E-12
Ba-137m	4.97E-11
Ra-225	1.75E-17
Ac-225	2.44E-17
Fr-221	5.12E-17
U-238	4.90E-14
Th-234	2.23E-15
Pa-234m	1.03E-14
Pa-234	6.30E-16
TOTAL	1.13E-08

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	1.8E-01	1.1E-01	1.0E-01	8.7E-02	7.5E-02	6.6E-02	5.2E-02
NNW	3.2E-01	2.1E-01	1.9E-01	1.6E-01	1.4E-01	1.2E-01	9.8E-02
NW	4.5E-01	3.0E-01	2.7E-01	2.3E-01	2.0E-01	1.8E-01	1.4E-01
WNW	3.2E-01	2.2E-01	1.9E-01	1.7E-01	1.5E-01	1.3E-01	1.1E-01
W	1.9E-01	1.2E-01	1.1E-01	9.4E-02	8.1E-02	7.2E-02	5.7E-02
WSW	1.4E-01	9.0E-02	7.8E-02	6.9E-02	6.0E-02	5.3E-02	4.2E-02
SW	1.3E-01	8.5E-02	7.5E-02	6.5E-02	5.7E-02	5.1E-02	4.0E-02
SSW	1.3E-01	8.6E-02	7.5E-02	6.6E-02	5.8E-02	5.1E-02	4.1E-02
S	1.0E-01	6.0E-02	5.1E-02	4.4E-02	3.8E-02	3.3E-02	2.5E-02
SSE	7.8E-02	4.7E-02	4.1E-02	3.5E-02	3.0E-02	2.6E-02	2.1E-02
SSE	7.4E-02	4.5E-02	3.9E-02	3.4E-02	2.9E-02	2.5E-02	2.0E-02
ESE	8.1E-02	4.8E-02	4.1E-02	3.5E-02	3.0E-02	2.6E-02	2.0E-02
E	9.3E-02	5.5E-02	4.7E-02	4.0E-02	3.4E-02	3.0E-02	2.3E-02
ENE	1.2E-01	6.8E-02	5.8E-02	5.0E-02	4.2E-02	3.7E-02	2.8E-02
NE	1.1E-01	6.5E-02	5.6E-02	4.7E-02	4.0E-02	3.5E-02	2.7E-02
NNE	1.3E-01	7.9E-02	6.8E-02	5.8E-02	5.0E-02	4.3E-02	3.4E-02

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8800
N	4.9E-02	4.2E-02	2.8E-03	2.7E-03	2.6E-03	1.6E-03	1.2E-03
NNW	9.2E-02	7.9E-02	5.6E-03	5.4E-03	5.2E-03	3.2E-03	2.5E-03
NW	1.4E-01	1.2E-01	8.7E-03	8.4E-03	8.0E-03	4.9E-03	3.9E-03
WNW	9.9E-02	8.5E-02	6.4E-03	6.1E-03	5.9E-03	3.7E-03	2.9E-03
W	5.3E-02	4.5E-02	3.2E-03	3.1E-03	2.9E-03	1.8E-03	1.4E-03
WSW	3.9E-02	3.4E-02	2.5E-03	2.4E-03	2.3E-03	1.4E-03	1.1E-03
SW	3.8E-02	3.2E-02	2.4E-03	2.3E-03	2.2E-03	1.4E-03	1.1E-03
SSW	3.8E-02	3.3E-02	2.4E-03	2.3E-03	2.2E-03	1.4E-03	1.1E-03
S	2.3E-02	2.0E-02	1.2E-03	1.2E-03	1.1E-03	6.7E-04	5.3E-04
SSE	1.9E-02	1.6E-02	1.0E-03	1.0E-03	9.6E-04	5.9E-04	4.7E-04
SSE	1.8E-02	1.6E-02	1.0E-03	9.7E-04	9.3E-04	5.7E-04	4.5E-04
ESE	1.8E-02	1.5E-02	9.1E-04	8.7E-04	8.4E-04	5.1E-04	4.1E-04
E	2.1E-02	1.8E-02	1.1E-03	1.1E-03	1.0E-03	6.3E-04	5.0E-04
ENE	2.6E-02	2.2E-02	1.3E-03	1.2E-03	1.2E-03	7.2E-04	5.7E-04
NE	2.5E-02	2.1E-02	1.2E-03	1.2E-03	1.1E-03	6.8E-04	5.4E-04
NNE	3.1E-02	2.6E-02	1.6E-03	1.6E-03	1.5E-03	9.1E-04	7.3E-04

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	8.5E-04	5.7E-04	5.2E-04	1.3E-04	6.8E-05	5.6E-05
NNW	1.7E-03	1.2E-03	1.1E-03	2.6E-04	1.4E-04	1.2E-04
NW	2.7E-03	1.8E-03	1.7E-03	4.2E-04	2.3E-04	1.9E-04
WNW	2.0E-03	1.4E-03	1.3E-03	3.2E-04	1.8E-04	1.5E-04
W	9.9E-04	6.7E-04	6.1E-04	1.5E-04	8.5E-05	7.0E-05
WSW	7.7E-04	5.2E-04	4.8E-04	1.2E-04	6.5E-05	5.4E-05
SW	7.5E-04	5.0E-04	4.6E-04	1.1E-04	6.1E-05	5.0E-05
SSW	7.4E-04	5.0E-04	4.5E-04	1.1E-04	5.9E-05	4.9E-05
S	3.6E-04	2.4E-04	2.2E-04	5.3E-05	3.0E-05	2.5E-05
SSE	3.2E-04	2.1E-04	2.0E-04	4.9E-05	2.7E-05	2.2E-05
SSE	3.1E-04	2.1E-04	1.9E-04	4.7E-05	2.6E-05	2.1E-05
ESE	2.8E-04	1.9E-04	1.7E-04	4.3E-05	2.4E-05	2.0E-05
E	3.4E-04	2.3E-04	2.1E-04	5.4E-05	3.1E-05	2.6E-05
ENE	3.9E-04	2.6E-04	2.3E-04	5.7E-05	3.2E-05	2.7E-05
NE	3.7E-04	2.4E-04	2.2E-04	5.6E-05	3.2E-05	2.7E-05
NNE	5.0E-04	3.3E-04	3.0E-04	7.6E-05	4.2E-05	3.5E-05

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	1.4E-08	8.7E-09	7.6E-09	6.6E-09	5.7E-09	5.1E-09	4.0E-09
NNW	2.5E-08	1.6E-08	1.4E-08	1.2E-08	1.1E-08	9.5E-09	7.5E-09
NW	3.4E-08	2.3E-08	2.0E-08	1.8E-08	1.6E-08	1.4E-08	1.1E-08
WNW	2.4E-08	1.7E-08	1.5E-08	1.3E-08	1.1E-08	1.0E-08	8.0E-09
W	1.5E-08	9.4E-09	8.2E-09	7.2E-09	6.2E-09	5.5E-09	4.3E-09
WSW	1.1E-08	6.8E-09	6.0E-09	5.2E-09	4.5E-09	4.0E-09	3.2E-09
SW	1.0E-08	6.5E-09	5.7E-09	5.0E-09	4.3E-09	3.9E-09	3.1E-09
SSW	1.0E-08	6.5E-09	5.7E-09	5.0E-09	4.4E-09	3.9E-09	3.1E-09
S	7.7E-09	4.5E-09	3.9E-09	3.4E-09	2.9E-09	2.5E-09	1.9E-09
SSE	6.0E-09	3.6E-09	3.1E-09	2.7E-09	2.3E-09	2.0E-09	1.6E-09
SSE	5.6E-09	3.4E-09	3.0E-09	2.6E-09	2.2E-09	1.9E-09	1.5E-09
ESE	6.2E-09	3.6E-09	3.1E-09	2.7E-09	2.3E-09	2.0E-09	1.5E-09
E	7.1E-09	4.2E-09	3.6E-09	3.1E-09	2.6E-09	2.3E-09	1.7E-09
ENE	9.0E-09	5.2E-09	4.4E-09	3.8E-09	3.2E-09	2.8E-09	2.1E-09
NE	8.6E-09	5.0E-09	4.2E-09	3.6E-09	3.1E-09	2.7E-09	2.0E-09
NNE	1.0E-08	6.0E-09	5.2E-09	4.4E-09	3.8E-09	3.3E-09	2.6E-09

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8800
N	3.7E-09	3.2E-09	2.2E-10	2.1E-10	2.0E-10	1.2E-10	9.6E-11
NNW	7.0E-09	6.0E-09	4.3E-10	4.1E-10	4.0E-10	2.4E-10	1.9E-10
NW	1.0E-08	8.9E-09	6.7E-10	6.4E-10	6.1E-10	3.8E-10	3.0E-10
WNW	7.5E-09	6.5E-09	4.9E-10	4.7E-10	4.5E-10	2.8E-10	2.2E-10
W	4.0E-09	3.4E-09	2.4E-10	2.3E-10	2.3E-10	1.4E-10	1.1E-10
WSW	3.0E-09	2.6E-09	1.9E-10	1.8E-10	1.7E-10	1.1E-10	8.5E-11
SW	2.9E-09	2.5E-09	1.8E-10	1.8E-10	1.7E-10	1.1E-10	8.3E-11
SSW	2.9E-09	2.5E-09	1.8E-10	1.8E-10	1.7E-10	1.0E-10	8.3E-11
S	1.8E-09	1.5E-09	9.4E-11	9.0E-11	8.6E-11	5.2E-11	4.1E-11
SSE	1.5E-09	1.2E-09	8.1E-11	7.7E-11	7.4E-11	4.5E-11	3.6E-11
SSE	1.4E-09	1.2E-09	7.8E-11	7.5E-11	7.1E-11	4.4E-11	3.5E-11
ESE	1.4E-09	1.2E-09	7.1E-11	6.8E-11	6.5E-11	4.0E-11	3.2E-11
E	1.6E-09	1.4E-09	8.6E-11	8.2E-11	7.9E-11	4.8E-11	3.9E-11
ENE	2.0E-09	1.7E-09	1.0E-10	9.6E-11	9.2E-11	5.6E-11	4.5E-11
NE	1.9E-09	1.6E-09	9.4E-11	9.0E-11	8.6E-11	5.3E-11	4.2E-11
NNE	2.4E-09	2.0E-09	1.3E-10	1.2E-10	1.2E-10	7.1E-11	5.6E-11

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	6.6E-11	4.4E-11	4.0E-11	9.8E-12	5.3E-12	4.4E-12
NNW	1.3E-10	8.9E-11	8.1E-11	2.0E-11	1.1E-11	9.0E-12
NW	2.1E-10	1.4E-10	1.3E-10	3.3E-11	1.8E-11	1.5E-11
WNW	1.5E-10	1.1E-10	9.7E-11	2.5E-11	1.4E-11	1.1E-11
W	7.6E-11	5.1E-11	4.7E-11	1.2E-11	6.6E-12	5.4E-12
WSW	5.9E-11	4.0E-11	3.7E-11	9.3E-12	5.0E-12	4.2E-12
SW	5.8E-11	3.9E-11	3.6E-11	8.9E-12	4.7E-12	3.9E-12
SSW	5.7E-11	3.8E-11	3.5E-11	8.6E-12	4.6E-12	3.8E-12
S	2.8E-11	1.9E-11	1.7E-11	4.2E-12	2.4E-12	2.0E-12
SSE	2.5E-11	1.7E-11	1.5E-11	3.8E-12	2.1E-12	1.8E-12
SSE	2.4E-11	1.6E-11	1.5E-11	3.7E-12	2.0E-12	1.7E-12
ESE	2.2E-11	1.5E-11	1.3E-11	3.4E-12	1.9E-12	1.6E-12
E	2.7E-11	1.8E-11	1.6E-11	4.3E-12	2.4E-12	2.0E-12
ENE	3.0E-11	2.0E-11	1.8E-11	4.5E-12	2.6E-12	2.1E-12
NE	2.9E-11	1.9E-11	1.8E-11	4.4E-12	2.5E-12	2.1E-12
NNE	3.9E-11	2.6E-11	2.4E-11	6.0E-12	3.3E-12	2.8E-12

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Tue Mar 08 14:07:13 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP, fence, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_f.
Dataset Date: Mar 8, 2016 02:07 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	2.048	3.026	3.424	3.373	2.668	2.867	0.000	0.067
NNW	2.072	2.883	3.259	3.929	3.522	3.268	0.000	0.118
NW	2.161	2.806	3.080	4.405	3.903	3.301	0.000	0.170
WNW	1.685	3.098	2.796	3.778	4.040	3.392	0.000	0.116
W	1.565	2.149	2.644	4.211	4.240	3.243	0.000	0.068
WSW	1.635	2.175	2.915	4.407	4.290	3.539	0.000	0.052
SW	1.847	2.105	2.450	4.603	3.528	3.416	0.000	0.049
SSW	1.877	2.839	3.170	3.769	3.185	3.351	0.000	0.048
S	1.980	3.598	4.455	2.865	2.452	2.815	0.000	0.042
SSE	1.953	2.843	3.489	4.018	3.172	3.668	0.000	0.031
SE	1.847	2.783	3.194	3.248	2.908	3.286	0.000	0.028
ESE	1.712	1.991	2.837	3.555	2.950	3.239	0.000	0.028
E	1.784	2.837	3.570	5.690	4.168	3.239	0.000	0.038
ENE	1.939	2.974	3.796	4.942	3.417	0.000	0.000	0.050
NE	1.858	2.947	3.812	3.794	3.153	0.772	0.000	0.045
NNE	1.941	2.777	3.198	3.635	2.900	2.877	0.000	0.050

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	3.025	3.903	4.534	4.555	3.222	3.296	0.000
NNW	3.051	3.937	4.493	5.054	4.221	3.574	0.000
NW	3.176	4.023	4.409	5.650	4.602	3.600	0.000
WNW	2.707	4.039	4.200	4.926	4.646	3.759	0.000
W	2.512	3.359	4.100	5.634	5.130	3.728	0.000
WSW	2.578	3.449	4.523	6.229	5.446	3.767	0.000
SW	2.921	3.429	3.829	6.267	4.718	3.791	0.000
SSW	2.928	4.176	5.098	5.361	3.982	3.761	0.000
S	3.079	5.906	5.941	3.928	3.317	3.535	0.000
SSE	2.958	4.203	5.112	5.220	3.880	3.941	0.000

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
SE	2.764	3.577	4.320	4.523	3.360	3.522	0.000
ESE	2.534	2.968	3.794	4.977	4.206	3.472	0.000
E	2.569	4.084	5.642	7.743	5.415	3.472	0.000
ENE	2.894	4.048	5.196	6.242	4.349	0.000	0.000
NE	2.761	4.167	5.086	5.187	3.635	0.772	0.000
NNE	2.870	3.611	4.219	4.742	3.485	3.035	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.1799	0.1129	0.2230	0.3161	0.1543	0.0138	0.0000
NNW	0.1070	0.0684	0.1329	0.4114	0.2502	0.0302	0.0000
NW	0.0656	0.0372	0.0828	0.4279	0.3390	0.0475	0.0000
WNW	0.0822	0.0441	0.0796	0.3185	0.4220	0.0535	0.0000
W	0.1121	0.0466	0.0878	0.4137	0.3102	0.0296	0.0000
WSW	0.1171	0.0460	0.0880	0.4220	0.2625	0.0644	0.0000
SW	0.1260	0.0516	0.0861	0.4531	0.2083	0.0750	0.0000
SSW	0.1445	0.0656	0.1526	0.3869	0.1842	0.0662	0.0000
S	0.1847	0.1458	0.3966	0.2233	0.0393	0.0103	0.0000
SSE	0.2057	0.1088	0.2608	0.2983	0.1011	0.0253	0.0000
SE	0.2559	0.1200	0.2334	0.2675	0.1032	0.0200	0.0000
ESE	0.3091	0.1190	0.2073	0.2845	0.0779	0.0021	0.0000
E	0.1955	0.1012	0.1785	0.3759	0.1473	0.0016	0.0000
ENE	0.2023	0.1226	0.2325	0.3963	0.0463	0.0000	0.0000
NE	0.2566	0.1563	0.2707	0.2645	0.0513	0.0007	0.0000
NNE	0.2496	0.1462	0.2379	0.2669	0.0925	0.0070	0.0000
TOTAL	0.1438	0.0789	0.1556	0.3636	0.2249	0.0332	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 24.2 degrees C
297.37 K
Precipitation: 53.2 cm/y
Humidity: 8.0 g/cu m
Lid Height: 1000.0 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 4.592 m/s

Vertical Temperature Gradients:
STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Tue Mar 08 14:07:13 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP, fence, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_f.
Dataset Date: Mar 8, 2016 02:07 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.911E-06	2.494E-06	2.178E-06	1.897E-06	1.639E-06	1.446E-06	1.137E-06
NNW	7.068E-06	4.615E-06	4.047E-06	3.540E-06	3.070E-06	2.715E-06	2.145E-06
NW	9.850E-06	6.598E-06	5.822E-06	5.121E-06	4.466E-06	3.967E-06	3.158E-06
WNW	6.964E-06	4.754E-06	4.209E-06	3.713E-06	3.246E-06	2.888E-06	2.304E-06
W	4.212E-06	2.700E-06	2.358E-06	2.054E-06	1.775E-06	1.566E-06	1.232E-06
WSW	3.065E-06	1.956E-06	1.712E-06	1.497E-06	1.299E-06	1.150E-06	9.120E-07
SW	2.870E-06	1.852E-06	1.627E-06	1.427E-06	1.243E-06	1.104E-06	8.799E-07
SSW	2.889E-06	1.870E-06	1.643E-06	1.442E-06	1.256E-06	1.115E-06	8.879E-07
S	2.195E-06	1.298E-06	1.115E-06	9.575E-07	8.164E-07	7.129E-07	5.516E-07
SSE	1.706E-06	1.029E-06	8.882E-07	7.663E-07	6.564E-07	5.753E-07	4.479E-07
SE	1.614E-06	9.821E-07	8.493E-07	7.338E-07	6.295E-07	5.522E-07	4.306E-07
ESE	1.775E-06	1.038E-06	8.878E-07	7.588E-07	6.437E-07	5.597E-07	4.297E-07
E	2.024E-06	1.190E-06	1.019E-06	8.717E-07	7.404E-07	6.444E-07	4.955E-07
ENE	2.591E-06	1.492E-06	1.272E-06	1.084E-06	9.170E-07	7.960E-07	6.095E-07
NE	2.463E-06	1.418E-06	1.208E-06	1.030E-06	8.717E-07	7.566E-07	5.792E-07
NNE	2.859E-06	1.710E-06	1.471E-06	1.265E-06	1.079E-06	9.429E-07	7.298E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	1.056E-06	9.034E-07	6.038E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.996E-06	1.712E-06	1.212E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.944E-06	2.536E-06	1.888E-07	1.810E-07	1.736E-07	1.070E-07	8.468E-08
WNW	2.149E-06	1.852E-06	1.388E-07	1.330E-07	1.277E-07	7.893E-08	6.254E-08
W	1.145E-06	9.800E-07	6.892E-08	6.605E-08	6.337E-08	3.901E-08	3.090E-08
WSW	8.494E-07	7.306E-07	5.318E-08	5.098E-08	4.893E-08	3.020E-08	2.395E-08
SW	8.205E-07	7.076E-07	5.206E-08	4.990E-08	4.788E-08	2.951E-08	2.339E-08
SSW	8.279E-07	7.135E-07	5.168E-08	4.952E-08	4.751E-08	2.919E-08	2.310E-08
S	5.103E-07	4.332E-07	2.608E-08	2.494E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.150E-07	3.535E-07	2.252E-08	2.155E-08	2.065E-08	1.257E-08	9.955E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.991E-07	3.402E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.966E-07	3.352E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.576E-07	3.871E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.622E-07	4.747E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.342E-07	4.508E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.751E-07	5.731E-07	3.494E-08	3.344E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.587E-08	1.063E-08	9.741E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.533E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.933E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.907E-06	2.492E-06	2.176E-06	1.896E-06	1.638E-06	1.445E-06	1.136E-06
NNW	7.059E-06	4.611E-06	4.044E-06	3.537E-06	3.067E-06	2.713E-06	2.144E-06
NW	9.835E-06	6.591E-06	5.816E-06	5.116E-06	4.462E-06	3.964E-06	3.156E-06
WNW	6.953E-06	4.749E-06	4.205E-06	3.710E-06	3.243E-06	2.886E-06	2.302E-06
W	4.207E-06	2.698E-06	2.356E-06	2.053E-06	1.774E-06	1.565E-06	1.231E-06
WSW	3.061E-06	1.954E-06	1.710E-06	1.495E-06	1.298E-06	1.150E-06	9.114E-07
SW	2.866E-06	1.850E-06	1.625E-06	1.426E-06	1.242E-06	1.104E-06	8.793E-07
SSW	2.886E-06	1.868E-06	1.642E-06	1.441E-06	1.255E-06	1.115E-06	8.874E-07
S	2.193E-06	1.298E-06	1.114E-06	9.570E-07	8.160E-07	7.126E-07	5.514E-07
SSE	1.705E-06	1.028E-06	8.876E-07	7.658E-07	6.561E-07	5.750E-07	4.477E-07
SE	1.612E-06	9.814E-07	8.487E-07	7.334E-07	6.291E-07	5.519E-07	4.304E-07
ESE	1.773E-06	1.038E-06	8.873E-07	7.584E-07	6.434E-07	5.595E-07	4.296E-07
E	2.022E-06	1.189E-06	1.018E-06	8.713E-07	7.400E-07	6.441E-07	4.954E-07
ENE	2.589E-06	1.491E-06	1.271E-06	1.083E-06	9.167E-07	7.957E-07	6.093E-07
NE	2.461E-06	1.417E-06	1.208E-06	1.030E-06	8.714E-07	7.563E-07	5.791E-07
NNE	2.856E-06	1.709E-06	1.470E-06	1.264E-06	1.079E-06	9.424E-07	7.295E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.055E-06	9.030E-07	6.037E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.994E-06	1.711E-06	1.211E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.942E-06	2.535E-06	1.888E-07	1.809E-07	1.736E-07	1.070E-07	8.467E-08
WNW	2.147E-06	1.851E-06	1.387E-07	1.330E-07	1.277E-07	7.893E-08	6.253E-08
W	1.144E-06	9.795E-07	6.891E-08	6.604E-08	6.336E-08	3.901E-08	3.090E-08
WSW	8.489E-07	7.302E-07	5.318E-08	5.098E-08	4.892E-08	3.020E-08	2.395E-08
SW	8.200E-07	7.072E-07	5.205E-08	4.989E-08	4.788E-08	2.951E-08	2.338E-08
SSW	8.274E-07	7.132E-07	5.167E-08	4.952E-08	4.750E-08	2.919E-08	2.310E-08
S	5.101E-07	4.331E-07	2.608E-08	2.493E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.149E-07	3.533E-07	2.251E-08	2.155E-08	2.065E-08	1.257E-08	9.954E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.990E-07	3.400E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.965E-07	3.351E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.575E-07	3.870E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.621E-07	4.746E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.341E-07	4.507E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.749E-07	5.729E-07	3.494E-08	3.343E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.586E-08	1.063E-08	9.740E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.532E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.932E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.911E-06	2.494E-06	2.178E-06	1.897E-06	1.639E-06	1.446E-06	1.137E-06
NNW	7.068E-06	4.615E-06	4.047E-06	3.540E-06	3.070E-06	2.715E-06	2.145E-06
NW	9.849E-06	6.598E-06	5.822E-06	5.121E-06	4.466E-06	3.967E-06	3.158E-06
WNW	6.963E-06	4.754E-06	4.209E-06	3.713E-06	3.246E-06	2.888E-06	2.304E-06
W	4.212E-06	2.700E-06	2.358E-06	2.054E-06	1.775E-06	1.566E-06	1.232E-06
WSW	3.065E-06	1.956E-06	1.712E-06	1.497E-06	1.299E-06	1.150E-06	9.120E-07
SW	2.870E-06	1.852E-06	1.627E-06	1.427E-06	1.243E-06	1.104E-06	8.798E-07
SSW	2.889E-06	1.870E-06	1.643E-06	1.442E-06	1.256E-06	1.115E-06	8.879E-07
S	2.195E-06	1.298E-06	1.115E-06	9.575E-07	8.164E-07	7.129E-07	5.516E-07
SSE	1.706E-06	1.029E-06	8.881E-07	7.663E-07	6.564E-07	5.753E-07	4.479E-07
SE	1.614E-06	9.821E-07	8.493E-07	7.338E-07	6.294E-07	5.522E-07	4.305E-07
ESE	1.775E-06	1.038E-06	8.878E-07	7.587E-07	6.437E-07	5.597E-07	4.297E-07
E	2.024E-06	1.190E-06	1.019E-06	8.717E-07	7.404E-07	6.443E-07	4.955E-07
ENE	2.591E-06	1.492E-06	1.271E-06	1.084E-06	9.170E-07	7.959E-07	6.095E-07
NE	2.462E-06	1.418E-06	1.208E-06	1.030E-06	8.717E-07	7.566E-07	5.792E-07
NNE	2.859E-06	1.710E-06	1.471E-06	1.265E-06	1.079E-06	9.428E-07	7.298E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.056E-06	9.034E-07	6.038E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.995E-06	1.712E-06	1.212E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.944E-06	2.536E-06	1.888E-07	1.810E-07	1.736E-07	1.070E-07	8.468E-08
WNW	2.149E-06	1.852E-06	1.388E-07	1.330E-07	1.277E-07	7.893E-08	6.254E-08
W	1.145E-06	9.800E-07	6.892E-08	6.605E-08	6.337E-08	3.901E-08	3.090E-08
WSW	8.494E-07	7.306E-07	5.318E-08	5.098E-08	4.893E-08	3.020E-08	2.395E-08
SW	8.205E-07	7.076E-07	5.206E-08	4.990E-08	4.788E-08	2.951E-08	2.339E-08
SSW	8.279E-07	7.135E-07	5.168E-08	4.952E-08	4.751E-08	2.919E-08	2.310E-08
S	5.103E-07	4.332E-07	2.608E-08	2.493E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.150E-07	3.535E-07	2.252E-08	2.155E-08	2.065E-08	1.257E-08	9.955E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.991E-07	3.402E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.966E-07	3.352E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.576E-07	3.871E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.622E-07	4.747E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.342E-07	4.508E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.751E-07	5.731E-07	3.494E-08	3.344E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.587E-08	1.063E-08	9.741E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.533E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.933E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.060E-06	2.067E-06	1.835E-06	1.623E-06	1.424E-06	1.272E-06	1.021E-06
NNW	5.255E-06	3.728E-06	3.337E-06	2.974E-06	2.626E-06	2.355E-06	1.905E-06
NW	7.077E-06	5.208E-06	4.699E-06	4.218E-06	3.749E-06	3.381E-06	2.759E-06
WNW	4.910E-06	3.696E-06	3.352E-06	3.021E-06	2.696E-06	2.438E-06	1.998E-06
W	3.156E-06	2.202E-06	1.962E-06	1.741E-06	1.531E-06	1.368E-06	1.101E-06
WSW	2.336E-06	1.604E-06	1.426E-06	1.265E-06	1.113E-06	9.961E-07	8.047E-07
SW	2.191E-06	1.511E-06	1.347E-06	1.198E-06	1.057E-06	9.485E-07	7.700E-07
SSW	2.220E-06	1.528E-06	1.362E-06	1.212E-06	1.069E-06	9.597E-07	7.789E-07
S	1.832E-06	1.139E-06	9.903E-07	8.598E-07	7.409E-07	6.523E-07	5.119E-07
SSE	1.401E-06	8.876E-07	7.755E-07	6.767E-07	5.860E-07	5.182E-07	4.096E-07
SE	1.320E-06	8.435E-07	7.387E-07	6.459E-07	5.604E-07	4.962E-07	3.931E-07
ESE	1.484E-06	9.167E-07	7.943E-07	6.872E-07	5.898E-07	5.175E-07	4.033E-07
E	1.667E-06	1.039E-06	9.026E-07	7.827E-07	6.733E-07	5.918E-07	4.626E-07
ENE	2.187E-06	1.331E-06	1.150E-06	9.914E-07	8.483E-07	7.426E-07	5.765E-07
NE	2.098E-06	1.268E-06	1.094E-06	9.424E-07	8.060E-07	7.053E-07	5.473E-07
NNE	2.363E-06	1.486E-06	1.296E-06	1.128E-06	9.737E-07	8.586E-07	6.752E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	9.542E-07	8.260E-07	5.956E-08	5.704E-08	5.469E-08	3.344E-08	2.647E-08
NNW	1.783E-06	1.550E-06	1.192E-07	1.143E-07	1.096E-07	6.751E-08	5.347E-08
NW	2.590E-06	2.262E-06	1.851E-07	1.775E-07	1.704E-07	1.056E-07	8.377E-08
WNW	1.877E-06	1.643E-06	1.360E-07	1.304E-07	1.253E-07	7.788E-08	6.184E-08
W	1.029E-06	8.917E-07	6.787E-08	6.507E-08	6.245E-08	3.862E-08	3.065E-08
WSW	7.536E-07	6.555E-07	5.208E-08	4.995E-08	4.796E-08	2.978E-08	2.367E-08
SW	7.221E-07	6.299E-07	5.088E-08	4.880E-08	4.686E-08	2.906E-08	2.309E-08
SSW	7.303E-07	6.368E-07	5.057E-08	4.849E-08	4.654E-08	2.877E-08	2.282E-08
S	4.754E-07	4.067E-07	2.583E-08	2.470E-08	2.365E-08	1.425E-08	1.126E-08
SSE	3.813E-07	3.276E-07	2.221E-08	2.127E-08	2.039E-08	1.246E-08	9.883E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.661E-07	3.148E-07	2.133E-08	2.042E-08	1.958E-08	1.199E-08	9.524E-09
ESE	3.737E-07	3.182E-07	1.936E-08	1.853E-08	1.776E-08	1.083E-08	8.635E-09
E	4.291E-07	3.661E-07	2.364E-08	2.264E-08	2.171E-08	1.331E-08	1.059E-08
ENE	5.338E-07	4.538E-07	2.756E-08	2.637E-08	2.526E-08	1.530E-08	1.214E-08
NE	5.066E-07	4.305E-07	2.567E-08	2.456E-08	2.353E-08	1.428E-08	1.138E-08
NNE	6.273E-07	5.370E-07	3.459E-08	3.311E-08	3.173E-08	1.932E-08	1.537E-08

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.812E-08	1.206E-08	1.103E-08	2.666E-09	1.429E-09	1.175E-09
NNW	3.675E-08	2.460E-08	2.254E-08	5.546E-09	2.992E-09	2.468E-09
NW	5.791E-08	3.912E-08	3.591E-08	9.041E-09	4.885E-09	4.041E-09
WNW	4.297E-08	2.926E-08	2.690E-08	6.925E-09	3.765E-09	3.120E-09
W	2.115E-08	1.424E-08	1.306E-08	3.286E-09	1.801E-09	1.492E-09
WSW	1.637E-08	1.105E-08	1.014E-08	2.555E-09	1.386E-09	1.148E-09
SW	1.595E-08	1.074E-08	9.853E-09	2.447E-09	1.301E-09	1.074E-09
SSW	1.571E-08	1.054E-08	9.660E-09	2.372E-09	1.258E-09	1.036E-09
S	7.625E-09	4.992E-09	4.553E-09	1.106E-09	6.236E-10	5.213E-10
SSE	6.774E-09	4.511E-09	4.129E-09	1.027E-09	5.673E-10	4.706E-10
SE	6.534E-09	4.349E-09	3.980E-09	9.808E-10	5.372E-10	4.441E-10
ESE	5.925E-09	3.932E-09	3.597E-09	8.893E-10	4.974E-10	4.117E-10
E	7.294E-09	4.880E-09	4.472E-09	1.141E-09	6.496E-10	5.417E-10
ENE	8.241E-09	5.390E-09	4.916E-09	1.184E-09	6.708E-10	5.573E-10
NE	7.780E-09	5.135E-09	4.693E-09	1.162E-09	6.599E-10	5.490E-10
NNE	1.053E-08	7.001E-09	6.406E-09	1.589E-09	8.825E-10	7.311E-10

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	2.952E-06	2.014E-06	1.792E-06	1.590E-06	1.398E-06	1.251E-06	1.007E-06
NNW	5.008E-06	3.604E-06	3.237E-06	2.895E-06	2.563E-06	2.304E-06	1.871E-06
NW	6.685E-06	5.006E-06	4.535E-06	4.086E-06	3.645E-06	3.295E-06	2.701E-06
WNW	4.633E-06	3.547E-06	3.230E-06	2.923E-06	2.618E-06	2.373E-06	1.954E-06
W	3.003E-06	2.126E-06	1.901E-06	1.693E-06	1.493E-06	1.338E-06	1.080E-06
WSW	2.225E-06	1.548E-06	1.381E-06	1.229E-06	1.084E-06	9.722E-07	7.883E-07
SW	2.091E-06	1.460E-06	1.306E-06	1.164E-06	1.030E-06	9.258E-07	7.541E-07
SSW	2.126E-06	1.480E-06	1.323E-06	1.180E-06	1.044E-06	9.384E-07	7.641E-07
S	1.784E-06	1.119E-06	9.743E-07	8.473E-07	7.313E-07	6.446E-07	5.069E-07
SSE	1.358E-06	8.675E-07	7.596E-07	6.640E-07	5.762E-07	5.101E-07	4.043E-07
SE	1.282E-06	8.258E-07	7.246E-07	6.347E-07	5.517E-07	4.891E-07	3.885E-07
ESE	1.445E-06	8.996E-07	7.811E-07	6.770E-07	5.821E-07	5.114E-07	3.994E-07
E	1.609E-06	1.013E-06	8.825E-07	7.672E-07	6.615E-07	5.825E-07	4.567E-07
ENE	2.123E-06	1.305E-06	1.129E-06	9.760E-07	8.368E-07	7.335E-07	5.709E-07
NE	2.045E-06	1.246E-06	1.077E-06	9.295E-07	7.963E-07	6.977E-07	5.425E-07
NNE	2.298E-06	1.457E-06	1.273E-06	1.110E-06	9.598E-07	8.475E-07	6.680E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	9.420E-07	8.167E-07	5.946E-08	5.695E-08	5.461E-08	3.340E-08	2.645E-08
NNW	1.754E-06	1.527E-06	1.189E-07	1.140E-07	1.094E-07	6.741E-08	5.341E-08
NW	2.539E-06	2.223E-06	1.846E-07	1.770E-07	1.700E-07	1.054E-07	8.364E-08
WNW	1.839E-06	1.613E-06	1.356E-07	1.301E-07	1.249E-07	7.773E-08	6.174E-08
W	1.011E-06	8.780E-07	6.771E-08	6.492E-08	6.231E-08	3.856E-08	3.061E-08
WSW	7.390E-07	6.441E-07	5.192E-08	4.980E-08	4.782E-08	2.971E-08	2.363E-08
SW	7.078E-07	6.187E-07	5.072E-08	4.865E-08	4.671E-08	2.899E-08	2.305E-08
SSW	7.171E-07	6.265E-07	5.042E-08	4.835E-08	4.641E-08	2.871E-08	2.279E-08
S	4.710E-07	4.034E-07	2.580E-08	2.467E-08	2.363E-08	1.424E-08	1.125E-08
SSE	3.765E-07	3.239E-07	2.217E-08	2.123E-08	2.035E-08	1.244E-08	9.873E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.620E-07	3.117E-07	2.129E-08	2.039E-08	1.955E-08	1.198E-08	9.516E-09
ESE	3.703E-07	3.157E-07	1.934E-08	1.851E-08	1.774E-08	1.082E-08	8.632E-09
E	4.240E-07	3.623E-07	2.360E-08	2.261E-08	2.168E-08	1.330E-08	1.059E-08
ENE	5.289E-07	4.502E-07	2.754E-08	2.635E-08	2.524E-08	1.529E-08	1.214E-08
NE	5.025E-07	4.275E-07	2.566E-08	2.455E-08	2.352E-08	1.428E-08	1.138E-08
NNE	6.211E-07	5.323E-07	3.455E-08	3.307E-08	3.170E-08	1.931E-08	1.536E-08

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.811E-08	1.205E-08	1.102E-08	2.666E-09	1.430E-09	1.175E-09
NNW	3.672E-08	2.458E-08	2.252E-08	5.544E-09	2.992E-09	2.469E-09
NW	5.783E-08	3.908E-08	3.587E-08	9.036E-09	4.884E-09	4.041E-09
WNW	4.292E-08	2.923E-08	2.687E-08	6.921E-09	3.764E-09	3.120E-09
W	2.113E-08	1.423E-08	1.305E-08	3.285E-09	1.801E-09	1.492E-09
WSW	1.635E-08	1.103E-08	1.013E-08	2.554E-09	1.385E-09	1.148E-09
SW	1.592E-08	1.073E-08	9.841E-09	2.445E-09	1.301E-09	1.074E-09
SSW	1.569E-08	1.053E-08	9.649E-09	2.371E-09	1.258E-09	1.037E-09
S	7.622E-09	4.991E-09	4.552E-09	1.106E-09	6.238E-10	5.215E-10
SSE	6.769E-09	4.507E-09	4.126E-09	1.027E-09	5.674E-10	4.707E-10
SE	6.530E-09	4.347E-09	3.978E-09	9.807E-10	5.373E-10	4.442E-10
ESE	5.924E-09	3.931E-09	3.596E-09	8.894E-10	4.975E-10	4.118E-10
E	7.291E-09	4.878E-09	4.471E-09	1.141E-09	6.496E-10	5.418E-10
ENE	8.239E-09	5.389E-09	4.916E-09	1.184E-09	6.710E-10	5.574E-10
NE	7.780E-09	5.136E-09	4.693E-09	1.162E-09	6.600E-10	5.490E-10
NNE	1.053E-08	6.999E-09	6.404E-09	1.589E-09	8.827E-10	7.313E-10

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.499E-06	2.287E-06	2.012E-06	1.765E-06	1.535E-06	1.362E-06	1.081E-06
NNW	6.185E-06	4.182E-06	3.701E-06	3.264E-06	2.853E-06	2.540E-06	2.028E-06
NW	8.497E-06	5.919E-06	5.273E-06	4.679E-06	4.115E-06	3.681E-06	2.963E-06
WNW	5.965E-06	4.238E-06	3.791E-06	3.376E-06	2.977E-06	2.668E-06	2.155E-06
W	3.696E-06	2.456E-06	2.164E-06	1.901E-06	1.655E-06	1.469E-06	1.167E-06
WSW	2.707E-06	1.783E-06	1.572E-06	1.383E-06	1.208E-06	1.075E-06	8.594E-07
SW	2.538E-06	1.685E-06	1.490E-06	1.315E-06	1.152E-06	1.028E-06	8.262E-07
SSW	2.563E-06	1.703E-06	1.506E-06	1.330E-06	1.165E-06	1.040E-06	8.349E-07
S	2.018E-06	1.221E-06	1.055E-06	9.101E-07	7.798E-07	6.835E-07	5.324E-07
SSE	1.557E-06	9.599E-07	8.332E-07	7.226E-07	6.221E-07	5.474E-07	4.292E-07
SE	1.471E-06	9.149E-07	7.956E-07	6.912E-07	5.960E-07	5.251E-07	4.124E-07
ESE	1.633E-06	9.790E-07	8.422E-07	7.238E-07	6.174E-07	5.391E-07	4.168E-07
E	1.848E-06	1.115E-06	9.614E-07	8.277E-07	7.072E-07	6.183E-07	4.792E-07
ENE	2.393E-06	1.413E-06	1.211E-06	1.038E-06	8.831E-07	7.696E-07	5.932E-07
NE	2.284E-06	1.344E-06	1.152E-06	9.872E-07	8.396E-07	7.315E-07	5.636E-07
NNE	2.618E-06	1.601E-06	1.386E-06	1.198E-06	1.028E-06	9.019E-07	7.033E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.007E-06	8.660E-07	5.998E-08	5.743E-08	5.506E-08	3.358E-08	2.657E-08
NNW	1.892E-06	1.633E-06	1.202E-07	1.152E-07	1.105E-07	6.787E-08	5.371E-08
NW	2.771E-06	2.402E-06	1.870E-07	1.793E-07	1.721E-07	1.063E-07	8.423E-08
WNW	2.016E-06	1.750E-06	1.374E-07	1.318E-07	1.265E-07	7.842E-08	6.220E-08
W	1.088E-06	9.366E-07	6.840E-08	6.557E-08	6.292E-08	3.882E-08	3.077E-08
WSW	8.024E-07	6.938E-07	5.264E-08	5.048E-08	4.846E-08	3.000E-08	2.381E-08
SW	7.724E-07	6.696E-07	5.149E-08	4.936E-08	4.738E-08	2.929E-08	2.324E-08
SSW	7.804E-07	6.762E-07	5.114E-08	4.902E-08	4.704E-08	2.898E-08	2.296E-08
S	4.934E-07	4.204E-07	2.596E-08	2.482E-08	2.376E-08	1.429E-08	1.129E-08
SSE	3.986E-07	3.408E-07	2.237E-08	2.141E-08	2.052E-08	1.251E-08	9.920E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.831E-07	3.279E-07	2.147E-08	2.056E-08	1.971E-08	1.204E-08	9.558E-09
ESE	3.854E-07	3.269E-07	1.942E-08	1.858E-08	1.781E-08	1.085E-08	8.645E-09
E	4.435E-07	3.767E-07	2.373E-08	2.272E-08	2.178E-08	1.334E-08	1.061E-08
ENE	5.482E-07	4.643E-07	2.763E-08	2.643E-08	2.531E-08	1.532E-08	1.215E-08
NE	5.207E-07	4.409E-07	2.576E-08	2.465E-08	2.361E-08	1.432E-08	1.140E-08
NNE	6.519E-07	5.556E-07	3.477E-08	3.328E-08	3.189E-08	1.938E-08	1.540E-08

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.817E-08	1.208E-08	1.105E-08	2.667E-09	1.428E-09	1.174E-09
NNW	3.688E-08	2.468E-08	2.261E-08	5.552E-09	2.991E-09	2.467E-09
NW	5.816E-08	3.928E-08	3.605E-08	9.056E-09	4.883E-09	4.039E-09
WNW	4.317E-08	2.938E-08	2.701E-08	6.938E-09	3.764E-09	3.120E-09
W	2.122E-08	1.428E-08	1.310E-08	3.290E-09	1.800E-09	1.491E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.560E-09	1.385E-09	1.148E-09
SW	1.603E-08	1.079E-08	9.899E-09	2.452E-09	1.301E-09	1.073E-09
SSW	1.579E-08	1.059E-08	9.701E-09	2.376E-09	1.257E-09	1.035E-09
S	7.637E-09	4.998E-09	4.558E-09	1.106E-09	6.228E-10	5.206E-10
SSE	6.794E-09	4.522E-09	4.139E-09	1.028E-09	5.671E-10	4.703E-10
SE	6.551E-09	4.359E-09	3.989E-09	9.814E-10	5.368E-10	4.437E-10
ESE	5.929E-09	3.933E-09	3.598E-09	8.889E-10	4.970E-10	4.113E-10
E	7.303E-09	4.885E-09	4.476E-09	1.141E-09	6.494E-10	5.415E-10
ENE	8.245E-09	5.391E-09	4.917E-09	1.184E-09	6.704E-10	5.569E-10
NE	7.792E-09	5.142E-09	4.698E-09	1.162E-09	6.595E-10	5.485E-10
NNE	1.055E-08	7.011E-09	6.415E-09	1.589E-09	8.818E-10	7.305E-10

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.143E-06	2.109E-06	1.869E-06	1.651E-06	1.446E-06	1.289E-06	1.033E-06
NNW	5.425E-06	3.810E-06	3.402E-06	3.026E-06	2.667E-06	2.388E-06	1.927E-06
NW	7.331E-06	5.333E-06	4.800E-06	4.299E-06	3.813E-06	3.433E-06	2.795E-06
WNW	5.104E-06	3.794E-06	3.430E-06	3.084E-06	2.746E-06	2.479E-06	2.026E-06
W	3.251E-06	2.245E-06	1.996E-06	1.768E-06	1.552E-06	1.385E-06	1.112E-06
WSW	2.399E-06	1.633E-06	1.450E-06	1.285E-06	1.129E-06	1.009E-06	8.140E-07
SW	2.251E-06	1.541E-06	1.372E-06	1.218E-06	1.074E-06	9.625E-07	7.799E-07
SSW	2.282E-06	1.559E-06	1.388E-06	1.233E-06	1.087E-06	9.743E-07	7.892E-07
S	1.867E-06	1.155E-06	1.002E-06	8.693E-07	7.483E-07	6.583E-07	5.158E-07
SSE	1.429E-06	9.005E-07	7.858E-07	6.849E-07	5.925E-07	5.234E-07	4.132E-07
SE	1.348E-06	8.570E-07	7.495E-07	6.545E-07	5.672E-07	5.017E-07	3.968E-07
ESE	1.512E-06	9.279E-07	8.029E-07	6.937E-07	5.947E-07	5.213E-07	4.056E-07
E	1.696E-06	1.051E-06	9.116E-07	7.896E-07	6.785E-07	5.958E-07	4.651E-07
ENE	2.221E-06	1.345E-06	1.159E-06	9.988E-07	8.538E-07	7.468E-07	5.791E-07
NE	2.131E-06	1.281E-06	1.104E-06	9.502E-07	8.118E-07	7.098E-07	5.501E-07
NNE	2.411E-06	1.508E-06	1.312E-06	1.141E-06	9.838E-07	8.667E-07	6.804E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	9.645E-07	8.338E-07	5.964E-08	5.712E-08	5.477E-08	3.346E-08	2.649E-08
NNW	1.803E-06	1.565E-06	1.194E-07	1.144E-07	1.098E-07	6.758E-08	5.352E-08
NW	2.622E-06	2.287E-06	1.855E-07	1.778E-07	1.707E-07	1.058E-07	8.385E-08
WNW	1.902E-06	1.662E-06	1.362E-07	1.307E-07	1.255E-07	7.797E-08	6.191E-08
W	1.039E-06	8.992E-07	6.796E-08	6.515E-08	6.253E-08	3.865E-08	3.067E-08
WSW	7.619E-07	6.620E-07	5.218E-08	5.004E-08	4.805E-08	2.982E-08	2.369E-08
SW	7.309E-07	6.369E-07	5.099E-08	4.890E-08	4.695E-08	2.910E-08	2.312E-08
SSW	7.395E-07	6.441E-07	5.068E-08	4.859E-08	4.663E-08	2.881E-08	2.285E-08
S	4.788E-07	4.093E-07	2.586E-08	2.473E-08	2.368E-08	1.426E-08	1.127E-08
SSE	3.844E-07	3.299E-07	2.224E-08	2.129E-08	2.041E-08	1.247E-08	9.890E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.694E-07	3.173E-07	2.135E-08	2.045E-08	1.961E-08	1.200E-08	9.531E-09
ESE	3.757E-07	3.197E-07	1.937E-08	1.854E-08	1.777E-08	1.083E-08	8.637E-09
E	4.312E-07	3.676E-07	2.365E-08	2.265E-08	2.172E-08	1.332E-08	1.060E-08
ENE	5.360E-07	4.554E-07	2.757E-08	2.638E-08	2.527E-08	1.530E-08	1.214E-08
NE	5.090E-07	4.323E-07	2.569E-08	2.458E-08	2.355E-08	1.429E-08	1.139E-08
NNE	6.319E-07	5.405E-07	3.463E-08	3.314E-08	3.176E-08	1.933E-08	1.537E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.813E-08	1.206E-08	1.103E-08	2.666E-09	1.429E-09	1.175E-09
NNW	3.677E-08	2.462E-08	2.255E-08	5.547E-09	2.992E-09	2.468E-09
NW	5.795E-08	3.915E-08	3.594E-08	9.044E-09	4.884E-09	4.040E-09
WNW	4.301E-08	2.928E-08	2.692E-08	6.927E-09	3.765E-09	3.120E-09
W	2.116E-08	1.425E-08	1.307E-08	3.286E-09	1.801E-09	1.492E-09
WSW	1.638E-08	1.105E-08	1.015E-08	2.556E-09	1.385E-09	1.148E-09
SW	1.596E-08	1.075E-08	9.862E-09	2.447E-09	1.301E-09	1.074E-09
SSW	1.573E-08	1.055E-08	9.667E-09	2.373E-09	1.258E-09	1.036E-09
S	7.627E-09	4.993E-09	4.554E-09	1.106E-09	6.235E-10	5.212E-10
SSE	6.778E-09	4.513E-09	4.130E-09	1.028E-09	5.673E-10	4.706E-10
SE	6.537E-09	4.351E-09	3.982E-09	9.810E-10	5.371E-10	4.440E-10
ESE	5.925E-09	3.932E-09	3.597E-09	8.892E-10	4.974E-10	4.116E-10
E	7.296E-09	4.880E-09	4.473E-09	1.141E-09	6.495E-10	5.417E-10
ENE	8.242E-09	5.390E-09	4.916E-09	1.184E-09	6.708E-10	5.573E-10
NE	7.783E-09	5.137E-09	4.694E-09	1.162E-09	6.599E-10	5.489E-10
NNE	1.054E-08	7.004E-09	6.408E-09	1.589E-09	8.824E-10	7.310E-10

CY 2014 CAP88-PC Output Data for the Maximum Exposed Off-Site Individual at the DOE WIPP Maximum Residential Location (8,800 meters WNW)

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Mon Mar 07 14:11:58 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014
DOSE Age Group: Adult

Comments: CY 2014 emiss Ind NESHAP,MEOSI, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Committed Effective Dose Equivalent (mrem)
2.90E-03

At This Location: 8800 Meters West Northwest

Dataset Name: B_Ind14r_m.
Dataset Date: Mar 7, 2016 02:11 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

Mon Mar 07 14:11:58 2016 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 8800 Meters West Northwest
Lifetime Fatal Cancer Risk: 2.22E-10

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	2.15E-04
UB_Wall	2.17E-04
Bone_Sur	1.18E-01
Brain	2.15E-04
Breasts	2.25E-04
St_Wall	2.18E-04
SI_Wall	2.17E-04
ULI_Wall	2.27E-04
LLI_Wall	2.47E-04
Kidneys	6.17E-04
Liver	8.17E-03
Muscle	2.22E-04
Ovaries	2.27E-03
Pancreas	2.15E-04
R_Marrow	4.13E-03
Skin	2.55E-04
Spleen	2.17E-04
Testes	2.26E-03
Thymus	2.18E-04
Thyroid	2.20E-04
GB_Wall	2.15E-04
Ht_Wall	2.17E-04
Uterus	2.15E-04
ET_Reg	5.65E-04
Lung_66	2.00E-03
Effectiv	2.90E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 2014

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Am-241	M	1.000	1.8E-08	1.7E-03	1.0E-08	1.7E-03
Pu-238	M	1.000	7.5E-09	4.8E-06	7.2E-09	4.8E-06
Pu-239	M	1.000	6.4E-09	9.4E-05	5.3E-09	9.4E-05
Sr-90	M	1.000	6.5E-07	6.9E-07	4.2E-07	1.8E-06
Cs-137	F	1.000	8.4E-06	7.6E-06	7.3E-06	2.3E-05
U-233	M	1.000	1.2E-08	5.0E-08	8.9E-09	7.1E-08
U-238	M	1.000	1.1E-08	1.7E-08	8.7E-09	3.7E-08

SITE INFORMATION

Temperature: 24.210 degrees C
Precipitation: 53.240 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 8800 meters

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.70	6.70	20.00
Diameter (m):	5.20	1.80	2.60
Plume Rise Momentum (m/s): (Exit Velocity)	6.70	10.80	3.30

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

347	490	539	592	652	707	822
860	945	5100	5250	5400	7500	8800
11520	15610	16670	47000	70000	79700	

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Mon Mar 07 14:11:58 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP,MEOSI, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_m.
Dataset Date: Mar 7, 2016 02:11 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Am-241	M	1.000	5.32E-06	1.80E-03
Pu-238	M	1.000	5.32E-06	1.80E-03
Pu-239	M	1.000	5.32E-06	1.80E-03
Sr-90	M	1.000	5.32E-06	1.80E-03
Cs-137	F	1.000	5.32E-06	1.80E-03
U-233	M	1.000	5.32E-06	1.80E-03
U-238	M	1.000	5.32E-06	1.80E-03

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
Nuclide	Radio-active	Surface	Water	Milk (1)	Meat (2)
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Pu-239	7.87E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Sr-90	6.59E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Cs-137	6.29E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
U-233	1.19E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic meters/yr	5.26E+03
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight)	
(Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass	
when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	1.00E+00
Meat	1.00E+00
Milk	1.00E+00
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA (Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	7.62E+01
Milk ingestion (L/y)	5.30E+01
Meat ingestion (kg/y)	8.40E+01
Leafy vegetable ingestion (kg/y)	7.79E+00
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Mon Mar 07 14:11:58 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014
DOSE Age Group: Adult

Comments: CY 2014 emiss Ind NESHAP,MEOSI, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_m.
Dataset Date: Mar 7, 2016 02:11 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

Mon Mar 07 14:11:58 2016 SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	2.15E-04
UB_Wall	2.17E-04
Bone_Sur	1.18E-01
Brain	2.15E-04
Breasts	2.25E-04
St_Wall	2.18E-04
SI_Wall	2.17E-04
ULI_Wall	2.27E-04
LLI_Wall	2.47E-04
Kidneys	6.17E-04
Liver	8.17E-03
Muscle	2.22E-04
Ovaries	2.27E-03
Pancreas	2.15E-04
R_Marrow	4.13E-03
Skin	2.55E-04
Spleen	2.17E-04
Testes	2.26E-03
Thymus	2.18E-04
Thyroid	2.20E-04
GB_Wall	2.15E-04
Ht_Wall	2.17E-04
Uterus	2.15E-04
ET_Reg	5.65E-04
Lung_66	2.00E-03
Effectiv	2.90E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.07E-04
INHALATION	2.77E-03
AIR IMMERSION	3.95E-10
GROUND SURFACE	1.68E-05
INTERNAL	2.88E-03
EXTERNAL	1.68E-05
TOTAL	2.90E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Am-241	2.70E-03
Np-237	1.76E-10
Pa-233	1.46E-09
U-233	8.92E-09
Th-229	7.24E-12
Pu-238	8.63E-06
U-234	9.14E-14
Th-230	2.59E-17
Ra-226	2.63E-18
Rn-222	1.47E-19
Pu-239	1.83E-04
U-235m	0.00E+00
U-235	1.93E-13
Th-231	1.97E-14
Pa-231	2.59E-17
Sr-90	2.99E-07
Y-90	4.06E-08
Cs-137	2.89E-06
Ba-137m	2.73E-06
Ra-225	1.03E-12
Ac-225	1.23E-12
Fr-221	2.51E-12
U-238	3.77E-09
Th-234	1.22E-10
Pa-234m	1.67E-09
Pa-234	3.30E-11
TOTAL	2.90E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	8.68E-12
INHALATION	2.05E-10
AIR IMMERSION	2.02E-16
GROUND SURFACE	8.37E-12
INTERNAL	2.14E-10
EXTERNAL	8.37E-12
TOTAL	2.22E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Am-241	2.06E-10
Np-237	8.67E-17
Pa-233	7.85E-16
U-233	3.03E-15
Th-229	3.83E-18
Pu-238	7.44E-13
U-234	3.15E-20
Th-230	1.10E-23
Ra-226	1.43E-24
Rn-222	8.00E-26
Pu-239	1.35E-11
U-235m	0.00E+00
U-235	1.05E-19
Th-231	9.00E-21
Pa-231	1.35E-23
Sr-90	6.22E-15
Y-90	4.83E-15
Cs-137	4.78E-14
Ba-137m	1.47E-12
Ra-225	4.65E-19
Ac-225	6.48E-19
Fr-221	1.36E-18
U-238	1.11E-15
Th-234	6.33E-17
Pa-234m	2.93E-16
Pa-234	1.79E-17
TOTAL	2.22E-10

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	1.8E-01	1.1E-01	1.0E-01	8.7E-02	7.5E-02	6.6E-02	5.2E-02
NNW	3.2E-01	2.1E-01	1.9E-01	1.6E-01	1.4E-01	1.2E-01	9.8E-02
NW	4.5E-01	3.0E-01	2.7E-01	2.3E-01	2.0E-01	1.8E-01	1.4E-01
WNW	3.2E-01	2.2E-01	1.9E-01	1.7E-01	1.5E-01	1.3E-01	1.1E-01
W	1.9E-01	1.2E-01	1.1E-01	9.4E-02	8.1E-02	7.2E-02	5.7E-02
WSW	1.4E-01	9.0E-02	7.8E-02	6.9E-02	6.0E-02	5.3E-02	4.2E-02
SW	1.3E-01	8.5E-02	7.5E-02	6.5E-02	5.7E-02	5.1E-02	4.0E-02
SSW	1.3E-01	8.6E-02	7.5E-02	6.6E-02	5.8E-02	5.1E-02	4.1E-02
S	1.0E-01	6.0E-02	5.1E-02	4.4E-02	3.8E-02	3.3E-02	2.5E-02
SSE	7.8E-02	4.7E-02	4.1E-02	3.5E-02	3.0E-02	2.6E-02	2.1E-02
SSE	7.4E-02	4.5E-02	3.9E-02	3.4E-02	2.9E-02	2.5E-02	2.0E-02
ESE	8.1E-02	4.8E-02	4.1E-02	3.5E-02	3.0E-02	2.6E-02	2.0E-02
E	9.3E-02	5.5E-02	4.7E-02	4.0E-02	3.4E-02	3.0E-02	2.3E-02
ENE	1.2E-01	6.8E-02	5.8E-02	5.0E-02	4.2E-02	3.7E-02	2.8E-02
NE	1.1E-01	6.5E-02	5.6E-02	4.7E-02	4.0E-02	3.5E-02	2.7E-02
NNE	1.3E-01	7.9E-02	6.8E-02	5.8E-02	5.0E-02	4.3E-02	3.4E-02

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8800
N	4.9E-02	4.2E-02	2.8E-03	2.7E-03	2.6E-03	1.6E-03	1.2E-03
NNW	9.2E-02	7.9E-02	5.6E-03	5.4E-03	5.2E-03	3.2E-03	2.5E-03
NW	1.4E-01	1.2E-01	8.7E-03	8.4E-03	8.0E-03	4.9E-03	3.9E-03
WNW	9.9E-02	8.5E-02	6.4E-03	6.1E-03	5.9E-03	3.7E-03	2.9E-03
W	5.3E-02	4.5E-02	3.2E-03	3.1E-03	2.9E-03	1.8E-03	1.4E-03
WSW	3.9E-02	3.4E-02	2.5E-03	2.4E-03	2.3E-03	1.4E-03	1.1E-03
SW	3.8E-02	3.2E-02	2.4E-03	2.3E-03	2.2E-03	1.4E-03	1.1E-03
SSW	3.8E-02	3.3E-02	2.4E-03	2.3E-03	2.2E-03	1.4E-03	1.1E-03
S	2.3E-02	2.0E-02	1.2E-03	1.2E-03	1.1E-03	6.7E-04	5.3E-04
SSE	1.9E-02	1.6E-02	1.0E-03	1.0E-03	9.6E-04	5.9E-04	4.7E-04
SSE	1.8E-02	1.6E-02	1.0E-03	9.7E-04	9.3E-04	5.7E-04	4.5E-04
ESE	1.8E-02	1.5E-02	9.1E-04	8.7E-04	8.4E-04	5.1E-04	4.1E-04
E	2.1E-02	1.8E-02	1.1E-03	1.1E-03	1.0E-03	6.3E-04	5.0E-04
ENE	2.6E-02	2.2E-02	1.3E-03	1.2E-03	1.2E-03	7.2E-04	5.7E-04
NE	2.5E-02	2.1E-02	1.2E-03	1.2E-03	1.1E-03	6.8E-04	5.4E-04
NNE	3.1E-02	2.6E-02	1.6E-03	1.6E-03	1.5E-03	9.1E-04	7.3E-04

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	8.5E-04	5.7E-04	5.2E-04	1.3E-04	6.8E-05	5.6E-05
NNW	1.7E-03	1.2E-03	1.1E-03	2.6E-04	1.4E-04	1.2E-04
NW	2.7E-03	1.8E-03	1.7E-03	4.2E-04	2.3E-04	1.9E-04
WNW	2.0E-03	1.4E-03	1.3E-03	3.2E-04	1.8E-04	1.5E-04
W	9.9E-04	6.7E-04	6.1E-04	1.5E-04	8.5E-05	7.0E-05
WSW	7.7E-04	5.2E-04	4.8E-04	1.2E-04	6.5E-05	5.4E-05
SW	7.5E-04	5.0E-04	4.6E-04	1.1E-04	6.1E-05	5.0E-05
SSW	7.4E-04	5.0E-04	4.5E-04	1.1E-04	5.9E-05	4.9E-05
S	3.6E-04	2.4E-04	2.2E-04	5.3E-05	3.0E-05	2.5E-05
SSE	3.2E-04	2.1E-04	2.0E-04	4.9E-05	2.7E-05	2.2E-05
SSE	3.1E-04	2.1E-04	1.9E-04	4.7E-05	2.6E-05	2.1E-05
ESE	2.8E-04	1.9E-04	1.7E-04	4.3E-05	2.4E-05	2.0E-05
E	3.4E-04	2.3E-04	2.1E-04	5.4E-05	3.1E-05	2.6E-05
ENE	3.9E-04	2.6E-04	2.3E-04	5.7E-05	3.2E-05	2.7E-05
NE	3.7E-04	2.4E-04	2.2E-04	5.6E-05	3.2E-05	2.7E-05
NNE	5.0E-04	3.3E-04	3.0E-04	7.6E-05	4.2E-05	3.5E-05

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	1.4E-08	8.7E-09	7.6E-09	6.6E-09	5.7E-09	5.1E-09	4.0E-09
NNW	2.5E-08	1.6E-08	1.4E-08	1.2E-08	1.1E-08	9.5E-09	7.5E-09
NW	3.4E-08	2.3E-08	2.0E-08	1.8E-08	1.6E-08	1.4E-08	1.1E-08
WNW	2.4E-08	1.7E-08	1.5E-08	1.3E-08	1.1E-08	1.0E-08	8.0E-09
W	1.5E-08	9.4E-09	8.2E-09	7.2E-09	6.2E-09	5.5E-09	4.3E-09
WSW	1.1E-08	6.8E-09	6.0E-09	5.2E-09	4.5E-09	4.0E-09	3.2E-09
SW	1.0E-08	6.5E-09	5.7E-09	5.0E-09	4.3E-09	3.9E-09	3.1E-09
SSW	1.0E-08	6.5E-09	5.7E-09	5.0E-09	4.4E-09	3.9E-09	3.1E-09
S	7.7E-09	4.5E-09	3.9E-09	3.4E-09	2.9E-09	2.5E-09	1.9E-09
SSE	6.0E-09	3.6E-09	3.1E-09	2.7E-09	2.3E-09	2.0E-09	1.6E-09
SSE	5.6E-09	3.4E-09	3.0E-09	2.6E-09	2.2E-09	1.9E-09	1.5E-09
ESE	6.2E-09	3.6E-09	3.1E-09	2.7E-09	2.3E-09	2.0E-09	1.5E-09
E	7.1E-09	4.2E-09	3.6E-09	3.1E-09	2.6E-09	2.3E-09	1.7E-09
ENE	9.0E-09	5.2E-09	4.4E-09	3.8E-09	3.2E-09	2.8E-09	2.1E-09
NE	8.6E-09	5.0E-09	4.2E-09	3.6E-09	3.1E-09	2.7E-09	2.0E-09
NNE	1.0E-08	6.0E-09	5.2E-09	4.4E-09	3.8E-09	3.3E-09	2.6E-09

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8800
N	3.7E-09	3.2E-09	2.2E-10	2.1E-10	2.0E-10	1.2E-10	9.6E-11
NNW	7.0E-09	6.0E-09	4.3E-10	4.1E-10	4.0E-10	2.4E-10	1.9E-10
NW	1.0E-08	8.9E-09	6.7E-10	6.4E-10	6.1E-10	3.8E-10	3.0E-10
WNW	7.5E-09	6.5E-09	4.9E-10	4.7E-10	4.5E-10	2.8E-10	2.2E-10
W	4.0E-09	3.4E-09	2.4E-10	2.3E-10	2.3E-10	1.4E-10	1.1E-10
WSW	3.0E-09	2.6E-09	1.9E-10	1.8E-10	1.7E-10	1.1E-10	8.5E-11
SW	2.9E-09	2.5E-09	1.8E-10	1.8E-10	1.7E-10	1.1E-10	8.3E-11
SSW	2.9E-09	2.5E-09	1.8E-10	1.8E-10	1.7E-10	1.0E-10	8.3E-11
S	1.8E-09	1.5E-09	9.4E-11	9.0E-11	8.6E-11	5.2E-11	4.1E-11
SSE	1.5E-09	1.2E-09	8.1E-11	7.7E-11	7.4E-11	4.5E-11	3.6E-11
SSE	1.4E-09	1.2E-09	7.8E-11	7.5E-11	7.1E-11	4.4E-11	3.5E-11
ESE	1.4E-09	1.2E-09	7.1E-11	6.8E-11	6.5E-11	4.0E-11	3.2E-11
E	1.6E-09	1.4E-09	8.6E-11	8.2E-11	7.9E-11	4.8E-11	3.9E-11
ENE	2.0E-09	1.7E-09	1.0E-10	9.6E-11	9.2E-11	5.6E-11	4.5E-11
NE	1.9E-09	1.6E-09	9.4E-11	9.0E-11	8.6E-11	5.3E-11	4.2E-11
NNE	2.4E-09	2.0E-09	1.3E-10	1.2E-10	1.2E-10	7.1E-11	5.6E-11

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	6.6E-11	4.4E-11	4.0E-11	9.8E-12	5.3E-12	4.4E-12
NNW	1.3E-10	8.9E-11	8.1E-11	2.0E-11	1.1E-11	9.0E-12
NW	2.1E-10	1.4E-10	1.3E-10	3.3E-11	1.8E-11	1.5E-11
WNW	1.5E-10	1.1E-10	9.7E-11	2.5E-11	1.4E-11	1.1E-11
W	7.6E-11	5.1E-11	4.7E-11	1.2E-11	6.6E-12	5.4E-12
WSW	5.9E-11	4.0E-11	3.7E-11	9.3E-12	5.0E-12	4.2E-12
SW	5.8E-11	3.9E-11	3.6E-11	8.9E-12	4.7E-12	3.9E-12
SSW	5.7E-11	3.8E-11	3.5E-11	8.6E-12	4.6E-12	3.8E-12
S	2.8E-11	1.9E-11	1.7E-11	4.2E-12	2.4E-12	2.0E-12
SSE	2.5E-11	1.7E-11	1.5E-11	3.8E-12	2.1E-12	1.8E-12
SSE	2.4E-11	1.6E-11	1.5E-11	3.7E-12	2.0E-12	1.7E-12
ESE	2.2E-11	1.5E-11	1.3E-11	3.4E-12	1.9E-12	1.6E-12
E	2.7E-11	1.8E-11	1.6E-11	4.3E-12	2.4E-12	2.0E-12
ENE	3.0E-11	2.0E-11	1.8E-11	4.5E-12	2.6E-12	2.1E-12
NE	2.9E-11	1.9E-11	1.8E-11	4.4E-12	2.5E-12	2.1E-12
NNE	3.9E-11	2.6E-11	2.4E-11	6.0E-12	3.3E-12	2.8E-12

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Mon Mar 07 14:11:58 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP,MEOSI, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_m.
Dataset Date: Mar 7, 2016 02:11 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	2.048	3.026	3.424	3.373	2.668	2.867	0.000	0.067
NNW	2.072	2.883	3.259	3.929	3.522	3.268	0.000	0.118
NW	2.161	2.806	3.080	4.405	3.903	3.301	0.000	0.170
WNW	1.685	3.098	2.796	3.778	4.040	3.392	0.000	0.116
W	1.565	2.149	2.644	4.211	4.240	3.243	0.000	0.068
WSW	1.635	2.175	2.915	4.407	4.290	3.539	0.000	0.052
SW	1.847	2.105	2.450	4.603	3.528	3.416	0.000	0.049
SSW	1.877	2.839	3.170	3.769	3.185	3.351	0.000	0.048
S	1.980	3.598	4.455	2.865	2.452	2.815	0.000	0.042
SSE	1.953	2.843	3.489	4.018	3.172	3.668	0.000	0.031
SE	1.847	2.783	3.194	3.248	2.908	3.286	0.000	0.028
ESE	1.712	1.991	2.837	3.555	2.950	3.239	0.000	0.028
E	1.784	2.837	3.570	5.690	4.168	3.239	0.000	0.038
ENE	1.939	2.974	3.796	4.942	3.417	0.000	0.000	0.050
NE	1.858	2.947	3.812	3.794	3.153	0.772	0.000	0.045
NNE	1.941	2.777	3.198	3.635	2.900	2.877	0.000	0.050

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	3.025	3.903	4.534	4.555	3.222	3.296	0.000
NNW	3.051	3.937	4.493	5.054	4.221	3.574	0.000
NW	3.176	4.023	4.409	5.650	4.602	3.600	0.000
WNW	2.707	4.039	4.200	4.926	4.646	3.759	0.000
W	2.512	3.359	4.100	5.634	5.130	3.728	0.000
WSW	2.578	3.449	4.523	6.229	5.446	3.767	0.000
SW	2.921	3.429	3.829	6.267	4.718	3.791	0.000
SSW	2.928	4.176	5.098	5.361	3.982	3.761	0.000
S	3.079	5.906	5.941	3.928	3.317	3.535	0.000
SSE	2.958	4.203	5.112	5.220	3.880	3.941	0.000

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
SE	2.764	3.577	4.320	4.523	3.360	3.522	0.000
ESE	2.534	2.968	3.794	4.977	4.206	3.472	0.000
E	2.569	4.084	5.642	7.743	5.415	3.472	0.000
ENE	2.894	4.048	5.196	6.242	4.349	0.000	0.000
NE	2.761	4.167	5.086	5.187	3.635	0.772	0.000
NNE	2.870	3.611	4.219	4.742	3.485	3.035	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.1799	0.1129	0.2230	0.3161	0.1543	0.0138	0.0000
NNW	0.1070	0.0684	0.1329	0.4114	0.2502	0.0302	0.0000
NW	0.0656	0.0372	0.0828	0.4279	0.3390	0.0475	0.0000
WNW	0.0822	0.0441	0.0796	0.3185	0.4220	0.0535	0.0000
W	0.1121	0.0466	0.0878	0.4137	0.3102	0.0296	0.0000
WSW	0.1171	0.0460	0.0880	0.4220	0.2625	0.0644	0.0000
SW	0.1260	0.0516	0.0861	0.4531	0.2083	0.0750	0.0000
SSW	0.1445	0.0656	0.1526	0.3869	0.1842	0.0662	0.0000
S	0.1847	0.1458	0.3966	0.2233	0.0393	0.0103	0.0000
SSE	0.2057	0.1088	0.2608	0.2983	0.1011	0.0253	0.0000
SE	0.2559	0.1200	0.2334	0.2675	0.1032	0.0200	0.0000
ESE	0.3091	0.1190	0.2073	0.2845	0.0779	0.0021	0.0000
E	0.1955	0.1012	0.1785	0.3759	0.1473	0.0016	0.0000
ENE	0.2023	0.1226	0.2325	0.3963	0.0463	0.0000	0.0000
NE	0.2566	0.1563	0.2707	0.2645	0.0513	0.0007	0.0000
NNE	0.2496	0.1462	0.2379	0.2669	0.0925	0.0070	0.0000
TOTAL	0.1438	0.0789	0.1556	0.3636	0.2249	0.0332	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 24.2 degrees C
297.37 K
Precipitation: 53.2 cm/y
Humidity: 8.0 g/cu m
Lid Height: 1000.0 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 4.592 m/s

Vertical Temperature Gradients:
STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Mon Mar 07 14:11:58 2016

Facility: Waste Isolation Pilot Plant
Address: 34 Louis Whitlock Road
City: Carlsbad
State: NM Zip: 88221

Source Category: Stack
Source Type: Stack
Emission Year: 2014

Comments: CY 2014 emiss Ind NESHAP,MEOSI, mod.resid.dist.
Includes release of 02/14/14, V4 run Mar 2016

Dataset Name: B_Ind14r_m.
Dataset Date: Mar 7, 2016 02:11 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_14A.WND

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.911E-06	2.494E-06	2.178E-06	1.897E-06	1.639E-06	1.446E-06	1.137E-06
NNW	7.068E-06	4.615E-06	4.047E-06	3.540E-06	3.070E-06	2.715E-06	2.145E-06
NW	9.850E-06	6.598E-06	5.822E-06	5.121E-06	4.466E-06	3.967E-06	3.158E-06
WNW	6.964E-06	4.754E-06	4.209E-06	3.713E-06	3.246E-06	2.888E-06	2.304E-06
W	4.212E-06	2.700E-06	2.358E-06	2.054E-06	1.775E-06	1.566E-06	1.232E-06
WSW	3.065E-06	1.956E-06	1.712E-06	1.497E-06	1.299E-06	1.150E-06	9.120E-07
SW	2.870E-06	1.852E-06	1.627E-06	1.427E-06	1.243E-06	1.104E-06	8.799E-07
SSW	2.889E-06	1.870E-06	1.643E-06	1.442E-06	1.256E-06	1.115E-06	8.879E-07
S	2.195E-06	1.298E-06	1.115E-06	9.575E-07	8.164E-07	7.129E-07	5.516E-07
SSE	1.706E-06	1.029E-06	8.882E-07	7.663E-07	6.564E-07	5.753E-07	4.479E-07
SE	1.614E-06	9.821E-07	8.493E-07	7.338E-07	6.295E-07	5.522E-07	4.306E-07
ESE	1.775E-06	1.038E-06	8.878E-07	7.588E-07	6.437E-07	5.597E-07	4.297E-07
E	2.024E-06	1.190E-06	1.019E-06	8.717E-07	7.404E-07	6.444E-07	4.955E-07
ENE	2.591E-06	1.492E-06	1.272E-06	1.084E-06	9.170E-07	7.960E-07	6.095E-07
NE	2.463E-06	1.418E-06	1.208E-06	1.030E-06	8.717E-07	7.566E-07	5.792E-07
NNE	2.859E-06	1.710E-06	1.471E-06	1.265E-06	1.079E-06	9.429E-07	7.298E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	1.056E-06	9.034E-07	6.038E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.996E-06	1.712E-06	1.212E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.944E-06	2.536E-06	1.888E-07	1.810E-07	1.736E-07	1.070E-07	8.468E-08
WNW	2.149E-06	1.852E-06	1.388E-07	1.330E-07	1.277E-07	7.893E-08	6.254E-08
W	1.145E-06	9.800E-07	6.892E-08	6.605E-08	6.337E-08	3.901E-08	3.090E-08
WSW	8.494E-07	7.306E-07	5.318E-08	5.098E-08	4.893E-08	3.020E-08	2.395E-08
SW	8.205E-07	7.076E-07	5.206E-08	4.990E-08	4.788E-08	2.951E-08	2.339E-08
SSW	8.279E-07	7.135E-07	5.168E-08	4.952E-08	4.751E-08	2.919E-08	2.310E-08
S	5.103E-07	4.332E-07	2.608E-08	2.494E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.150E-07	3.535E-07	2.252E-08	2.155E-08	2.065E-08	1.257E-08	9.955E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.991E-07	3.402E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.966E-07	3.352E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.576E-07	3.871E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.622E-07	4.747E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.342E-07	4.508E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.751E-07	5.731E-07	3.494E-08	3.344E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.587E-08	1.063E-08	9.741E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.533E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.933E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.907E-06	2.492E-06	2.176E-06	1.896E-06	1.638E-06	1.445E-06	1.136E-06
NNW	7.059E-06	4.611E-06	4.044E-06	3.537E-06	3.067E-06	2.713E-06	2.144E-06
NW	9.835E-06	6.591E-06	5.816E-06	5.116E-06	4.462E-06	3.964E-06	3.156E-06
WNW	6.953E-06	4.749E-06	4.205E-06	3.710E-06	3.243E-06	2.886E-06	2.302E-06
W	4.207E-06	2.698E-06	2.356E-06	2.053E-06	1.774E-06	1.565E-06	1.231E-06
WSW	3.061E-06	1.954E-06	1.710E-06	1.495E-06	1.298E-06	1.150E-06	9.114E-07
SW	2.866E-06	1.850E-06	1.625E-06	1.426E-06	1.242E-06	1.104E-06	8.793E-07
SSW	2.886E-06	1.868E-06	1.642E-06	1.441E-06	1.255E-06	1.115E-06	8.874E-07
S	2.193E-06	1.298E-06	1.114E-06	9.570E-07	8.160E-07	7.126E-07	5.514E-07
SSE	1.705E-06	1.028E-06	8.876E-07	7.658E-07	6.561E-07	5.750E-07	4.477E-07
SE	1.612E-06	9.814E-07	8.487E-07	7.334E-07	6.291E-07	5.519E-07	4.304E-07
ESE	1.773E-06	1.038E-06	8.873E-07	7.584E-07	6.434E-07	5.595E-07	4.296E-07
E	2.022E-06	1.189E-06	1.018E-06	8.713E-07	7.400E-07	6.441E-07	4.954E-07
ENE	2.589E-06	1.491E-06	1.271E-06	1.083E-06	9.167E-07	7.957E-07	6.093E-07
NE	2.461E-06	1.417E-06	1.208E-06	1.030E-06	8.714E-07	7.563E-07	5.791E-07
NNE	2.856E-06	1.709E-06	1.470E-06	1.264E-06	1.079E-06	9.424E-07	7.295E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.055E-06	9.030E-07	6.037E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.994E-06	1.711E-06	1.211E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.942E-06	2.535E-06	1.888E-07	1.809E-07	1.736E-07	1.070E-07	8.467E-08
WNW	2.147E-06	1.851E-06	1.387E-07	1.330E-07	1.277E-07	7.893E-08	6.253E-08
W	1.144E-06	9.795E-07	6.891E-08	6.604E-08	6.336E-08	3.901E-08	3.090E-08
WSW	8.489E-07	7.302E-07	5.318E-08	5.098E-08	4.892E-08	3.020E-08	2.395E-08
SW	8.200E-07	7.072E-07	5.205E-08	4.989E-08	4.788E-08	2.951E-08	2.338E-08
SSW	8.274E-07	7.132E-07	5.167E-08	4.952E-08	4.750E-08	2.919E-08	2.310E-08
S	5.101E-07	4.331E-07	2.608E-08	2.493E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.149E-07	3.533E-07	2.251E-08	2.155E-08	2.065E-08	1.257E-08	9.954E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.990E-07	3.400E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.965E-07	3.351E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.575E-07	3.870E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.621E-07	4.746E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.341E-07	4.507E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.749E-07	5.729E-07	3.494E-08	3.343E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.586E-08	1.063E-08	9.740E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.532E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.932E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.911E-06	2.494E-06	2.178E-06	1.897E-06	1.639E-06	1.446E-06	1.137E-06
NNW	7.068E-06	4.615E-06	4.047E-06	3.540E-06	3.070E-06	2.715E-06	2.145E-06
NW	9.849E-06	6.598E-06	5.822E-06	5.121E-06	4.466E-06	3.967E-06	3.158E-06
WNW	6.963E-06	4.754E-06	4.209E-06	3.713E-06	3.246E-06	2.888E-06	2.304E-06
W	4.212E-06	2.700E-06	2.358E-06	2.054E-06	1.775E-06	1.566E-06	1.232E-06
WSW	3.065E-06	1.956E-06	1.712E-06	1.497E-06	1.299E-06	1.150E-06	9.120E-07
SW	2.870E-06	1.852E-06	1.627E-06	1.427E-06	1.243E-06	1.104E-06	8.798E-07
SSW	2.889E-06	1.870E-06	1.643E-06	1.442E-06	1.256E-06	1.115E-06	8.879E-07
S	2.195E-06	1.298E-06	1.115E-06	9.575E-07	8.164E-07	7.129E-07	5.516E-07
SSE	1.706E-06	1.029E-06	8.881E-07	7.663E-07	6.564E-07	5.753E-07	4.479E-07
SE	1.614E-06	9.821E-07	8.493E-07	7.338E-07	6.294E-07	5.522E-07	4.305E-07
ESE	1.775E-06	1.038E-06	8.878E-07	7.587E-07	6.437E-07	5.597E-07	4.297E-07
E	2.024E-06	1.190E-06	1.019E-06	8.717E-07	7.404E-07	6.443E-07	4.955E-07
ENE	2.591E-06	1.492E-06	1.271E-06	1.084E-06	9.170E-07	7.959E-07	6.095E-07
NE	2.462E-06	1.418E-06	1.208E-06	1.030E-06	8.717E-07	7.566E-07	5.792E-07
NNE	2.859E-06	1.710E-06	1.471E-06	1.265E-06	1.079E-06	9.428E-07	7.298E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.056E-06	9.034E-07	6.038E-08	5.780E-08	5.540E-08	3.372E-08	2.665E-08
NNW	1.995E-06	1.712E-06	1.212E-07	1.161E-07	1.113E-07	6.822E-08	5.393E-08
NW	2.944E-06	2.536E-06	1.888E-07	1.810E-07	1.736E-07	1.070E-07	8.468E-08
WNW	2.149E-06	1.852E-06	1.388E-07	1.330E-07	1.277E-07	7.893E-08	6.254E-08
W	1.145E-06	9.800E-07	6.892E-08	6.605E-08	6.337E-08	3.901E-08	3.090E-08
WSW	8.494E-07	7.306E-07	5.318E-08	5.098E-08	4.893E-08	3.020E-08	2.395E-08
SW	8.205E-07	7.076E-07	5.206E-08	4.990E-08	4.788E-08	2.951E-08	2.339E-08
SSW	8.279E-07	7.135E-07	5.168E-08	4.952E-08	4.751E-08	2.919E-08	2.310E-08
S	5.103E-07	4.332E-07	2.608E-08	2.493E-08	2.387E-08	1.433E-08	1.131E-08
SSE	4.150E-07	3.535E-07	2.252E-08	2.155E-08	2.065E-08	1.257E-08	9.955E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.991E-07	3.402E-07	2.161E-08	2.069E-08	1.983E-08	1.209E-08	9.589E-09
ESE	3.966E-07	3.352E-07	1.947E-08	1.864E-08	1.786E-08	1.087E-08	8.655E-09
E	4.576E-07	3.871E-07	2.381E-08	2.280E-08	2.186E-08	1.337E-08	1.063E-08
ENE	5.622E-07	4.747E-07	2.770E-08	2.649E-08	2.537E-08	1.534E-08	1.216E-08
NE	5.342E-07	4.508E-07	2.584E-08	2.472E-08	2.368E-08	1.435E-08	1.142E-08
NNE	6.751E-07	5.731E-07	3.494E-08	3.344E-08	3.203E-08	1.944E-08	1.544E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.821E-08	1.211E-08	1.107E-08	2.668E-09	1.426E-09	1.172E-09
NNW	3.700E-08	2.475E-08	2.267E-08	5.558E-09	2.989E-09	2.465E-09
NW	5.841E-08	3.942E-08	3.618E-08	9.071E-09	4.882E-09	4.038E-09
WNW	4.336E-08	2.949E-08	2.711E-08	6.949E-09	3.764E-09	3.119E-09
W	2.129E-08	1.432E-08	1.313E-08	3.293E-09	1.800E-09	1.491E-09
WSW	1.653E-08	1.114E-08	1.022E-08	2.565E-09	1.385E-09	1.148E-09
SW	1.611E-08	1.084E-08	9.943E-09	2.456E-09	1.300E-09	1.072E-09
SSW	1.587E-08	1.063E-08	9.741E-09	2.380E-09	1.256E-09	1.035E-09
S	7.647E-09	5.003E-09	4.562E-09	1.105E-09	6.221E-10	5.199E-10
SSE	6.812E-09	4.533E-09	4.148E-09	1.029E-09	5.668E-10	4.700E-10
SE	6.567E-09	4.368E-09	3.997E-09	9.819E-10	5.364E-10	4.433E-10
ESE	5.933E-09	3.935E-09	3.599E-09	8.885E-10	4.966E-10	4.109E-10
E	7.312E-09	4.889E-09	4.481E-09	1.142E-09	6.492E-10	5.414E-10
ENE	8.249E-09	5.392E-09	4.918E-09	1.183E-09	6.700E-10	5.566E-10
NE	7.802E-09	5.147E-09	4.703E-09	1.162E-09	6.590E-10	5.481E-10
NNE	1.057E-08	7.021E-09	6.423E-09	1.589E-09	8.812E-10	7.298E-10

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.060E-06	2.067E-06	1.835E-06	1.623E-06	1.424E-06	1.272E-06	1.021E-06
NNW	5.255E-06	3.728E-06	3.337E-06	2.974E-06	2.626E-06	2.355E-06	1.905E-06
NW	7.077E-06	5.208E-06	4.699E-06	4.218E-06	3.749E-06	3.381E-06	2.759E-06
WNW	4.910E-06	3.696E-06	3.352E-06	3.021E-06	2.696E-06	2.438E-06	1.998E-06
W	3.156E-06	2.202E-06	1.962E-06	1.741E-06	1.531E-06	1.368E-06	1.101E-06
WSW	2.336E-06	1.604E-06	1.426E-06	1.265E-06	1.113E-06	9.961E-07	8.047E-07
SW	2.191E-06	1.511E-06	1.347E-06	1.198E-06	1.057E-06	9.485E-07	7.700E-07
SSW	2.220E-06	1.528E-06	1.362E-06	1.212E-06	1.069E-06	9.597E-07	7.789E-07
S	1.832E-06	1.139E-06	9.903E-07	8.598E-07	7.409E-07	6.523E-07	5.119E-07
SSE	1.401E-06	8.876E-07	7.755E-07	6.767E-07	5.860E-07	5.182E-07	4.096E-07
SE	1.320E-06	8.435E-07	7.387E-07	6.459E-07	5.604E-07	4.962E-07	3.931E-07
ESE	1.484E-06	9.167E-07	7.943E-07	6.872E-07	5.898E-07	5.175E-07	4.033E-07
E	1.667E-06	1.039E-06	9.026E-07	7.827E-07	6.733E-07	5.918E-07	4.626E-07
ENE	2.187E-06	1.331E-06	1.150E-06	9.914E-07	8.483E-07	7.426E-07	5.765E-07
NE	2.098E-06	1.268E-06	1.094E-06	9.424E-07	8.060E-07	7.053E-07	5.473E-07
NNE	2.363E-06	1.486E-06	1.296E-06	1.128E-06	9.737E-07	8.586E-07	6.752E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	9.542E-07	8.260E-07	5.956E-08	5.704E-08	5.469E-08	3.344E-08	2.647E-08
NNW	1.783E-06	1.550E-06	1.192E-07	1.143E-07	1.096E-07	6.751E-08	5.347E-08
NW	2.590E-06	2.262E-06	1.851E-07	1.775E-07	1.704E-07	1.056E-07	8.377E-08
WNW	1.877E-06	1.643E-06	1.360E-07	1.304E-07	1.253E-07	7.788E-08	6.184E-08
W	1.029E-06	8.917E-07	6.787E-08	6.507E-08	6.245E-08	3.862E-08	3.065E-08
WSW	7.536E-07	6.555E-07	5.208E-08	4.995E-08	4.796E-08	2.978E-08	2.367E-08
SW	7.221E-07	6.299E-07	5.088E-08	4.880E-08	4.686E-08	2.906E-08	2.309E-08
SSW	7.303E-07	6.368E-07	5.057E-08	4.849E-08	4.654E-08	2.877E-08	2.282E-08
S	4.754E-07	4.067E-07	2.583E-08	2.470E-08	2.365E-08	1.425E-08	1.126E-08
SSE	3.813E-07	3.276E-07	2.221E-08	2.127E-08	2.039E-08	1.246E-08	9.883E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.661E-07	3.148E-07	2.133E-08	2.042E-08	1.958E-08	1.199E-08	9.524E-09
ESE	3.737E-07	3.182E-07	1.936E-08	1.853E-08	1.776E-08	1.083E-08	8.635E-09
E	4.291E-07	3.661E-07	2.364E-08	2.264E-08	2.171E-08	1.331E-08	1.059E-08
ENE	5.338E-07	4.538E-07	2.756E-08	2.637E-08	2.526E-08	1.530E-08	1.214E-08
NE	5.066E-07	4.305E-07	2.567E-08	2.456E-08	2.353E-08	1.428E-08	1.138E-08
NNE	6.273E-07	5.370E-07	3.459E-08	3.311E-08	3.173E-08	1.932E-08	1.537E-08

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.812E-08	1.206E-08	1.103E-08	2.666E-09	1.429E-09	1.175E-09
NNW	3.675E-08	2.460E-08	2.254E-08	5.546E-09	2.992E-09	2.468E-09
NW	5.791E-08	3.912E-08	3.591E-08	9.041E-09	4.885E-09	4.041E-09
WNW	4.297E-08	2.926E-08	2.690E-08	6.925E-09	3.765E-09	3.120E-09
W	2.115E-08	1.424E-08	1.306E-08	3.286E-09	1.801E-09	1.492E-09
WSW	1.637E-08	1.105E-08	1.014E-08	2.555E-09	1.386E-09	1.148E-09
SW	1.595E-08	1.074E-08	9.853E-09	2.447E-09	1.301E-09	1.074E-09
SSW	1.571E-08	1.054E-08	9.660E-09	2.372E-09	1.258E-09	1.036E-09
S	7.625E-09	4.992E-09	4.553E-09	1.106E-09	6.236E-10	5.213E-10
SSE	6.774E-09	4.511E-09	4.129E-09	1.027E-09	5.673E-10	4.706E-10
SE	6.534E-09	4.349E-09	3.980E-09	9.808E-10	5.372E-10	4.441E-10
ESE	5.925E-09	3.932E-09	3.597E-09	8.893E-10	4.974E-10	4.117E-10
E	7.294E-09	4.880E-09	4.472E-09	1.141E-09	6.496E-10	5.417E-10
ENE	8.241E-09	5.390E-09	4.916E-09	1.184E-09	6.708E-10	5.573E-10
NE	7.780E-09	5.135E-09	4.693E-09	1.162E-09	6.599E-10	5.490E-10
NNE	1.053E-08	7.001E-09	6.406E-09	1.589E-09	8.825E-10	7.311E-10

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	2.952E-06	2.014E-06	1.792E-06	1.590E-06	1.398E-06	1.251E-06	1.007E-06
NNW	5.008E-06	3.604E-06	3.237E-06	2.895E-06	2.563E-06	2.304E-06	1.871E-06
NW	6.685E-06	5.006E-06	4.535E-06	4.086E-06	3.645E-06	3.295E-06	2.701E-06
WNW	4.633E-06	3.547E-06	3.230E-06	2.923E-06	2.618E-06	2.373E-06	1.954E-06
W	3.003E-06	2.126E-06	1.901E-06	1.693E-06	1.493E-06	1.338E-06	1.080E-06
WSW	2.225E-06	1.548E-06	1.381E-06	1.229E-06	1.084E-06	9.722E-07	7.883E-07
SW	2.091E-06	1.460E-06	1.306E-06	1.164E-06	1.030E-06	9.258E-07	7.541E-07
SSW	2.126E-06	1.480E-06	1.323E-06	1.180E-06	1.044E-06	9.384E-07	7.641E-07
S	1.784E-06	1.119E-06	9.743E-07	8.473E-07	7.313E-07	6.446E-07	5.069E-07
SSE	1.358E-06	8.675E-07	7.596E-07	6.640E-07	5.762E-07	5.101E-07	4.043E-07
SE	1.282E-06	8.258E-07	7.246E-07	6.347E-07	5.517E-07	4.891E-07	3.885E-07
ESE	1.445E-06	8.996E-07	7.811E-07	6.770E-07	5.821E-07	5.114E-07	3.994E-07
E	1.609E-06	1.013E-06	8.825E-07	7.672E-07	6.615E-07	5.825E-07	4.567E-07
ENE	2.123E-06	1.305E-06	1.129E-06	9.760E-07	8.368E-07	7.335E-07	5.709E-07
NE	2.045E-06	1.246E-06	1.077E-06	9.295E-07	7.963E-07	6.977E-07	5.425E-07
NNE	2.298E-06	1.457E-06	1.273E-06	1.110E-06	9.598E-07	8.475E-07	6.680E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
N	9.420E-07	8.167E-07	5.946E-08	5.695E-08	5.461E-08	3.340E-08	2.645E-08
NNW	1.754E-06	1.527E-06	1.189E-07	1.140E-07	1.094E-07	6.741E-08	5.341E-08
NW	2.539E-06	2.223E-06	1.846E-07	1.770E-07	1.700E-07	1.054E-07	8.364E-08
WNW	1.839E-06	1.613E-06	1.356E-07	1.301E-07	1.249E-07	7.773E-08	6.174E-08
W	1.011E-06	8.780E-07	6.771E-08	6.492E-08	6.231E-08	3.856E-08	3.061E-08
WSW	7.390E-07	6.441E-07	5.192E-08	4.980E-08	4.782E-08	2.971E-08	2.363E-08
SW	7.078E-07	6.187E-07	5.072E-08	4.865E-08	4.671E-08	2.899E-08	2.305E-08
SSW	7.171E-07	6.265E-07	5.042E-08	4.835E-08	4.641E-08	2.871E-08	2.279E-08
S	4.710E-07	4.034E-07	2.580E-08	2.467E-08	2.363E-08	1.424E-08	1.125E-08
SSE	3.765E-07	3.239E-07	2.217E-08	2.123E-08	2.035E-08	1.244E-08	9.873E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.620E-07	3.117E-07	2.129E-08	2.039E-08	1.955E-08	1.198E-08	9.516E-09
ESE	3.703E-07	3.157E-07	1.934E-08	1.851E-08	1.774E-08	1.082E-08	8.632E-09
E	4.240E-07	3.623E-07	2.360E-08	2.261E-08	2.168E-08	1.330E-08	1.059E-08
ENE	5.289E-07	4.502E-07	2.754E-08	2.635E-08	2.524E-08	1.529E-08	1.214E-08
NE	5.025E-07	4.275E-07	2.566E-08	2.455E-08	2.352E-08	1.428E-08	1.138E-08
NNE	6.211E-07	5.323E-07	3.455E-08	3.307E-08	3.170E-08	1.931E-08	1.536E-08

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.811E-08	1.205E-08	1.102E-08	2.666E-09	1.430E-09	1.175E-09
NNW	3.672E-08	2.458E-08	2.252E-08	5.544E-09	2.992E-09	2.469E-09
NW	5.783E-08	3.908E-08	3.587E-08	9.036E-09	4.884E-09	4.041E-09
WNW	4.292E-08	2.923E-08	2.687E-08	6.921E-09	3.764E-09	3.120E-09
W	2.113E-08	1.423E-08	1.305E-08	3.285E-09	1.801E-09	1.492E-09
WSW	1.635E-08	1.103E-08	1.013E-08	2.554E-09	1.385E-09	1.148E-09
SW	1.592E-08	1.073E-08	9.841E-09	2.445E-09	1.301E-09	1.074E-09
SSW	1.569E-08	1.053E-08	9.649E-09	2.371E-09	1.258E-09	1.037E-09
S	7.622E-09	4.991E-09	4.552E-09	1.106E-09	6.238E-10	5.215E-10
SSE	6.769E-09	4.507E-09	4.126E-09	1.027E-09	5.674E-10	4.707E-10
SE	6.530E-09	4.347E-09	3.978E-09	9.807E-10	5.373E-10	4.442E-10
ESE	5.924E-09	3.931E-09	3.596E-09	8.894E-10	4.975E-10	4.118E-10
E	7.291E-09	4.878E-09	4.471E-09	1.141E-09	6.496E-10	5.418E-10
ENE	8.239E-09	5.389E-09	4.916E-09	1.184E-09	6.710E-10	5.574E-10
NE	7.780E-09	5.136E-09	4.693E-09	1.162E-09	6.600E-10	5.490E-10
NNE	1.053E-08	6.999E-09	6.404E-09	1.589E-09	8.827E-10	7.313E-10

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.499E-06	2.287E-06	2.012E-06	1.765E-06	1.535E-06	1.362E-06	1.081E-06
NNW	6.185E-06	4.182E-06	3.701E-06	3.264E-06	2.853E-06	2.540E-06	2.028E-06
NW	8.497E-06	5.919E-06	5.273E-06	4.679E-06	4.115E-06	3.681E-06	2.963E-06
WNW	5.965E-06	4.238E-06	3.791E-06	3.376E-06	2.977E-06	2.668E-06	2.155E-06
W	3.696E-06	2.456E-06	2.164E-06	1.901E-06	1.655E-06	1.469E-06	1.167E-06
WSW	2.707E-06	1.783E-06	1.572E-06	1.383E-06	1.208E-06	1.075E-06	8.594E-07
SW	2.538E-06	1.685E-06	1.490E-06	1.315E-06	1.152E-06	1.028E-06	8.262E-07
SSW	2.563E-06	1.703E-06	1.506E-06	1.330E-06	1.165E-06	1.040E-06	8.349E-07
S	2.018E-06	1.221E-06	1.055E-06	9.101E-07	7.798E-07	6.835E-07	5.324E-07
SSE	1.557E-06	9.599E-07	8.332E-07	7.226E-07	6.221E-07	5.474E-07	4.292E-07
SE	1.471E-06	9.149E-07	7.956E-07	6.912E-07	5.960E-07	5.251E-07	4.124E-07
ESE	1.633E-06	9.790E-07	8.422E-07	7.238E-07	6.174E-07	5.391E-07	4.168E-07
E	1.848E-06	1.115E-06	9.614E-07	8.277E-07	7.072E-07	6.183E-07	4.792E-07
ENE	2.393E-06	1.413E-06	1.211E-06	1.038E-06	8.831E-07	7.696E-07	5.932E-07
NE	2.284E-06	1.344E-06	1.152E-06	9.872E-07	8.396E-07	7.315E-07	5.636E-07
NNE	2.618E-06	1.601E-06	1.386E-06	1.198E-06	1.028E-06	9.019E-07	7.033E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	1.007E-06	8.660E-07	5.998E-08	5.743E-08	5.506E-08	3.358E-08	2.657E-08
NNW	1.892E-06	1.633E-06	1.202E-07	1.152E-07	1.105E-07	6.787E-08	5.371E-08
NW	2.771E-06	2.402E-06	1.870E-07	1.793E-07	1.721E-07	1.063E-07	8.423E-08
WNW	2.016E-06	1.750E-06	1.374E-07	1.318E-07	1.265E-07	7.842E-08	6.220E-08
W	1.088E-06	9.366E-07	6.840E-08	6.557E-08	6.292E-08	3.882E-08	3.077E-08
WSW	8.024E-07	6.938E-07	5.264E-08	5.048E-08	4.846E-08	3.000E-08	2.381E-08
SW	7.724E-07	6.696E-07	5.149E-08	4.936E-08	4.738E-08	2.929E-08	2.324E-08
SSW	7.804E-07	6.762E-07	5.114E-08	4.902E-08	4.704E-08	2.898E-08	2.296E-08
S	4.934E-07	4.204E-07	2.596E-08	2.482E-08	2.376E-08	1.429E-08	1.129E-08
SSE	3.986E-07	3.408E-07	2.237E-08	2.141E-08	2.052E-08	1.251E-08	9.920E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.831E-07	3.279E-07	2.147E-08	2.056E-08	1.971E-08	1.204E-08	9.558E-09
ESE	3.854E-07	3.269E-07	1.942E-08	1.858E-08	1.781E-08	1.085E-08	8.645E-09
E	4.435E-07	3.767E-07	2.373E-08	2.272E-08	2.178E-08	1.334E-08	1.061E-08
ENE	5.482E-07	4.643E-07	2.763E-08	2.643E-08	2.531E-08	1.532E-08	1.215E-08
NE	5.207E-07	4.409E-07	2.576E-08	2.465E-08	2.361E-08	1.432E-08	1.140E-08
NNE	6.519E-07	5.556E-07	3.477E-08	3.328E-08	3.189E-08	1.938E-08	1.540E-08

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.817E-08	1.208E-08	1.105E-08	2.667E-09	1.428E-09	1.174E-09
NNW	3.688E-08	2.468E-08	2.261E-08	5.552E-09	2.991E-09	2.467E-09
NW	5.816E-08	3.928E-08	3.605E-08	9.056E-09	4.883E-09	4.039E-09
WNW	4.317E-08	2.938E-08	2.701E-08	6.938E-09	3.764E-09	3.120E-09
W	2.122E-08	1.428E-08	1.310E-08	3.290E-09	1.800E-09	1.491E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.560E-09	1.385E-09	1.148E-09
SW	1.603E-08	1.079E-08	9.899E-09	2.452E-09	1.301E-09	1.073E-09
SSW	1.579E-08	1.059E-08	9.701E-09	2.376E-09	1.257E-09	1.035E-09
S	7.637E-09	4.998E-09	4.558E-09	1.106E-09	6.228E-10	5.206E-10
SSE	6.794E-09	4.522E-09	4.139E-09	1.028E-09	5.671E-10	4.703E-10
SE	6.551E-09	4.359E-09	3.989E-09	9.814E-10	5.368E-10	4.437E-10
ESE	5.929E-09	3.933E-09	3.598E-09	8.889E-10	4.970E-10	4.113E-10
E	7.303E-09	4.885E-09	4.476E-09	1.141E-09	6.494E-10	5.415E-10
ENE	8.245E-09	5.391E-09	4.917E-09	1.184E-09	6.704E-10	5.569E-10
NE	7.792E-09	5.142E-09	4.698E-09	1.162E-09	6.595E-10	5.485E-10
NNE	1.055E-08	7.011E-09	6.415E-09	1.589E-09	8.818E-10	7.305E-10

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.143E-06	2.109E-06	1.869E-06	1.651E-06	1.446E-06	1.289E-06	1.033E-06
NNW	5.425E-06	3.810E-06	3.402E-06	3.026E-06	2.667E-06	2.388E-06	1.927E-06
NW	7.331E-06	5.333E-06	4.800E-06	4.299E-06	3.813E-06	3.433E-06	2.795E-06
WNW	5.104E-06	3.794E-06	3.430E-06	3.084E-06	2.746E-06	2.479E-06	2.026E-06
W	3.251E-06	2.245E-06	1.996E-06	1.768E-06	1.552E-06	1.385E-06	1.112E-06
WSW	2.399E-06	1.633E-06	1.450E-06	1.285E-06	1.129E-06	1.009E-06	8.140E-07
SW	2.251E-06	1.541E-06	1.372E-06	1.218E-06	1.074E-06	9.625E-07	7.799E-07
SSW	2.282E-06	1.559E-06	1.388E-06	1.233E-06	1.087E-06	9.743E-07	7.892E-07
S	1.867E-06	1.155E-06	1.002E-06	8.693E-07	7.483E-07	6.583E-07	5.158E-07
SSE	1.429E-06	9.005E-07	7.858E-07	6.849E-07	5.925E-07	5.234E-07	4.132E-07
SE	1.348E-06	8.570E-07	7.495E-07	6.545E-07	5.672E-07	5.017E-07	3.968E-07
ESE	1.512E-06	9.279E-07	8.029E-07	6.937E-07	5.947E-07	5.213E-07	4.056E-07
E	1.696E-06	1.051E-06	9.116E-07	7.896E-07	6.785E-07	5.958E-07	4.651E-07
ENE	2.221E-06	1.345E-06	1.159E-06	9.988E-07	8.538E-07	7.468E-07	5.791E-07
NE	2.131E-06	1.281E-06	1.104E-06	9.502E-07	8.118E-07	7.098E-07	5.501E-07
NNE	2.411E-06	1.508E-06	1.312E-06	1.141E-06	9.838E-07	8.667E-07	6.804E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8800
N	9.645E-07	8.338E-07	5.964E-08	5.712E-08	5.477E-08	3.346E-08	2.649E-08
NNW	1.803E-06	1.565E-06	1.194E-07	1.144E-07	1.098E-07	6.758E-08	5.352E-08
NW	2.622E-06	2.287E-06	1.855E-07	1.778E-07	1.707E-07	1.058E-07	8.385E-08
WNW	1.902E-06	1.662E-06	1.362E-07	1.307E-07	1.255E-07	7.797E-08	6.191E-08
W	1.039E-06	8.992E-07	6.796E-08	6.515E-08	6.253E-08	3.865E-08	3.067E-08
WSW	7.619E-07	6.620E-07	5.218E-08	5.004E-08	4.805E-08	2.982E-08	2.369E-08
SW	7.309E-07	6.369E-07	5.099E-08	4.890E-08	4.695E-08	2.910E-08	2.312E-08
SSW	7.395E-07	6.441E-07	5.068E-08	4.859E-08	4.663E-08	2.881E-08	2.285E-08
S	4.788E-07	4.093E-07	2.586E-08	2.473E-08	2.368E-08	1.426E-08	1.127E-08
SSE	3.844E-07	3.299E-07	2.224E-08	2.129E-08	2.041E-08	1.247E-08	9.890E-09

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8800
SE	3.694E-07	3.173E-07	2.135E-08	2.045E-08	1.961E-08	1.200E-08	9.531E-09
ESE	3.757E-07	3.197E-07	1.937E-08	1.854E-08	1.777E-08	1.083E-08	8.637E-09
E	4.312E-07	3.676E-07	2.365E-08	2.265E-08	2.172E-08	1.332E-08	1.060E-08
ENE	5.360E-07	4.554E-07	2.757E-08	2.638E-08	2.527E-08	1.530E-08	1.214E-08
NE	5.090E-07	4.323E-07	2.569E-08	2.458E-08	2.355E-08	1.429E-08	1.139E-08
NNE	6.319E-07	5.405E-07	3.463E-08	3.314E-08	3.176E-08	1.933E-08	1.537E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.813E-08	1.206E-08	1.103E-08	2.666E-09	1.429E-09	1.175E-09
NNW	3.677E-08	2.462E-08	2.255E-08	5.547E-09	2.992E-09	2.468E-09
NW	5.795E-08	3.915E-08	3.594E-08	9.044E-09	4.884E-09	4.040E-09
WNW	4.301E-08	2.928E-08	2.692E-08	6.927E-09	3.765E-09	3.120E-09
W	2.116E-08	1.425E-08	1.307E-08	3.286E-09	1.801E-09	1.492E-09
WSW	1.638E-08	1.105E-08	1.015E-08	2.556E-09	1.385E-09	1.148E-09
SW	1.596E-08	1.075E-08	9.862E-09	2.447E-09	1.301E-09	1.074E-09
SSW	1.573E-08	1.055E-08	9.667E-09	2.373E-09	1.258E-09	1.036E-09
S	7.627E-09	4.993E-09	4.554E-09	1.106E-09	6.235E-10	5.212E-10
SSE	6.778E-09	4.513E-09	4.130E-09	1.028E-09	5.673E-10	4.706E-10
SE	6.537E-09	4.351E-09	3.982E-09	9.810E-10	5.371E-10	4.440E-10
ESE	5.925E-09	3.932E-09	3.597E-09	8.892E-10	4.974E-10	4.116E-10
E	7.296E-09	4.880E-09	4.473E-09	1.141E-09	6.495E-10	5.417E-10
ENE	8.242E-09	5.390E-09	4.916E-09	1.184E-09	6.708E-10	5.573E-10
NE	7.783E-09	5.137E-09	4.694E-09	1.162E-09	6.599E-10	5.489E-10
NNE	1.054E-08	7.004E-09	6.408E-09	1.589E-09	8.824E-10	7.310E-10

Annual Periodic Confirmatory Measurement Compliance Report for the U.S. Department of Energy Waste Isolation Pilot Plant - Emended

For Calendar Year 2015

As Required By 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage"

CY 2015 ANNUAL PERIODIC CONFIRMATORY MEASUREMENT COMPLIANCE REPORT SUMMARY

REPORT SUMMARY

This report satisfies the reporting requirements established by 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage." Emission monitoring and compliance procedures for DOE facilities require the use of CAP88-PC (Clean Air Act Assessment Package-1988) or AIRDOS-PC computer models, or other approved procedures, to calculate effective dose equivalents (EDEs) to members of the public.

The CAP88-PC computer model is a set of computer programs, databases and associated utility programs for estimation of dose and risk from radionuclide emissions to air (Trinity 2013). CAP88-PC dose assessment computer model was used to estimate the dose(s) reported in this report. Copies of the output data from CAP88-PC are attached.

Year of Reporting Period: CY 2015

Compliance:

Calculations made using the above referenced code indicate that the EDE to an individual member of the public resulting from normal operations conducted at this facility is about $4.12x10^{-04}$ millirem/year whole body dose, and $1.38x10^{-02}$ mrem/year to the critical organ of a maximally exposed individual spending the entire period at the Exclusive Use Area fence line point having the maximum calculated airborne radioactivity concentration. At the residence 8,850 meters west-northwest from the WIPP facility, the EDE value to the maximally exposed off-site individual is $8.81x10^{-06}$ mrem per year whole body and $2.76x10^{-04}$ mrem per year to the critical organ. These values are in compliance with the requirements of 40 CFR 191 Subpart A, which states that management and storage of transuranic radioactive wastes operated by the DOE to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation not exceed 25 mrem to the whole-body and 75 mrem to any critical organ.

1.0 FACILITY NAME AND LOCATION

Facility: Waste Isolation Pilot Plant

Facility Location: 26 Miles (42 km) East of Carlsbad, New Mexico 88220
Lat. 32.372, Long. -103.792

2.0 RADIOACTIVE MATERIALS USED

The waste managed at WIPP contains contact-handled (CH) and remote-handled (RH) transuranic (TRU) radionuclides. The CH-TRU and RH-TRU radionuclides with the highest potential to deliver a dose to an off-site receptor are ^{238}Pu, $^{239/240}$Pu, ^{241}Am, ^{90}Sr, ^{137}Cs, $^{233/234}$U, and ^{238}U. Operations at the WIPP facility do not involve handling any loose radioactive material. All waste containers are sealed at the waste-generating facilities and remain sealed during the disposal operation. Removable contamination on the exterior surfaces of containers is restricted to minimal levels in accordance with DOE/WIPP-02-3122 (DOE 2013a), and should not present a significant source of radionuclide release in airborne effluents. During normal operating conditions, there is essentially no potential for airborne emissions of radionuclides contained in the CH-TRU and RH-TRU waste managed at the WIPP facility.

Since February 2014 accident, there is a potential limited source term, comprised mostly of ^{241}Am and a lesser amount of $^{239/240}$Pu that remains underground as fixed contamination. These radionuclides are likely on the surfaces of the disposal circuit passageways of the underground ventilation paths. Engineered barriers and administrative controls are in place to prevent the resuspension and remobilization of radioactive contamination during recovery and subsequent waste emplacement operations.

Small quantities (i.e., activities) of radioactive materials (mostly sealed sources) are used at the WIPP facility to calibrate and verify the operation of various radiation detection instrumentation. However, this source of radioactive materials does not have the potential to result in measurable off-site dose consequences.

Summary of the Source Term from WIPP Operation

Table A-6. Summary of Radionuclide Effluents from Underground Storage Areas

Station	Radionuclide	Activity Released (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
B	^{238}Pu	1.78E-08	1	M
B	$^{239/240}$Pu	3.50E-07	1	M
B	^{241}Am	3.19E-06	1	M
B	^{90}Sr	2.45E-07	1	M
B	^{137}Cs	4.51E-06	1	F
B	$^{233/234}$U	1.33E-08	1	M
B	^{238}U	8.98E-09	1	M

1 The default particle size in micrometers for inhaled particles.

2 Absorption Type: These are established to describe the absorption type of the materials from the respiratory tract into the blood for inhaled particles. The absorption types are F (fast), M (moderate), S (slow), as defined in ICRP Publication 66 (ICRP 1994), and Federal Guidance Report No. 13 (EPA 1999). Default values are recommended unless specific documented information supports use of another type.

Table A-7. Summary of Radionuclide Effluents from Waste Handling Building

Station	Radionuclide	Activity Released (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
C	^{238}Pu	3.43E-09	1	M
C	$^{239/240}$Pu	4.01E-09	1	M
C	^{241}Am	5.77E-09	1	M
C	^{90}Sr	1.67E-07	1	M
C	^{137}Cs	3.17E-06	1	F
C	$^{233/234}$U	8.26E-09	1	M
C	^{238}U	5.37E-09	1	M

1 The default particle size in micrometers for inhaled particles.

2 Absorption Type: These are established to describe the absorption type of the materials from the respiratory tract into the blood for inhaled particles. The absorption types are F (fast), M (moderate), S (slow), as defined in ICRP Publication 66 (ICRP 1994), and Federal Guidance Report No. 13 (EPA 1999). Default values are recommended unless specific documented information supports use of another type.

3.0 DESCRIPTION OF OPERATIONS

The WIPP facility is a TRU radioactive waste disposal facility owned by the DOE and operated by Nuclear Waste Partnership LLC. The principal operation of the WIPP facility involves the receipt and permanent disposal of contact and remote-handled TRU and TRU mixed waste. Only waste that conforms with DOE/WIPP-02-3122 is accepted for placement in the WIPP

facility. Administrative controls prohibit the waste containers from being opened once they are accepted at WIPP.

4.0 EMISSION POINTS

The WIPP facility has two emission points, Stations B and C, which act as potential release pathways of airborne radionuclides to the environment. During operations in the Filtration mode, Station B exhausts air from the underground repository that has passed through a bank of high-efficiency particulate air (HEPA) filters. Air from the Waste Handling Building (WHB) is exhausted to the atmosphere at Station C after passing through HEPA filters.

5.0 EFFLUENT CONTROLS

Radionuclide emissions from waste containers are controlled by carbon composite filter vents that must be fitted to all waste containers accepted at the WIPP facility. Each filter must exhibit filtering efficiencies of greater than 99.95 percent with 0.3 to 0.5-micron particles of dioctyl phthalate (DOP) smoke (DOE 2003).

Air monitors are maintained at strategic locations in the WHB and in the U/G repository to monitor the real-time levels of airborne radioactivity. Readouts from monitors sampling filtered U/G air are displayed in the Central Monitoring Room (CMR), a continuously occupied location from which WIPP facility operations are monitored. During normal operating conditions, the U/G repository exhaust air passes through HEPA filtration units before being released to the atmosphere through Station B. The WHB exhaust air, which ventilates aboveground waste-handling operations in the WHB, is subject to continuous HEPA filtration before being released to the atmosphere through Station C. Stations B and C HEPA filtration units are polyalphaolefin-tested annually and must exhibit a minimum efficiency of 99.97 percent.

The WHB ventilation system maintains a negative pressure differential between the outside environment and the waste-handling environment. This provides a secondary confinement barrier against the release of radionuclides to the environment, where the waste containers themselves are considered the primary barrier. A negative pressure differential ensures that any leaks in the WHB structure will result in an in-leakage of outside air, which precludes a potential release of airborne contamination inside the WHB to the environment.

The U/G ventilation system is composed of four subsystems with a common air supply. Dividing the air supply inhibits the spread of contamination in the event that radioactive material becomes airborne. Separation of the subsystem air flows is maintained by the use of air locks until the flows are recombined at the exhaust shaft. A pressure differential is maintained between the subsystems to ensure that any air leakage flows from the non-nuclear areas (least contamination potential) to the radioactive materials areas (highest contamination potential).

5.1 Air Sampling and Analysis

The WIPP facility uses skid-mounted FASs at each emission point to collect representative samples of airborne particulates. Each emission point FAS has two independent vacuum pumps: one vacuum pump supplies the vacuum and the other functions as a backup. In the event of an external power failure, an uninterruptible power supply provides sufficient power to run each emission point FAS for approximately 30 minutes. Diesel generators are available to supply electrical power should the electrical outage last longer than 30 minutes.

Approved and controlled operating procedures are used at the WIPP facility to ensure uniform methods are used to collect, package, and transport FAS filters. The use of such procedures provides a means for demonstrating quality assurance of air emission data. Station A FAS filters (non-NESHAP) are collected as needed each working shift in order to assess the U/G effluent air upstream of the ventilation HEPA filters. Station B FAS filters are collected daily and more often as needed to define suspected U/G effluent events. Station C FAS filters are collected weekly, or as needed. Filters from both emission point stations are analyzed for ^{238}Pu, $^{239/240}$Pu, ^{241}Am, ^{90}Sr, ^{137}Cs, $^{233/234}$U, and ^{238}U. These radionuclides comprise about 99 percent of the radioactive content anticipated within the WIPP Waste Inventory (DOE/WIPP-02-3122).

6.0 DISTANCES TO NEAREST RECEPTORS FROM RELEASE POINTS

The WIPP facility is located in a low population density area that has less than 30 permanent residents living within a nominal 10-mile radius (DOE 2013b). The area surrounding the WIPP facility is used primarily for grazing and development of potash, oil, and gas resources. All land within the WIPP site boundary up to the "exclusive use area" is leased for grazing, which is the only significant agricultural activity in the vicinity of the WIPP facility. Development of the natural resources results in a transient (nonpermanent) population consisting primarily of workers at two potash mines, and numerous oil and gas wells located within 10 miles (16.1 km) of the WIPP facility.

Based on the above referenced EPA guidance document, demographic information, and WIPP's meteorological condition, the receptor selected to meet the defined 40 CFR Part 61, Subpart H, description of the nearest permanent residence, school, business or office is the James Ranch located 3.36 miles (5.4 km) from the WIPP site in the SSW sector. The associated Mills Ranch, also in the SSW sector, is 3.42 miles (5.5 km) from the WIPP site.

However, based on the default parameters in the CAP88-PC model for agricultural activities, and the prevailing wind direction, the Smith Ranch was selected as the receptor location for the maximally exposed off-site individual. This receptor is located 5.53 miles (8.9 km) WNW of the facility. This is a more accurate update from the nominal conservative 4.66 miles (7.5 km) distance used while Station A was the primary air effluent point.

The nearest farm producing vegetables is 14.29 miles (23 km) from the WIPP site in the SW sector of the facility; milk produced commercially is 49.71 miles (80.0 km) from the WIPP site in the NW sector; and beef cattle are raised on the WIPP lands outside the WIPP Exclusive Use Area.

In compliance with 40 CFR 191 Subpart A, the location of the nearest Exclusive Use Area Boundary receptor is 0.216 miles (0.347 km) south of the WIPP Facility repository effluent point, but the default prevailing wind direction is to the northwest at the fence line 0.511 (0.822 km) from the designated source stack (Station B). The maximum fence line concentration is at 0.404 miles (0.650 km) WNW.

7.0 INPUT DATA FOR CAP88-PC DOSE ASSESSMENT COMPUTER MODEL

Table A-8. WIPP Source Term, Emission Point, Meteorological, and Population Input Data for CAP88-PC Dose Assessment Computer Model

Radionuclides from Station B	See Table A-6 *Summary of Radionuclide Effluents from Underground Storage Areas*
Radionuclides from Station C	See Table A-7 *Summary of Radionuclide Effluents from the Waste Handling Building*
Emission Point Data	See Table A-9 *Characteristics of WIPP Emission Points*
Meteorological Data File	WIPP_15.wnd (Met data for the WIPP Site CY-2015)
Population Data File (used for WIPP ASER reporting)	WIPP2016.pop (Population data for WIPP region, modified for CAP88-PC Version 4 use) [5]
Annual Precipitation	44.4 cm/yr (CY 2015)
Annual Ambient Temperature	17.26°C (CY 2015)
Lid Height	1,000 m (default)
Agricultural Scenario	Local (default)
Absolute Humidity	8 grams/cubic meter (g/m^3) (default)

Table A-9. Characteristics of WIPP Emission Points

Characteristics	Station B	Station C
Effective Station Height (m)	6.7	20.0
Effective Station Diameter (m)	1.8	2.6
Station Area (m^2)	2.6	6.8
Flow Rate (ft^3/min)	6.0×10^4	4.7×10^4 (top-end) 2.0×10^4 (low-end)
Flow Rate (m^3/min)	1699	1331 (top-end) 566 (low-end)
Exit Velocity (m/sec)	10.8	3.3 (top-end) 1.4 (low-end)
Effective Exit Velocity (m/sec)	10.8	3.3
Orientation	Vertical	Vertical
Shape	Round	Square
HEPA Filtered	Yes	Yes

[5] Due to the constraints of CAP-88, Version 4, distances greater than 80 km are restricted by the program. Distances greater than 80 km were changed to a value less than 80 km, which would make the resulting concentrations at their respective distances more conservative.

8.0 DESCRIPTION OF CONSTRUCTION AND MODIFICATIONS COMPLETED DURING REPORTING PERIOD

Construction to increase the capacity of the Station B HEPA filtration trains was commenced and equipment placement initiated for anticipated operation in CY 2016. The ventilation flow capacity will increase from 60,000 CFM to 114,000 CFM by the addition of two more HEPA filter trains parallel to the existing two HEPA filter trains in continuous use since the CY 2014 radiological event. This ventilation flow increase was calculated to increase the dose to the public by less than 1% of the 10 mrem/yr standard. Upon satisfactory sampler compliance qualification testing, no modification to the sampling equipment or sample filter flow rates is expected. No modifications were undertaken on the C sampling station during this period.

9.0 REFERENCES

40 CFR Part 191, Subpart A. Environmental Standards for Management and Storage.

DOE 2003. *Nuclear Air Cleaning Handbook*, DOE HDBK-1169-2003, November 2003. U. S. Department of Energy, Washington, D.C.

DOE 2013a. Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, DOE/WIPP-02-3122, April 22, 2013. DOE-CBFO, Carlsbad, NM.

DOE 2013b. *Waste Isolation Pilot Plant Land Management Plan*, DOE/WIPP-93-004, Reprint D, January 1, 2013. DOE-CBFO, Carlsbad, NM.

EPA 1999. *Federal Guidance Report No. 13, Cancer Risk Coefficients for Environmental Exposure to Radionuclides,* EPA 402-R-99-001, September 1999. Office of Radiation and Indoor Air, U.S. Environmental Protection Agency, Washington, D.C.

ICRP 1994. Human Respiratory Tract Model for Radiological Protection. ICRP Publication 66. Ann. ICRP 24 (1-3).

Trinity 2013. *CAP88-PC Version 4.0 User Guide*, June 2013. Trinity Engineering Associates, Inc. Cincinnati OH.

10.0 OATH AND SIGNATURE

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment (see 18 U.S.C. 1001).

Signed: _____ Date: _____

Title: _____

CY 2015 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (650 meters WNW)

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Wed Apr 27 12:04:11 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015
DOSE Age Group: Adult

Comments:

Committed Effective Dose Equivalent (mrem)
4.12E-04

At This Location: 652 Meters West Northwest

Dataset Name: B_Ind15f_edp.
Dataset Date: Apr 27, 2016 12:04 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

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Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 652 Meters West Northwest
Lifetime Fatal Cancer Risk: 4.50E-11

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	9.14E-05
UB_Wall	9.50E-05
Bone_Sur	1.38E-02
Brain	8.72E-05
Breasts	9.01E-05
St_Wall	9.18E-05
SI_Wall	9.27E-05
ULI_Wall	9.55E-05
LLI_Wall	1.06E-04
Kidneys	1.38E-04
Liver	1.10E-03
Muscle	9.44E-05
Ovaries	3.28E-04
Pancreas	9.16E-05
R_Marrow	5.69E-04
Skin	2.09E-04
Spleen	9.22E-05
Testes	3.27E-04
Thymus	9.09E-05
Thyroid	9.44E-05
GB_Wall	9.12E-05
Ht_Wall	9.24E-05
Uterus	9.33E-05
ET_Reg	1.29E-04
Lung_66	3.00E-04
Effectiv	4.12E-04

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RADIONUCLIDE EMISSIONS DURING THE YEAR 2015

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	1.8E-08	3.4E-09	2.1E-08
Pu-239	M	1.000	3.5E-07	4.0E-09	3.5E-07
Am-241	M	1.000	3.2E-06	5.8E-09	3.2E-06
Sr-90	M	1.000	2.4E-07	1.7E-07	4.1E-07
Cs-137	F	1.000	4.5E-06	3.2E-06	7.7E-06
U-233	M	1.000	1.3E-08	8.3E-09	2.2E-08
U-238	M	1.000	9.0E-09	5.4E-09	1.4E-08

SITE INFORMATION

Temperature: 17.260 degrees C
Precipitation: 44.400 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 652 meters

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	6.70	20.00
Diameter (m):	1.80	2.60
Plume Rise Momentum (m/s): (Exit Velocity)	10.80	3.30

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

347	490	539	592	652	707	822
860	945	5100	5250	5400	7500	8850
11520	15610	16670	47000	70000	79700	

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Wed Apr 27 12:04:11 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15f_edp.
Dataset Date: Apr 27, 2016 12:04 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Pu-238	M	1.000	4.44E-06	1.80E-03
Pu-239	M	1.000	4.44E-06	1.80E-03
Am-241	M	1.000	4.44E-06	1.80E-03
Sr-90	M	1.000	4.44E-06	1.80E-03
Cs-137	F	1.000	4.44E-06	1.80E-03
U-233	M	1.000	4.44E-06	1.80E-03
U-238	M	1.000	4.44E-06	1.80E-03

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	DECAY CONSTANT (PER DAY) Radio-active	Surface	Water	TRANSFER COEFFICIENT Milk (1)	Meat (2)
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Pu-239	7.87E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Sr-90	6.59E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Cs-137	6.29E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
U-233	1.19E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic meters/yr	5.26E+03
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight)	
(Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass	
when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	1.00E+00
Meat	1.00E+00
Milk	1.00E+00
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA (Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	7.62E+01
Milk ingestion (L/y)	5.30E+01
Meat ingestion (kg/y)	8.40E+01
Leafy vegetable ingestion (kg/y)	7.79E+00
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Wed Apr 27 12:04:11 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015
DOSE Age Group: Adult

Comments:

Dataset Name: B_Ind15f_edp.
Dataset Date: Apr 27, 2016 12:04 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	9.14E-05
UB_Wall	9.50E-05
Bone_Sur	1.38E-02
Brain	8.72E-05
Breasts	9.01E-05
St_Wall	9.18E-05
SI_Wall	9.27E-05
ULI_Wall	9.55E-05
LLI_Wall	1.06E-04
Kidneys	1.38E-04
Liver	1.10E-03
Muscle	9.44E-05
Ovaries	3.28E-04
Pancreas	9.16E-05
R_Marrow	5.69E-04
Skin	2.09E-04
Spleen	9.22E-05
Testes	3.27E-04
Thymus	9.09E-05
Thyroid	9.44E-05
GB_Wall	9.12E-05
Ht_Wall	9.24E-05
Uterus	9.33E-05
ET_Reg	1.29E-04
Lung_66	3.00E-04
Effectiv	4.12E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	4.84E-05
INHALATION	3.27E-04
AIR IMMERSION	1.29E-09
GROUND SURFACE	3.63E-05
INTERNAL	3.75E-04
EXTERNAL	3.63E-05
TOTAL	4.12E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	2.05E-06
U-234	2.93E-14
Th-230	8.28E-18
Ra-226	8.32E-19
Rn-222	4.63E-20
Po-218	8.27E-25
Pb-214	3.02E-17
At-218	3.11E-24
Bi-214	1.77E-16
Rn-218	1.79E-26
Po-214	9.79E-21
Tl-210	6.90E-20
Pb-210	1.03E-19
Bi-210	1.67E-18
Hg-206	8.86E-26
Po-210	4.27E-22
Tl-206	3.90E-24
Pu-239	3.94E-05
U-235m	0.00E+00
U-235	3.20E-14
Th-231	3.27E-15
Pa-231	4.29E-18
Ac-227	1.27E-20
Th-227	6.05E-18
Fr-223	5.71E-20
Ra-223	6.77E-18
Rn-219	2.93E-18
At-219	0.00E+00
Bi-215	1.32E-23
Po-215	8.95E-21
Pb-211	5.75E-18
Bi-211	2.37E-18
Tl-207	2.98E-18
Po-211	1.14E-21
Am-241	2.96E-04
Np-237	1.50E-11
Pa-233	1.23E-10
U-233	1.30E-07
Th-229	8.49E-11
Ra-225	1.20E-11
Ac-225	1.44E-11
Fr-221	2.94E-11
At-217	2.48E-13
Bi-213	1.79E-10
Po-213	3.82E-14
Tl-209	4.61E-11
Pb-209	3.48E-12

Sr-90	2.70E-06
Y-90	3.66E-07
Cs-137	3.65E-05
Ba-137m	3.45E-05
U-238	7.11E-08
Th-234	1.85E-09
Pa-234m	2.53E-08
Pa-234	4.98E-10
TOTAL	4.12E-04

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.36E-12
INHALATION	2.43E-11
AIR IMMERSION	7.00E-16
GROUND SURFACE	1.93E-11
INTERNAL	2.57E-11
EXTERNAL	1.93E-11
TOTAL	4.50E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	1.75E-13
U-234	1.01E-20
Th-230	3.51E-24
Ra-226	4.52E-25
Rn-222	2.53E-26
Po-218	3.69E-31
Pb-214	1.62E-23
At-218	3.83E-31
Bi-214	9.33E-23
Rn-218	9.82E-33
Po-214	5.37E-27
Tl-210	3.68E-26
Pb-210	4.63E-26
Bi-210	1.85E-25
Hg-206	3.93E-32
Po-210	2.34E-28
Tl-206	4.38E-31
Pu-239	2.92E-12
U-235m	0.00E+00
U-235	1.74E-20
Th-231	1.49E-21
Pa-231	2.24E-24
Ac-227	4.74E-27
Th-227	3.28E-24
Fr-223	2.13E-26
Ra-223	3.65E-24
Rn-219	1.60E-24
At-219	0.00E+00
Bi-215	5.88E-30
Po-215	4.91E-27
Pb-211	2.06E-24
Bi-211	1.29E-24
Tl-207	3.83E-25
Po-211	6.25E-28
Am-241	2.25E-11
Np-237	7.36E-18
Pa-233	6.66E-17
U-233	4.43E-14
Th-229	4.49E-17
Ra-225	5.45E-18
Ac-225	7.59E-18
Fr-221	1.59E-17
At-217	1.35E-19
Bi-213	7.75E-17
Po-213	2.09E-20
Tl-209	2.47E-17
Pb-209	4.59E-19

Sr-90	5.81E-14
Y-90	4.36E-14
Cs-137	6.08E-13
Ba-137m	1.86E-11
U-238	2.16E-14
Th-234	9.57E-16
Pa-234m	4.42E-15
Pa-234	2.71E-16
TOTAL	4.50E-11

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	4.8E-04	3.0E-04	2.6E-04	2.3E-04	2.0E-04	1.7E-04	1.4E-04
NNW	8.1E-04	5.2E-04	4.6E-04	4.0E-04	3.5E-04	3.1E-04	2.4E-04
NW	1.2E-03	7.9E-04	7.0E-04	6.2E-04	5.4E-04	4.8E-04	3.9E-04
WNW	8.4E-04	5.9E-04	5.3E-04	4.7E-04	4.1E-04	3.7E-04	3.0E-04
W	4.7E-04	3.1E-04	2.7E-04	2.4E-04	2.1E-04	1.8E-04	1.5E-04
WSW	3.6E-04	2.3E-04	2.0E-04	1.8E-04	1.5E-04	1.4E-04	1.1E-04
SW	3.4E-04	2.2E-04	1.9E-04	1.7E-04	1.5E-04	1.3E-04	1.0E-04
SSW	3.1E-04	2.0E-04	1.8E-04	1.5E-04	1.3E-04	1.2E-04	9.5E-05
S	2.3E-04	1.4E-04	1.2E-04	1.0E-04	8.9E-05	7.8E-05	6.1E-05
SSE	2.6E-04	1.6E-04	1.4E-04	1.2E-04	1.0E-04	9.2E-05	7.2E-05
SSE	2.3E-04	1.5E-04	1.3E-04	1.1E-04	9.6E-05	8.5E-05	6.7E-05
ESE	2.2E-04	1.4E-04	1.2E-04	1.0E-04	8.6E-05	7.6E-05	5.9E-05
E	2.4E-04	1.4E-04	1.2E-04	1.0E-04	8.8E-05	7.7E-05	5.9E-05
ENE	2.9E-04	1.7E-04	1.4E-04	1.2E-04	1.0E-04	9.1E-05	7.0E-05
NE	2.7E-04	1.6E-04	1.3E-04	1.1E-04	9.7E-05	8.4E-05	6.5E-05
NNE	3.4E-04	2.0E-04	1.7E-04	1.5E-04	1.3E-04	1.1E-04	8.6E-05

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	1.3E-04	1.1E-04	7.5E-06	7.2E-06	6.9E-06	4.2E-06	3.4E-06
NNW	2.3E-04	2.0E-04	1.4E-05	1.4E-05	1.3E-05	8.2E-06	6.5E-06
NW	3.6E-04	3.1E-04	2.4E-05	2.3E-05	2.2E-05	1.4E-05	1.1E-05
WNW	2.8E-04	2.4E-04	1.9E-05	1.9E-05	1.8E-05	1.1E-05	8.8E-06
W	1.4E-04	1.2E-04	8.8E-06	8.5E-06	8.1E-06	5.1E-06	4.0E-06
WSW	1.0E-04	8.7E-05	6.6E-06	6.3E-06	6.1E-06	3.8E-06	3.0E-06
SW	9.7E-05	8.3E-05	6.4E-06	6.1E-06	5.9E-06	3.7E-06	2.9E-06
SSW	8.9E-05	7.7E-05	5.9E-06	5.7E-06	5.4E-06	3.4E-06	2.7E-06
S	5.6E-05	4.8E-05	3.2E-06	3.1E-06	2.9E-06	1.8E-06	1.4E-06
SSE	6.7E-05	5.7E-05	3.9E-06	3.8E-06	3.6E-06	2.2E-06	1.8E-06
SSE	6.2E-05	5.4E-05	3.8E-06	3.7E-06	3.5E-06	2.2E-06	1.7E-06
ESE	5.4E-05	4.6E-05	3.1E-06	2.9E-06	2.8E-06	1.8E-06	1.4E-06
E	5.5E-05	4.7E-05	3.0E-06	2.9E-06	2.8E-06	1.7E-06	1.4E-06
ENE	6.5E-05	5.5E-05	3.5E-06	3.3E-06	3.2E-06	2.0E-06	1.6E-06
NE	6.0E-05	5.1E-05	3.2E-06	3.1E-06	2.9E-06	1.8E-06	1.5E-06
NNE	8.0E-05	6.8E-05	4.5E-06	4.3E-06	4.1E-06	2.5E-06	2.0E-06

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	2.3E-06	1.6E-06	1.4E-06	3.6E-07	2.0E-07	1.7E-07
NNW	4.5E-06	3.1E-06	2.8E-06	7.3E-07	4.0E-07	3.4E-07
NW	7.8E-06	5.3E-06	4.8E-06	1.2E-06	6.8E-07	5.7E-07
WNW	6.2E-06	4.3E-06	3.9E-06	1.0E-06	5.7E-07	4.7E-07
W	2.8E-06	1.9E-06	1.7E-06	4.5E-07	2.5E-07	2.1E-07
WSW	2.1E-06	1.4E-06	1.3E-06	3.4E-07	1.9E-07	1.5E-07
SW	2.0E-06	1.4E-06	1.2E-06	3.1E-07	1.7E-07	1.4E-07
SSW	1.9E-06	1.3E-06	1.2E-06	3.0E-07	1.6E-07	1.3E-07
S	1.0E-06	6.7E-07	6.1E-07	1.6E-07	8.9E-08	7.5E-08
SSE	1.2E-06	8.3E-07	7.6E-07	1.9E-07	1.1E-07	8.9E-08
SSE	1.2E-06	8.0E-07	7.4E-07	1.8E-07	9.9E-08	8.2E-08
ESE	9.7E-07	6.6E-07	6.0E-07	1.5E-07	8.6E-08	7.1E-08
E	9.8E-07	6.6E-07	6.1E-07	1.6E-07	9.2E-08	7.7E-08
ENE	1.1E-06	7.5E-07	6.9E-07	1.8E-07	1.1E-07	8.8E-08
NE	1.0E-06	7.0E-07	6.4E-07	1.7E-07	1.0E-07	8.4E-08
NNE	1.4E-06	9.5E-07	8.7E-07	2.3E-07	1.3E-07	1.1E-07

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	5.3E-11	3.3E-11	2.9E-11	2.5E-11	2.2E-11	1.9E-11	1.5E-11
NNW	8.7E-11	5.7E-11	5.1E-11	4.4E-11	3.9E-11	3.4E-11	2.7E-11
NW	1.2E-10	8.5E-11	7.6E-11	6.7E-11	5.9E-11	5.3E-11	4.3E-11
WNW	8.9E-11	6.3E-11	5.7E-11	5.1E-11	4.5E-11	4.0E-11	3.3E-11
W	5.1E-11	3.4E-11	3.0E-11	2.6E-11	2.3E-11	2.0E-11	1.6E-11
WSW	3.8E-11	2.5E-11	2.2E-11	1.9E-11	1.7E-11	1.5E-11	1.2E-11
SW	3.7E-11	2.4E-11	2.1E-11	1.9E-11	1.6E-11	1.4E-11	1.2E-11
SSW	3.4E-11	2.2E-11	1.9E-11	1.7E-11	1.5E-11	1.3E-11	1.1E-11
S	2.5E-11	1.6E-11	1.3E-11	1.2E-11	1.0E-11	8.8E-12	6.9E-12
SSE	2.9E-11	1.8E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.1E-12
SSE	2.5E-11	1.6E-11	1.4E-11	1.2E-11	1.1E-11	9.6E-12	7.6E-12
ESE	2.5E-11	1.5E-11	1.3E-11	1.1E-11	9.8E-12	8.6E-12	6.7E-12
E	2.7E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.8E-12	6.8E-12
ENE	3.2E-11	1.9E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.1E-12
NE	3.0E-11	1.8E-11	1.5E-11	1.3E-11	1.1E-11	9.7E-12	7.5E-12
NNE	3.7E-11	2.3E-11	1.9E-11	1.7E-11	1.4E-11	1.3E-11	9.9E-12

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	1.4E-11	1.2E-11	9.2E-13	8.9E-13	8.5E-13	5.4E-13	4.3E-13
NNW	2.6E-11	2.2E-11	1.7E-12	1.7E-12	1.6E-12	1.0E-12	8.0E-13
NW	4.0E-11	3.5E-11	2.9E-12	2.8E-12	2.7E-12	1.7E-12	1.3E-12
WNW	3.1E-11	2.7E-11	2.3E-12	2.2E-12	2.1E-12	1.3E-12	1.1E-12
W	1.5E-11	1.3E-11	1.1E-12	1.0E-12	9.7E-13	6.1E-13	4.9E-13
WSW	1.1E-11	9.8E-12	7.9E-13	7.6E-13	7.3E-13	4.6E-13	3.7E-13
SW	1.1E-11	9.4E-12	7.6E-13	7.3E-13	7.0E-13	4.4E-13	3.5E-13
SSW	1.0E-11	8.7E-12	7.1E-13	6.8E-13	6.6E-13	4.2E-13	3.3E-13
S	6.4E-12	5.5E-12	4.0E-13	3.9E-13	3.7E-13	2.3E-13	1.9E-13
SSE	7.6E-12	6.5E-12	4.9E-13	4.7E-13	4.5E-13	2.8E-13	2.3E-13
SSE	7.1E-12	6.1E-12	4.7E-13	4.5E-13	4.4E-13	2.7E-13	2.2E-13
ESE	6.2E-12	5.3E-12	3.9E-13	3.7E-13	3.6E-13	2.3E-13	1.8E-13
E	6.3E-12	5.4E-12	3.9E-13	3.7E-13	3.6E-13	2.3E-13	1.8E-13
ENE	7.5E-12	6.4E-12	4.5E-13	4.3E-13	4.1E-13	2.6E-13	2.1E-13
NE	7.0E-12	5.9E-12	4.2E-13	4.0E-13	3.9E-13	2.5E-13	2.0E-13
NNE	9.2E-12	7.9E-12	5.7E-13	5.5E-13	5.3E-13	3.3E-13	2.7E-13

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	11520	15610	16670	47000	70000	79700
N	3.0E-13	2.0E-13	1.9E-13	5.0E-14	2.8E-14	2.4E-14
NNW	5.7E-13	3.9E-13	3.5E-13	9.4E-14	5.3E-14	4.4E-14
NW	9.4E-13	6.4E-13	5.9E-13	1.6E-13	8.7E-14	7.2E-14
WNW	7.5E-13	5.2E-13	4.8E-13	1.3E-13	7.1E-14	5.9E-14
W	3.4E-13	2.4E-13	2.2E-13	5.8E-14	3.2E-14	2.7E-14
WSW	2.6E-13	1.8E-13	1.7E-13	4.4E-14	2.4E-14	2.0E-14
SW	2.5E-13	1.7E-13	1.6E-13	4.1E-14	2.2E-14	1.9E-14
SSW	2.3E-13	1.6E-13	1.5E-13	3.9E-14	2.1E-14	1.8E-14
S	1.3E-13	9.0E-14	8.2E-14	2.2E-14	1.3E-14	1.1E-14
SSE	1.6E-13	1.1E-13	1.0E-13	2.6E-14	1.5E-14	1.2E-14
SSE	1.5E-13	1.0E-13	9.6E-14	2.5E-14	1.4E-14	1.1E-14
ESE	1.3E-13	8.8E-14	8.1E-14	2.1E-14	1.2E-14	1.0E-14
E	1.3E-13	9.0E-14	8.3E-14	2.3E-14	1.3E-14	1.1E-14
ENE	1.5E-13	1.0E-13	9.5E-14	2.6E-14	1.5E-14	1.3E-14
NE	1.4E-13	9.8E-14	9.0E-14	2.5E-14	1.5E-14	1.3E-14
NNE	1.9E-13	1.3E-13	1.2E-13	3.2E-14	1.9E-14	1.6E-14

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Wed Apr 27 12:04:11 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15f_edp.
Dataset Date: Apr 27, 2016 12:04 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	2.272	2.854	2.975	3.359	2.759	2.753	0.000	0.072
NNW	1.981	2.865	3.200	4.000	3.639	2.886	0.000	0.123
NW	1.905	2.763	2.860	4.448	3.784	3.178	0.000	0.179
WNW	1.722	2.020	2.294	3.609	4.037	3.320	0.000	0.124
W	1.585	1.868	2.251	4.050	4.069	3.256	0.000	0.066
WSW	1.406	1.725	2.079	4.049	3.483	3.236	0.000	0.048
SW	1.491	2.737	2.949	4.294	3.403	3.302	0.000	0.050
SSW	1.441	2.309	2.759	3.615	3.275	3.205	0.000	0.043
S	1.427	2.596	3.888	3.040	2.594	2.838	0.000	0.034
SSE	1.411	1.925	2.701	3.271	3.590	2.587	0.000	0.033
SE	1.562	1.979	2.561	2.655	2.278	2.345	0.000	0.028
ESE	1.505	1.989	2.111	2.820	2.421	1.187	0.000	0.026
E	1.580	2.453	2.985	4.502	3.729	2.174	0.000	0.036
ENE	1.818	2.521	3.317	4.495	2.861	2.572	0.000	0.046
NE	1.893	2.395	3.194	3.507	1.957	0.000	0.000	0.041
NNE	2.038	2.720	3.068	3.219	2.169	2.203	0.000	0.051

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	3.022	3.869	4.138	4.471	3.317	2.860	0.000
NNW	2.947	4.071	4.533	5.042	4.232	3.333	0.000
NW	2.885	3.904	4.403	5.432	4.385	3.590	0.000
WNW	2.659	3.297	3.662	4.839	4.550	3.875	0.000
W	2.542	3.077	3.408	5.472	5.146	3.894	0.000
WSW	2.217	2.863	3.769	5.390	4.650	3.646	0.000
SW	2.319	3.904	4.431	6.152	4.458	3.698	0.000
SSW	2.356	3.815	4.630	5.332	4.048	3.673	0.000
S	2.306	4.672	5.355	3.927	3.292	3.571	0.000
SSE	2.284	2.880	3.921	4.693	4.679	3.318	0.000

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
SE	2.421	2.929	3.641	3.751	3.187	2.890	0.000
ESE	2.238	2.921	3.340	5.048	3.894	1.672	0.000
E	2.346	3.552	4.778	6.827	4.784	3.172	0.000
ENE	2.581	3.650	4.765	6.131	3.626	2.572	0.000
NE	2.641	3.518	4.529	4.733	2.887	0.000	0.000
NNE	2.831	3.616	4.167	4.730	2.905	2.772	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.2186	0.1264	0.2158	0.3211	0.1051	0.0130	0.0000
NNW	0.1251	0.0835	0.1540	0.3797	0.2361	0.0217	0.0000
NW	0.0737	0.0387	0.0787	0.4343	0.3270	0.0475	0.0000
WNW	0.0793	0.0340	0.0618	0.2931	0.4633	0.0685	0.0000
W	0.1048	0.0468	0.0762	0.4173	0.3151	0.0398	0.0000
WSW	0.1485	0.0581	0.1132	0.3840	0.2363	0.0600	0.0000
SW	0.1155	0.0582	0.1197	0.4743	0.1691	0.0632	0.0000
SSW	0.1464	0.0779	0.1741	0.3599	0.1635	0.0782	0.0000
S	0.1778	0.1133	0.3982	0.2336	0.0622	0.0149	0.0000
SSE	0.1780	0.1018	0.2030	0.3601	0.1361	0.0211	0.0000
SE	0.2133	0.1248	0.2185	0.2964	0.1230	0.0240	0.0000
ESE	0.3078	0.1105	0.1868	0.2857	0.1070	0.0023	0.0000
E	0.2796	0.1079	0.1792	0.3559	0.0724	0.0050	0.0000
ENE	0.2831	0.1286	0.2090	0.3432	0.0355	0.0007	0.0000
NE	0.3552	0.1499	0.2354	0.2266	0.0330	0.0000	0.0000
NNE	0.3089	0.1395	0.2520	0.2430	0.0513	0.0053	0.0000
TOTAL	0.1596	0.0793	0.1501	0.3548	0.2210	0.0350	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 17.3 degrees C
290.42 K
Precipitation: 44.4 cm/y
Humidity: 8.0 g/cu m
Lid Height: 1000.0 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 4.314 m/s

Vertical Temperature Gradients:
STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Wed Apr 27 12:04:11 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15f_edp.
Dataset Date: Apr 27, 2016 12:04 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.988E-06	2.497E-06	2.172E-06	1.887E-06	1.627E-06	1.433E-06	1.125E-06
NNW	6.621E-06	4.336E-06	3.809E-06	3.337E-06	2.900E-06	2.569E-06	2.036E-06
NW	9.391E-06	6.467E-06	5.749E-06	5.093E-06	4.472E-06	3.994E-06	3.209E-06
WNW	6.785E-06	4.832E-06	4.327E-06	3.857E-06	3.406E-06	3.055E-06	2.470E-06
W	3.867E-06	2.559E-06	2.254E-06	1.980E-06	1.724E-06	1.531E-06	1.217E-06
WSW	2.908E-06	1.890E-06	1.661E-06	1.458E-06	1.270E-06	1.128E-06	8.982E-07
SW	2.784E-06	1.801E-06	1.584E-06	1.391E-06	1.212E-06	1.078E-06	8.600E-07
SSW	2.556E-06	1.646E-06	1.448E-06	1.272E-06	1.111E-06	9.884E-07	7.907E-07
S	1.912E-06	1.153E-06	9.958E-07	8.591E-07	7.360E-07	6.451E-07	5.023E-07
SSE	2.168E-06	1.339E-06	1.161E-06	1.006E-06	8.647E-07	7.601E-07	5.950E-07
SE	1.882E-06	1.203E-06	1.053E-06	9.191E-07	7.963E-07	7.042E-07	5.567E-07
ESE	1.855E-06	1.127E-06	9.722E-07	8.377E-07	7.162E-07	6.265E-07	4.859E-07
E	2.016E-06	1.175E-06	1.005E-06	8.598E-07	7.305E-07	6.362E-07	4.902E-07
ENE	2.421E-06	1.402E-06	1.197E-06	1.022E-06	8.666E-07	7.533E-07	5.783E-07
NE	2.228E-06	1.293E-06	1.106E-06	9.449E-07	8.019E-07	6.975E-07	5.359E-07
NNE	2.796E-06	1.668E-06	1.435E-06	1.234E-06	1.054E-06	9.218E-07	7.148E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.044E-06	8.934E-07	5.874E-08	5.622E-08	5.388E-08	3.273E-08	2.569E-08
NNW	1.896E-06	1.630E-06	1.159E-07	1.111E-07	1.065E-07	6.533E-08	5.130E-08
NW	2.999E-06	2.597E-06	1.998E-07	1.916E-07	1.839E-07	1.136E-07	8.926E-08
WNW	2.313E-06	2.008E-06	1.588E-07	1.523E-07	1.462E-07	9.074E-08	7.143E-08
W	1.134E-06	9.766E-07	7.156E-08	6.859E-08	6.582E-08	4.059E-08	3.191E-08
WSW	8.376E-07	7.224E-07	5.274E-08	5.056E-08	4.851E-08	2.992E-08	2.355E-08
SW	8.025E-07	6.931E-07	5.138E-08	4.925E-08	4.726E-08	2.912E-08	2.288E-08
SSW	7.384E-07	6.386E-07	4.721E-08	4.524E-08	4.341E-08	2.673E-08	2.102E-08
S	4.655E-07	3.965E-07	2.454E-08	2.347E-08	2.248E-08	1.358E-08	1.064E-08
SSE	5.522E-07	4.718E-07	3.089E-08	2.957E-08	2.834E-08	1.726E-08	1.357E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.180E-07	4.449E-07	2.999E-08	2.871E-08	2.752E-08	1.673E-08	1.314E-08
ESE	4.497E-07	3.822E-07	2.353E-08	2.252E-08	2.159E-08	1.316E-08	1.036E-08
E	4.529E-07	3.837E-07	2.299E-08	2.201E-08	2.111E-08	1.294E-08	1.023E-08
ENE	5.338E-07	4.513E-07	2.603E-08	2.491E-08	2.387E-08	1.452E-08	1.149E-08
NE	4.947E-07	4.183E-07	2.360E-08	2.258E-08	2.163E-08	1.315E-08	1.043E-08
NNE	6.616E-07	5.623E-07	3.393E-08	3.247E-08	3.111E-08	1.886E-08	1.486E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.766E-08	1.168E-08	1.067E-08	2.582E-09	1.408E-09	1.164E-09
NNW	3.555E-08	2.382E-08	2.183E-08	5.440E-09	2.970E-09	2.460E-09
NW	6.218E-08	4.201E-08	3.857E-08	9.722E-09	5.245E-09	4.343E-09
WNW	5.011E-08	3.425E-08	3.152E-08	8.193E-09	4.445E-09	3.692E-09
W	2.220E-08	1.496E-08	1.373E-08	3.457E-09	1.885E-09	1.563E-09
WSW	1.640E-08	1.107E-08	1.015E-08	2.551E-09	1.370E-09	1.133E-09
SW	1.585E-08	1.060E-08	9.707E-09	2.373E-09	1.262E-09	1.041E-09
SSW	1.460E-08	9.807E-09	8.991E-09	2.227E-09	1.181E-09	9.757E-10
S	7.302E-09	4.817E-09	4.400E-09	1.076E-09	5.940E-10	4.926E-10
SSE	9.343E-09	6.188E-09	5.657E-09	1.370E-09	7.456E-10	6.160E-10
SE	9.056E-09	6.008E-09	5.492E-09	1.306E-09	6.865E-10	5.626E-10
ESE	7.146E-09	4.739E-09	4.333E-09	1.052E-09	5.741E-10	4.731E-10
E	7.081E-09	4.701E-09	4.302E-09	1.073E-09	6.064E-10	5.045E-10
ENE	7.917E-09	5.219E-09	4.769E-09	1.180E-09	6.739E-10	5.613E-10
NE	7.226E-09	4.799E-09	4.391E-09	1.106E-09	6.293E-10	5.240E-10
NNE	1.023E-08	6.766E-09	6.184E-09	1.518E-09	8.431E-10	6.993E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	4.233E-06	2.611E-06	2.262E-06	1.958E-06	1.681E-06	1.477E-06	1.153E-06
NNW	7.153E-06	4.598E-06	4.018E-06	3.503E-06	3.030E-06	2.674E-06	2.106E-06
NW	1.029E-05	6.933E-06	6.127E-06	5.398E-06	4.714E-06	4.193E-06	3.344E-06
WNW	7.468E-06	5.208E-06	4.636E-06	4.109E-06	3.609E-06	3.222E-06	2.586E-06
W	4.213E-06	2.732E-06	2.393E-06	2.091E-06	1.812E-06	1.602E-06	1.265E-06
WSW	3.133E-06	2.003E-06	1.753E-06	1.532E-06	1.329E-06	1.177E-06	9.321E-07
SW	3.007E-06	1.911E-06	1.672E-06	1.462E-06	1.270E-06	1.125E-06	8.931E-07
SSW	2.737E-06	1.738E-06	1.523E-06	1.334E-06	1.161E-06	1.031E-06	8.207E-07
S	2.008E-06	1.197E-06	1.030E-06	8.859E-07	7.568E-07	6.618E-07	5.134E-07
SSE	2.306E-06	1.402E-06	1.211E-06	1.045E-06	8.951E-07	7.847E-07	6.112E-07
SE	1.992E-06	1.257E-06	1.096E-06	9.535E-07	8.234E-07	7.263E-07	5.715E-07
ESE	1.959E-06	1.174E-06	1.009E-06	8.661E-07	7.378E-07	6.436E-07	4.967E-07
E	2.126E-06	1.221E-06	1.040E-06	8.870E-07	7.512E-07	6.525E-07	5.006E-07
ENE	2.543E-06	1.451E-06	1.235E-06	1.051E-06	8.881E-07	7.701E-07	5.888E-07
NE	2.323E-06	1.333E-06	1.136E-06	9.684E-07	8.196E-07	7.114E-07	5.446E-07
NNE	2.933E-06	1.727E-06	1.481E-06	1.270E-06	1.082E-06	9.437E-07	7.289E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.070E-06	9.125E-07	5.894E-08	5.640E-08	5.404E-08	3.279E-08	2.573E-08
NNW	1.957E-06	1.676E-06	1.165E-07	1.116E-07	1.070E-07	6.553E-08	5.143E-08
NW	3.119E-06	2.690E-06	2.011E-07	1.927E-07	1.850E-07	1.141E-07	8.957E-08
WNW	2.415E-06	2.088E-06	1.599E-07	1.533E-07	1.472E-07	9.117E-08	7.171E-08
W	1.176E-06	1.009E-06	7.196E-08	6.896E-08	6.617E-08	4.074E-08	3.201E-08
WSW	8.679E-07	7.460E-07	5.307E-08	5.086E-08	4.880E-08	3.004E-08	2.363E-08
SW	8.321E-07	7.163E-07	5.171E-08	4.956E-08	4.755E-08	2.925E-08	2.296E-08
SSW	7.653E-07	6.600E-07	4.754E-08	4.555E-08	4.370E-08	2.685E-08	2.111E-08
S	4.753E-07	4.040E-07	2.461E-08	2.354E-08	2.254E-08	1.360E-08	1.066E-08
SSE	5.665E-07	4.827E-07	3.101E-08	2.968E-08	2.844E-08	1.730E-08	1.359E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.311E-07	4.550E-07	3.010E-08	2.882E-08	2.761E-08	1.677E-08	1.317E-08
ESE	4.591E-07	3.892E-07	2.358E-08	2.257E-08	2.163E-08	1.317E-08	1.036E-08
E	4.620E-07	3.905E-07	2.305E-08	2.207E-08	2.116E-08	1.295E-08	1.024E-08
ENE	5.429E-07	4.580E-07	2.608E-08	2.495E-08	2.391E-08	1.454E-08	1.149E-08
NE	5.023E-07	4.238E-07	2.363E-08	2.261E-08	2.166E-08	1.316E-08	1.044E-08
NNE	6.739E-07	5.715E-07	3.401E-08	3.254E-08	3.117E-08	1.889E-08	1.487E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.768E-08	1.169E-08	1.068E-08	2.582E-09	1.407E-09	1.163E-09
NNW	3.562E-08	2.386E-08	2.186E-08	5.443E-09	2.969E-09	2.459E-09
NW	6.234E-08	4.211E-08	3.866E-08	9.732E-09	5.244E-09	4.342E-09
WNW	5.027E-08	3.435E-08	3.160E-08	8.204E-09	4.446E-09	3.692E-09
W	2.225E-08	1.499E-08	1.375E-08	3.460E-09	1.885E-09	1.563E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.554E-09	1.369E-09	1.132E-09
SW	1.589E-08	1.062E-08	9.731E-09	2.375E-09	1.261E-09	1.041E-09
SSW	1.464E-08	9.835E-09	9.016E-09	2.230E-09	1.180E-09	9.751E-10
S	7.310E-09	4.821E-09	4.404E-09	1.076E-09	5.936E-10	4.923E-10
SSE	9.356E-09	6.195E-09	5.663E-09	1.370E-09	7.452E-10	6.156E-10
SE	9.068E-09	6.014E-09	5.498E-09	1.306E-09	6.859E-10	5.620E-10
ESE	7.149E-09	4.739E-09	4.333E-09	1.051E-09	5.737E-10	4.727E-10
E	7.086E-09	4.704E-09	4.304E-09	1.073E-09	6.061E-10	5.042E-10
ENE	7.920E-09	5.220E-09	4.769E-09	1.179E-09	6.736E-10	5.610E-10
NE	7.227E-09	4.799E-09	4.391E-09	1.105E-09	6.289E-10	5.236E-10
NNE	1.024E-08	6.768E-09	6.186E-09	1.517E-09	8.425E-10	6.987E-10

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	4.249E-06	2.618E-06	2.268E-06	1.962E-06	1.685E-06	1.479E-06	1.155E-06
NNW	7.187E-06	4.614E-06	4.031E-06	3.514E-06	3.038E-06	2.681E-06	2.110E-06
NW	1.034E-05	6.963E-06	6.151E-06	5.417E-06	4.730E-06	4.206E-06	3.353E-06
WNW	7.511E-06	5.232E-06	4.655E-06	4.125E-06	3.621E-06	3.233E-06	2.593E-06
W	4.235E-06	2.743E-06	2.402E-06	2.098E-06	1.817E-06	1.606E-06	1.268E-06
WSW	3.147E-06	2.010E-06	1.759E-06	1.537E-06	1.333E-06	1.180E-06	9.343E-07
SW	3.021E-06	1.918E-06	1.678E-06	1.467E-06	1.273E-06	1.128E-06	8.952E-07
SSW	2.748E-06	1.744E-06	1.528E-06	1.338E-06	1.164E-06	1.033E-06	8.226E-07
S	2.014E-06	1.199E-06	1.032E-06	8.876E-07	7.581E-07	6.629E-07	5.141E-07
SSE	2.315E-06	1.406E-06	1.214E-06	1.047E-06	8.971E-07	7.862E-07	6.122E-07
SE	1.999E-06	1.260E-06	1.098E-06	9.556E-07	8.251E-07	7.276E-07	5.724E-07
ESE	1.966E-06	1.177E-06	1.011E-06	8.679E-07	7.392E-07	6.446E-07	4.974E-07
E	2.133E-06	1.224E-06	1.043E-06	8.887E-07	7.525E-07	6.536E-07	5.012E-07
ENE	2.551E-06	1.454E-06	1.237E-06	1.053E-06	8.895E-07	7.712E-07	5.895E-07
NE	2.329E-06	1.336E-06	1.138E-06	9.698E-07	8.207E-07	7.122E-07	5.451E-07
NNE	2.942E-06	1.731E-06	1.484E-06	1.273E-06	1.084E-06	9.450E-07	7.297E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.071E-06	9.137E-07	5.895E-08	5.641E-08	5.405E-08	3.280E-08	2.573E-08
NNW	1.961E-06	1.679E-06	1.165E-07	1.116E-07	1.070E-07	6.554E-08	5.143E-08
NW	3.127E-06	2.696E-06	2.011E-07	1.928E-07	1.850E-07	1.141E-07	8.958E-08
WNW	2.421E-06	2.093E-06	1.600E-07	1.534E-07	1.473E-07	9.119E-08	7.172E-08
W	1.179E-06	1.011E-06	7.198E-08	6.899E-08	6.619E-08	4.075E-08	3.201E-08
WSW	8.698E-07	7.475E-07	5.309E-08	5.088E-08	4.882E-08	3.005E-08	2.364E-08
SW	8.339E-07	7.177E-07	5.173E-08	4.958E-08	4.756E-08	2.925E-08	2.297E-08
SSW	7.670E-07	6.614E-07	4.756E-08	4.557E-08	4.372E-08	2.686E-08	2.111E-08
S	4.759E-07	4.045E-07	2.462E-08	2.355E-08	2.255E-08	1.361E-08	1.066E-08
SSE	5.674E-07	4.834E-07	3.101E-08	2.969E-08	2.845E-08	1.730E-08	1.359E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.320E-07	4.556E-07	3.011E-08	2.882E-08	2.762E-08	1.677E-08	1.317E-08
ESE	4.597E-07	3.896E-07	2.358E-08	2.257E-08	2.163E-08	1.317E-08	1.036E-08
E	4.626E-07	3.909E-07	2.305E-08	2.207E-08	2.116E-08	1.296E-08	1.024E-08
ENE	5.435E-07	4.584E-07	2.608E-08	2.496E-08	2.391E-08	1.454E-08	1.149E-08
NE	5.027E-07	4.242E-07	2.363E-08	2.261E-08	2.166E-08	1.316E-08	1.044E-08
NNE	6.747E-07	5.721E-07	3.402E-08	3.254E-08	3.117E-08	1.889E-08	1.487E-08

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.768E-08	1.169E-08	1.068E-08	2.582E-09	1.407E-09	1.163E-09
NNW	3.562E-08	2.386E-08	2.187E-08	5.443E-09	2.969E-09	2.459E-09
NW	6.235E-08	4.212E-08	3.866E-08	9.733E-09	5.244E-09	4.342E-09
WNW	5.028E-08	3.435E-08	3.161E-08	8.205E-09	4.446E-09	3.692E-09
W	2.226E-08	1.499E-08	1.376E-08	3.461E-09	1.885E-09	1.563E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.554E-09	1.369E-09	1.132E-09
SW	1.589E-08	1.063E-08	9.733E-09	2.375E-09	1.261E-09	1.041E-09
SSW	1.465E-08	9.837E-09	9.017E-09	2.230E-09	1.180E-09	9.751E-10
S	7.311E-09	4.821E-09	4.404E-09	1.076E-09	5.936E-10	4.923E-10
SSE	9.357E-09	6.195E-09	5.664E-09	1.370E-09	7.451E-10	6.156E-10
SE	9.068E-09	6.015E-09	5.498E-09	1.306E-09	6.858E-10	5.620E-10
ESE	7.149E-09	4.739E-09	4.333E-09	1.051E-09	5.736E-10	4.727E-10
E	7.087E-09	4.704E-09	4.304E-09	1.073E-09	6.061E-10	5.042E-10
ENE	7.920E-09	5.220E-09	4.770E-09	1.179E-09	6.735E-10	5.610E-10
NE	7.227E-09	4.799E-09	4.391E-09	1.105E-09	6.289E-10	5.236E-10
NNE	1.024E-08	6.769E-09	6.186E-09	1.517E-09	8.424E-10	6.987E-10

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.590E-06	2.313E-06	2.027E-06	1.773E-06	1.538E-06	1.362E-06	1.078E-06
NNW	5.758E-06	3.911E-06	3.469E-06	3.068E-06	2.689E-06	2.399E-06	1.923E-06
NW	7.935E-06	5.712E-06	5.136E-06	4.598E-06	4.078E-06	3.672E-06	2.990E-06
WNW	5.677E-06	4.223E-06	3.826E-06	3.448E-06	3.077E-06	2.783E-06	2.283E-06
W	3.305E-06	2.279E-06	2.029E-06	1.800E-06	1.582E-06	1.415E-06	1.140E-06
WSW	2.544E-06	1.706E-06	1.512E-06	1.337E-06	1.173E-06	1.048E-06	8.431E-07
SW	2.423E-06	1.624E-06	1.440E-06	1.274E-06	1.119E-06	1.000E-06	8.062E-07
SSW	2.263E-06	1.498E-06	1.326E-06	1.172E-06	1.029E-06	9.199E-07	7.421E-07
S	1.755E-06	1.084E-06	9.407E-07	8.158E-07	7.023E-07	6.179E-07	4.843E-07
SSE	1.944E-06	1.237E-06	1.080E-06	9.421E-07	8.153E-07	7.204E-07	5.687E-07
SE	1.704E-06	1.116E-06	9.827E-07	8.633E-07	7.524E-07	6.685E-07	5.326E-07
ESE	1.685E-06	1.050E-06	9.125E-07	7.915E-07	6.811E-07	5.988E-07	4.684E-07
E	1.838E-06	1.100E-06	9.474E-07	8.155E-07	6.970E-07	6.097E-07	4.733E-07
ENE	2.224E-06	1.322E-06	1.136E-06	9.755E-07	8.317E-07	7.260E-07	5.613E-07
NE	2.073E-06	1.229E-06	1.056E-06	9.068E-07	7.732E-07	6.750E-07	5.218E-07
NNE	2.574E-06	1.571E-06	1.360E-06	1.176E-06	1.010E-06	8.864E-07	6.920E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.004E-06	8.624E-07	5.843E-08	5.593E-08	5.361E-08	3.262E-08	2.562E-08
NNW	1.796E-06	1.554E-06	1.151E-07	1.103E-07	1.058E-07	6.502E-08	5.110E-08
NW	2.805E-06	2.447E-06	1.978E-07	1.897E-07	1.821E-07	1.129E-07	8.878E-08
WNW	2.146E-06	1.879E-06	1.570E-07	1.506E-07	1.447E-07	9.004E-08	7.097E-08
W	1.066E-06	9.241E-07	7.091E-08	6.798E-08	6.525E-08	4.034E-08	3.175E-08
WSW	7.886E-07	6.841E-07	5.221E-08	5.006E-08	4.805E-08	2.971E-08	2.342E-08
SW	7.545E-07	6.555E-07	5.084E-08	4.874E-08	4.679E-08	2.892E-08	2.275E-08
SSW	6.947E-07	6.040E-07	4.667E-08	4.474E-08	4.294E-08	2.652E-08	2.089E-08
S	4.497E-07	3.844E-07	2.441E-08	2.335E-08	2.237E-08	1.353E-08	1.062E-08
SSE	5.290E-07	4.541E-07	3.069E-08	2.939E-08	2.817E-08	1.719E-08	1.352E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.967E-07	4.285E-07	2.981E-08	2.854E-08	2.736E-08	1.667E-08	1.311E-08
ESE	4.345E-07	3.709E-07	2.345E-08	2.245E-08	2.152E-08	1.313E-08	1.034E-08
E	4.382E-07	3.727E-07	2.289E-08	2.192E-08	2.102E-08	1.290E-08	1.021E-08
ENE	5.191E-07	4.404E-07	2.596E-08	2.485E-08	2.381E-08	1.450E-08	1.148E-08
NE	4.825E-07	4.092E-07	2.354E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.417E-07	5.473E-07	3.381E-08	3.235E-08	3.100E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09	1.165E-09
NNW	3.544E-08	2.376E-08	2.177E-08	5.435E-09	2.971E-09	2.461E-09
NW	6.190E-08	4.185E-08	3.842E-08	9.706E-09	5.246E-09	4.344E-09
WNW	4.985E-08	3.409E-08	3.137E-08	8.175E-09	4.445E-09	3.692E-09
W	2.211E-08	1.491E-08	1.368E-08	3.452E-09	1.885E-09	1.563E-09
WSW	1.633E-08	1.102E-08	1.011E-08	2.547E-09	1.370E-09	1.133E-09
SW	1.577E-08	1.055E-08	9.668E-09	2.369E-09	1.262E-09	1.042E-09
SSW	1.452E-08	9.762E-09	8.951E-09	2.223E-09	1.182E-09	9.765E-10
S	7.289E-09	4.810E-09	4.394E-09	1.076E-09	5.946E-10	4.932E-10
SSE	9.321E-09	6.176E-09	5.647E-09	1.369E-09	7.463E-10	6.167E-10
SE	9.038E-09	5.998E-09	5.484E-09	1.306E-09	6.876E-10	5.635E-10
ESE	7.142E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10	4.737E-10
E	7.072E-09	4.697E-09	4.298E-09	1.073E-09	6.069E-10	5.049E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.744E-10	5.618E-10
NE	7.224E-09	4.799E-09	4.392E-09	1.106E-09	6.299E-10	5.245E-10
NNE	1.022E-08	6.762E-09	6.181E-09	1.518E-09	8.440E-10	7.001E-10

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.578E-06	2.307E-06	2.023E-06	1.770E-06	1.536E-06	1.360E-06	1.077E-06
NNW	5.732E-06	3.898E-06	3.459E-06	3.059E-06	2.682E-06	2.393E-06	1.920E-06
NW	7.891E-06	5.689E-06	5.117E-06	4.583E-06	4.066E-06	3.662E-06	2.983E-06
WNW	5.643E-06	4.204E-06	3.810E-06	3.435E-06	3.067E-06	2.775E-06	2.278E-06
W	3.288E-06	2.270E-06	2.022E-06	1.794E-06	1.578E-06	1.412E-06	1.137E-06
WSW	2.533E-06	1.700E-06	1.507E-06	1.333E-06	1.170E-06	1.045E-06	8.415E-07
SW	2.412E-06	1.619E-06	1.435E-06	1.270E-06	1.116E-06	9.977E-07	8.046E-07
SSW	2.254E-06	1.494E-06	1.322E-06	1.169E-06	1.026E-06	9.178E-07	7.406E-07
S	1.750E-06	1.082E-06	9.390E-07	8.145E-07	7.013E-07	6.171E-07	4.838E-07
SSE	1.937E-06	1.233E-06	1.078E-06	9.402E-07	8.138E-07	7.192E-07	5.679E-07
SE	1.698E-06	1.114E-06	9.806E-07	8.616E-07	7.511E-07	6.674E-07	5.319E-07
ESE	1.680E-06	1.048E-06	9.107E-07	7.901E-07	6.800E-07	5.979E-07	4.678E-07
E	1.833E-06	1.098E-06	9.457E-07	8.142E-07	6.959E-07	6.089E-07	4.727E-07
ENE	2.218E-06	1.319E-06	1.134E-06	9.740E-07	8.306E-07	7.252E-07	5.608E-07
NE	2.068E-06	1.227E-06	1.054E-06	9.057E-07	7.723E-07	6.743E-07	5.214E-07
NNE	2.567E-06	1.568E-06	1.358E-06	1.174E-06	1.008E-06	8.853E-07	6.913E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.002E-06	8.614E-07	5.842E-08	5.592E-08	5.360E-08	3.262E-08	2.562E-08
NNW	1.793E-06	1.552E-06	1.150E-07	1.102E-07	1.057E-07	6.501E-08	5.110E-08
NW	2.799E-06	2.442E-06	1.978E-07	1.897E-07	1.821E-07	1.128E-07	8.876E-08
WNW	2.141E-06	1.875E-06	1.569E-07	1.506E-07	1.446E-07	9.002E-08	7.096E-08
W	1.064E-06	9.225E-07	7.089E-08	6.796E-08	6.523E-08	4.034E-08	3.175E-08
WSW	7.871E-07	6.830E-07	5.219E-08	5.004E-08	4.803E-08	2.971E-08	2.342E-08
SW	7.531E-07	6.543E-07	5.082E-08	4.873E-08	4.677E-08	2.891E-08	2.274E-08
SSW	6.934E-07	6.029E-07	4.666E-08	4.473E-08	4.293E-08	2.651E-08	2.089E-08
S	4.492E-07	3.841E-07	2.441E-08	2.335E-08	2.237E-08	1.353E-08	1.062E-08
SSE	5.283E-07	4.535E-07	3.069E-08	2.938E-08	2.817E-08	1.719E-08	1.352E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.961E-07	4.280E-07	2.980E-08	2.853E-08	2.735E-08	1.667E-08	1.310E-08
ESE	4.340E-07	3.705E-07	2.345E-08	2.245E-08	2.152E-08	1.313E-08	1.034E-08
E	4.377E-07	3.723E-07	2.289E-08	2.192E-08	2.102E-08	1.290E-08	1.021E-08
ENE	5.187E-07	4.401E-07	2.596E-08	2.484E-08	2.381E-08	1.450E-08	1.147E-08
NE	4.822E-07	4.090E-07	2.354E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.411E-07	5.468E-07	3.381E-08	3.235E-08	3.100E-08	1.882E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09	1.165E-09
NNW	3.544E-08	2.376E-08	2.177E-08	5.435E-09	2.971E-09	2.462E-09
NW	6.189E-08	4.184E-08	3.842E-08	9.705E-09	5.246E-09	4.344E-09
WNW	4.985E-08	3.409E-08	3.137E-08	8.175E-09	4.445E-09	3.692E-09
W	2.211E-08	1.491E-08	1.368E-08	3.452E-09	1.885E-09	1.563E-09
WSW	1.633E-08	1.102E-08	1.011E-08	2.547E-09	1.370E-09	1.133E-09
SW	1.577E-08	1.055E-08	9.667E-09	2.369E-09	1.262E-09	1.042E-09
SSW	1.452E-08	9.761E-09	8.950E-09	2.223E-09	1.182E-09	9.765E-10
S	7.289E-09	4.810E-09	4.394E-09	1.076E-09	5.946E-10	4.932E-10
SSE	9.321E-09	6.176E-09	5.646E-09	1.369E-09	7.463E-10	6.167E-10
SE	9.037E-09	5.998E-09	5.484E-09	1.306E-09	6.876E-10	5.635E-10
ESE	7.142E-09	4.738E-09	4.332E-09	1.052E-09	5.749E-10	4.737E-10
E	7.072E-09	4.697E-09	4.298E-09	1.073E-09	6.069E-10	5.049E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.744E-10	5.618E-10
NE	7.224E-09	4.799E-09	4.392E-09	1.106E-09	6.299E-10	5.245E-10
NNE	1.022E-08	6.762E-09	6.181E-09	1.518E-09	8.441E-10	7.001E-10

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.626E-06	2.330E-06	2.040E-06	1.783E-06	1.547E-06	1.368E-06	1.082E-06
NNW	5.837E-06	3.950E-06	3.500E-06	3.092E-06	2.708E-06	2.414E-06	1.933E-06
NW	8.068E-06	5.781E-06	5.192E-06	4.643E-06	4.114E-06	3.701E-06	3.010E-06
WNW	5.778E-06	4.278E-06	3.871E-06	3.485E-06	3.107E-06	2.808E-06	2.300E-06
W	3.356E-06	2.304E-06	2.049E-06	1.816E-06	1.595E-06	1.426E-06	1.147E-06
WSW	2.577E-06	1.723E-06	1.525E-06	1.348E-06	1.182E-06	1.055E-06	8.482E-07
SW	2.456E-06	1.640E-06	1.453E-06	1.285E-06	1.127E-06	1.007E-06	8.111E-07
SSW	2.290E-06	1.512E-06	1.337E-06	1.181E-06	1.036E-06	9.261E-07	7.465E-07
S	1.769E-06	1.090E-06	9.457E-07	8.198E-07	7.054E-07	6.204E-07	4.860E-07
SSE	1.964E-06	1.246E-06	1.088E-06	9.479E-07	8.198E-07	7.240E-07	5.711E-07
SE	1.720E-06	1.124E-06	9.891E-07	8.684E-07	7.564E-07	6.717E-07	5.348E-07
ESE	1.700E-06	1.057E-06	9.180E-07	7.957E-07	6.843E-07	6.013E-07	4.700E-07
E	1.854E-06	1.107E-06	9.527E-07	8.196E-07	7.000E-07	6.121E-07	4.748E-07
ENE	2.242E-06	1.329E-06	1.141E-06	9.797E-07	8.348E-07	7.285E-07	5.629E-07
NE	2.087E-06	1.235E-06	1.060E-06	9.103E-07	7.758E-07	6.770E-07	5.231E-07
NNE	2.594E-06	1.580E-06	1.367E-06	1.181E-06	1.014E-06	8.896E-07	6.940E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.007E-06	8.652E-07	5.846E-08	5.596E-08	5.363E-08	3.263E-08	2.563E-08
NNW	1.805E-06	1.561E-06	1.151E-07	1.103E-07	1.058E-07	6.504E-08	5.112E-08
NW	2.823E-06	2.460E-06	1.980E-07	1.899E-07	1.823E-07	1.129E-07	8.882E-08
WNW	2.161E-06	1.891E-06	1.571E-07	1.508E-07	1.448E-07	9.010E-08	7.101E-08
W	1.072E-06	9.289E-07	7.097E-08	6.804E-08	6.530E-08	4.036E-08	3.177E-08
WSW	7.931E-07	6.876E-07	5.226E-08	5.010E-08	4.809E-08	2.973E-08	2.343E-08
SW	7.589E-07	6.589E-07	5.089E-08	4.879E-08	4.683E-08	2.893E-08	2.276E-08
SSW	6.987E-07	6.071E-07	4.672E-08	4.479E-08	4.299E-08	2.654E-08	2.090E-08
S	4.511E-07	3.855E-07	2.442E-08	2.336E-08	2.238E-08	1.354E-08	1.062E-08
SSE	5.311E-07	4.557E-07	3.071E-08	2.940E-08	2.819E-08	1.720E-08	1.353E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.987E-07	4.300E-07	2.982E-08	2.855E-08	2.737E-08	1.667E-08	1.311E-08
ESE	4.359E-07	3.719E-07	2.346E-08	2.246E-08	2.153E-08	1.313E-08	1.034E-08
E	4.395E-07	3.737E-07	2.290E-08	2.193E-08	2.103E-08	1.291E-08	1.021E-08
ENE	5.205E-07	4.414E-07	2.597E-08	2.485E-08	2.381E-08	1.450E-08	1.148E-08
NE	4.836E-07	4.101E-07	2.355E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.435E-07	5.487E-07	3.382E-08	3.236E-08	3.101E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09	1.165E-09
NNW	3.545E-08	2.376E-08	2.178E-08	5.435E-09	2.971E-09	2.461E-09
NW	6.193E-08	4.186E-08	3.843E-08	9.707E-09	5.246E-09	4.344E-09
WNW	4.988E-08	3.411E-08	3.139E-08	8.177E-09	4.445E-09	3.692E-09
W	2.212E-08	1.491E-08	1.368E-08	3.453E-09	1.885E-09	1.563E-09
WSW	1.634E-08	1.103E-08	1.012E-08	2.547E-09	1.370E-09	1.133E-09
SW	1.578E-08	1.056E-08	9.672E-09	2.369E-09	1.262E-09	1.042E-09
SSW	1.453E-08	9.766E-09	8.954E-09	2.223E-09	1.182E-09	9.764E-10
S	7.290E-09	4.811E-09	4.395E-09	1.076E-09	5.945E-10	4.931E-10
SSE	9.323E-09	6.177E-09	5.648E-09	1.369E-09	7.462E-10	6.166E-10
SE	9.039E-09	5.999E-09	5.485E-09	1.306E-09	6.875E-10	5.634E-10
ESE	7.143E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10	4.737E-10
E	7.073E-09	4.698E-09	4.299E-09	1.073E-09	6.068E-10	5.048E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.743E-10	5.617E-10
NE	7.225E-09	4.799E-09	4.392E-09	1.106E-09	6.298E-10	5.244E-10
NNE	1.022E-08	6.763E-09	6.181E-09	1.518E-09	8.440E-10	7.000E-10

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.640E-06	2.336E-06	2.046E-06	1.788E-06	1.550E-06	1.371E-06	1.084E-06
NNW	5.869E-06	3.965E-06	3.513E-06	3.102E-06	2.716E-06	2.420E-06	1.937E-06
NW	8.121E-06	5.808E-06	5.214E-06	4.661E-06	4.128E-06	3.713E-06	3.018E-06
WNW	5.818E-06	4.301E-06	3.890E-06	3.500E-06	3.119E-06	2.818E-06	2.307E-06
W	3.377E-06	2.315E-06	2.057E-06	1.823E-06	1.601E-06	1.430E-06	1.149E-06
WSW	2.591E-06	1.729E-06	1.531E-06	1.352E-06	1.185E-06	1.058E-06	8.502E-07
SW	2.469E-06	1.647E-06	1.458E-06	1.289E-06	1.131E-06	1.010E-06	8.131E-07
SSW	2.301E-06	1.517E-06	1.342E-06	1.185E-06	1.039E-06	9.286E-07	7.483E-07
S	1.775E-06	1.093E-06	9.477E-07	8.213E-07	7.066E-07	6.214E-07	4.866E-07
SSE	1.972E-06	1.250E-06	1.091E-06	9.502E-07	8.216E-07	7.254E-07	5.720E-07
SE	1.727E-06	1.127E-06	9.916E-07	8.704E-07	7.581E-07	6.731E-07	5.357E-07
ESE	1.707E-06	1.060E-06	9.202E-07	7.974E-07	6.855E-07	6.023E-07	4.706E-07
E	1.861E-06	1.110E-06	9.548E-07	8.212E-07	7.013E-07	6.131E-07	4.754E-07
ENE	2.249E-06	1.332E-06	1.144E-06	9.814E-07	8.361E-07	7.295E-07	5.635E-07
NE	2.093E-06	1.237E-06	1.062E-06	9.117E-07	7.768E-07	6.779E-07	5.236E-07
NNE	2.603E-06	1.584E-06	1.370E-06	1.184E-06	1.015E-06	8.909E-07	6.949E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.009E-06	8.663E-07	5.847E-08	5.597E-08	5.364E-08	3.263E-08	2.563E-08
NNW	1.809E-06	1.564E-06	1.152E-07	1.104E-07	1.059E-07	6.506E-08	5.113E-08
NW	2.830E-06	2.466E-06	1.981E-07	1.900E-07	1.824E-07	1.130E-07	8.884E-08
WNW	2.167E-06	1.896E-06	1.572E-07	1.508E-07	1.449E-07	9.013E-08	7.103E-08
W	1.074E-06	9.308E-07	7.099E-08	6.806E-08	6.532E-08	4.037E-08	3.177E-08
WSW	7.948E-07	6.890E-07	5.228E-08	5.012E-08	4.811E-08	2.974E-08	2.344E-08
SW	7.607E-07	6.603E-07	5.091E-08	4.881E-08	4.685E-08	2.894E-08	2.276E-08
SSW	7.003E-07	6.084E-07	4.674E-08	4.481E-08	4.300E-08	2.655E-08	2.091E-08
S	4.517E-07	3.860E-07	2.443E-08	2.337E-08	2.238E-08	1.354E-08	1.062E-08
SSE	5.320E-07	4.563E-07	3.072E-08	2.941E-08	2.819E-08	1.720E-08	1.353E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.995E-07	4.306E-07	2.983E-08	2.856E-08	2.738E-08	1.668E-08	1.311E-08
ESE	4.365E-07	3.723E-07	2.346E-08	2.246E-08	2.153E-08	1.314E-08	1.034E-08
E	4.401E-07	3.741E-07	2.290E-08	2.194E-08	2.104E-08	1.291E-08	1.021E-08
ENE	5.210E-07	4.418E-07	2.597E-08	2.485E-08	2.382E-08	1.451E-08	1.148E-08
NE	4.841E-07	4.104E-07	2.355E-08	2.254E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.442E-07	5.492E-07	3.383E-08	3.237E-08	3.101E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)					
Dir	11520	15610	16670	47000	70000	79700
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09	1.165E-09
NNW	3.546E-08	2.377E-08	2.178E-08	5.435E-09	2.971E-09	2.461E-09
NW	6.194E-08	4.187E-08	3.844E-08	9.708E-09	5.246E-09	4.344E-09
WNW	4.989E-08	3.411E-08	3.139E-08	8.178E-09	4.445E-09	3.692E-09
W	2.212E-08	1.491E-08	1.369E-08	3.453E-09	1.885E-09	1.563E-09
WSW	1.634E-08	1.103E-08	1.012E-08	2.548E-09	1.370E-09	1.133E-09
SW	1.578E-08	1.056E-08	9.673E-09	2.369E-09	1.262E-09	1.042E-09
SSW	1.453E-08	9.768E-09	8.956E-09	2.223E-09	1.182E-09	9.764E-10
S	7.291E-09	4.811E-09	4.395E-09	1.076E-09	5.945E-10	4.931E-10
SSE	9.324E-09	6.178E-09	5.648E-09	1.369E-09	7.462E-10	6.166E-10
SE	9.040E-09	6.000E-09	5.485E-09	1.306E-09	6.874E-10	5.634E-10
ESE	7.143E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10	4.736E-10
E	7.073E-09	4.698E-09	4.299E-09	1.073E-09	6.068E-10	5.048E-10
ENE	7.914E-09	5.218E-09	4.768E-09	1.180E-09	6.743E-10	5.617E-10
NE	7.225E-09	4.799E-09	4.392E-09	1.106E-09	6.298E-10	5.244E-10
NNE	1.023E-08	6.763E-09	6.181E-09	1.518E-09	8.439E-10	7.000E-10

CY 2015 CAP88-PC Output Data for the Maximum Exposed Off-Site Individual at the DOE WIPP Maximum Residential Location (8,850 meters WNW)

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Wed Apr 27 12:05:22 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015
DOSE Age Group: Adult

Comments:

Committed Effective Dose Equivalent (mrem)
8.81E-06

At This Location: 8850 Meters West Northwest

Dataset Name: B_Ind15m_edp.
Dataset Date: Apr 27, 2016 12:05 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

Wed Apr 27 12:05:22 2016 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 8850 Meters West Northwest
Lifetime Fatal Cancer Risk: 1.06E-12

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	2.37E-06
UB_Wall	2.47E-06
Bone_Sur	2.76E-04
Brain	2.25E-06
Breasts	2.33E-06
St_Wall	2.38E-06
SI_Wall	2.40E-06
ULI_Wall	2.48E-06
LLI_Wall	2.76E-06
Kidneys	3.31E-06
Liver	2.25E-05
Muscle	2.45E-06
Ovaries	7.11E-06
Pancreas	2.38E-06
R_Marrow	1.21E-05
Skin	5.66E-06
Spleen	2.39E-06
Testes	7.09E-06
Thymus	2.36E-06
Thyroid	2.45E-06
GB_Wall	2.36E-06
Ht_Wall	2.40E-06
Uterus	2.42E-06
ET_Reg	3.10E-06
Lung_66	6.51E-06
Effectiv	8.81E-06

Wed Apr 27 12:05:22 2016 SYNOPSIS
Page 1a

RADIONUCLIDE EMISSIONS DURING THE YEAR 2015

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	1.8E-08	3.4E-09	2.1E-08
Pu-239	M	1.000	3.5E-07	4.0E-09	3.5E-07
Am-241	M	1.000	3.2E-06	5.8E-09	3.2E-06
Sr-90	M	1.000	2.4E-07	1.7E-07	4.1E-07
Cs-137	F	1.000	4.5E-06	3.2E-06	7.7E-06
U-233	M	1.000	1.3E-08	8.3E-09	2.2E-08
U-238	M	1.000	9.0E-09	5.4E-09	1.4E-08

SITE INFORMATION

Temperature: 17.260 degrees C
Precipitation: 44.400 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 8850 meters

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	6.70	20.00
Diameter (m):	1.80	2.60
Plume Rise Momentum (m/s): (Exit Velocity)	10.80	3.30

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

347	490	539	592	652	707	822
860	945	5100	5250	5400	7500	8850
11520	15610	16670	47000	70000		

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Wed Apr 27 12:05:22 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15m_edp.
Dataset Date: Apr 27, 2016 12:05 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Pu-238	M	1.000	4.44E-06	1.80E-03
Pu-239	M	1.000	4.44E-06	1.80E-03
Am-241	M	1.000	4.44E-06	1.80E-03
Sr-90	M	1.000	4.44E-06	1.80E-03
Cs-137	F	1.000	4.44E-06	1.80E-03
U-233	M	1.000	4.44E-06	1.80E-03
U-238	M	1.000	4.44E-06	1.80E-03

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
Nuclide	Radio-active	Surface	Water	Milk (1)	Meat (2)
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Pu-239	7.87E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Sr-90	6.59E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Cs-137	6.29E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
U-233	1.19E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic meters/yr	5.26E+03
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight)	
(Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass	
when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	1.00E+00
Meat	1.00E+00
Milk	1.00E+00
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA (Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	7.62E+01
Milk ingestion (L/y)	5.30E+01
Meat ingestion (kg/y)	8.40E+01
Leafy vegetable ingestion (kg/y)	7.79E+00
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

Non-Radon Individual Assessment
Wed Apr 27 12:05:22 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015
DOSE Age Group: Adult

Comments:

Dataset Name: B_Ind15m_edp.
Dataset Date: Apr 27, 2016 12:05 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	2.37E-06
UB_Wall	2.47E-06
Bone_Sur	2.76E-04
Brain	2.25E-06
Breasts	2.33E-06
St_Wall	2.38E-06
SI_Wall	2.40E-06
ULI_Wall	2.48E-06
LLI_Wall	2.76E-06
Kidneys	3.31E-06
Liver	2.25E-05
Muscle	2.45E-06
Ovaries	7.11E-06
Pancreas	2.38E-06
R_Marrow	1.21E-05
Skin	5.66E-06
Spleen	2.39E-06
Testes	7.09E-06
Thymus	2.36E-06
Thyroid	2.45E-06
GB_Wall	2.36E-06
Ht_Wall	2.40E-06
Uterus	2.42E-06
ET_Reg	3.10E-06
Lung_66	6.51E-06
Effectiv	8.81E-06

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.32E-06
INHALATION	6.48E-06
AIR IMMERSION	5.19E-11
GROUND SURFACE	1.01E-06
INTERNAL	7.80E-06
EXTERNAL	1.01E-06
TOTAL	8.81E-06

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	4.32E-08
U-234	7.77E-16
Th-230	2.19E-19
Ra-226	2.20E-20
Rn-222	1.22E-21
Po-218	2.19E-26
Pb-214	7.99E-19
At-218	8.22E-26
Bi-214	4.67E-18
Rn-218	2.32E-28
Po-214	2.59E-22
Tl-210	1.82E-21
Pb-210	2.73E-21
Bi-210	4.41E-20
Hg-206	0.00E+00
Po-210	1.13E-23
Tl-206	8.53E-26
Pu-239	7.88E-07
U-235m	0.00E+00
U-235	7.80E-16
Th-231	7.95E-17
Pa-231	1.04E-19
Ac-227	3.09E-22
Th-227	1.47E-19
Fr-223	1.39E-21
Ra-223	1.65E-19
Rn-219	7.13E-20
At-219	0.00E+00
Bi-215	2.81E-25
Po-215	2.18E-22
Pb-211	1.40E-19
Bi-211	5.77E-20
Tl-207	7.26E-20
Po-211	2.78E-23
Am-241	5.90E-06
Np-237	3.63E-13
Pa-233	3.00E-12
U-233	3.05E-09
Th-229	2.35E-12
Ra-225	3.33E-13
Ac-225	3.99E-13
Fr-221	8.13E-13
At-217	6.86E-15
Bi-213	4.96E-12
Po-213	1.06E-15
Tl-209	1.28E-12
Pb-209	9.64E-14

Sr-90	7.53E-08
Y-90	1.02E-08
Cs-137	1.02E-06
Ba-137m	9.65E-07
U-238	1.66E-09
Th-234	5.10E-11
Pa-234m	6.98E-10
Pa-234	1.38E-11
TOTAL	8.81E-06

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.53E-14
INHALATION	4.83E-13
AIR IMMERSION	2.82E-17
GROUND SURFACE	5.38E-13
INTERNAL	5.18E-13
EXTERNAL	5.38E-13
TOTAL	1.06E-12

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	3.72E-15
U-234	2.68E-22
Th-230	9.29E-26
Ra-226	1.19E-26
Rn-222	6.67E-28
Po-218	9.77E-33
Pb-214	4.27E-25
At-218	1.01E-32
Bi-214	2.47E-24
Rn-218	1.27E-34
Po-214	1.42E-28
Tl-210	9.74E-28
Pb-210	1.22E-27
Bi-210	4.89E-27
Hg-206	0.00E+00
Po-210	6.19E-30
Tl-206	9.59E-33
Pu-239	5.80E-14
U-235m	0.00E+00
U-235	4.22E-22
Th-231	3.63E-23
Pa-231	5.45E-26
Ac-227	1.15E-28
Th-227	7.98E-26
Fr-223	5.18E-28
Ra-223	8.90E-26
Rn-219	3.90E-26
At-219	0.00E+00
Bi-215	1.25E-31
Po-215	1.19E-28
Pb-211	5.01E-26
Bi-211	3.15E-26
Tl-207	9.33E-27
Po-211	1.52E-29
Am-241	4.51E-13
Np-237	1.79E-19
Pa-233	1.62E-18
U-233	1.04E-15
Th-229	1.24E-18
Ra-225	1.51E-19
Ac-225	2.10E-19
Fr-221	4.41E-19
At-217	3.75E-21
Bi-213	2.15E-18
Po-213	5.77E-22
Tl-209	6.82E-19

Pb-209	1.27E-20
Sr-90	1.58E-15
Y-90	1.22E-15
Cs-137	1.70E-14
Ba-137m	5.22E-13
U-238	4.93E-16
Th-234	2.64E-17
Pa-234m	1.22E-16
Pa-234	7.47E-18
TOTAL	1.06E-12

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	4.8E-04	3.0E-04	2.6E-04	2.3E-04	2.0E-04	1.7E-04	1.4E-04
NNW	8.1E-04	5.2E-04	4.6E-04	4.0E-04	3.5E-04	3.1E-04	2.4E-04
NW	1.2E-03	7.9E-04	7.0E-04	6.2E-04	5.4E-04	4.8E-04	3.9E-04
WNW	8.4E-04	5.9E-04	5.3E-04	4.7E-04	4.1E-04	3.7E-04	3.0E-04
W	4.7E-04	3.1E-04	2.7E-04	2.4E-04	2.1E-04	1.8E-04	1.5E-04
WSW	3.6E-04	2.3E-04	2.0E-04	1.8E-04	1.5E-04	1.4E-04	1.1E-04
SW	3.4E-04	2.2E-04	1.9E-04	1.7E-04	1.5E-04	1.3E-04	1.0E-04
SSW	3.1E-04	2.0E-04	1.8E-04	1.5E-04	1.3E-04	1.2E-04	9.5E-05
S	2.3E-04	1.4E-04	1.2E-04	1.0E-04	8.9E-05	7.8E-05	6.1E-05
SSE	2.6E-04	1.6E-04	1.4E-04	1.2E-04	1.0E-04	9.2E-05	7.2E-05
SSE	2.3E-04	1.5E-04	1.3E-04	1.1E-04	9.6E-05	8.5E-05	6.7E-05
ESE	2.2E-04	1.4E-04	1.2E-04	1.0E-04	8.6E-05	7.6E-05	5.9E-05
E	2.4E-04	1.4E-04	1.2E-04	1.0E-04	8.8E-05	7.7E-05	5.9E-05
ENE	2.9E-04	1.7E-04	1.4E-04	1.2E-04	1.0E-04	9.1E-05	7.0E-05
NE	2.7E-04	1.6E-04	1.3E-04	1.1E-04	9.7E-05	8.4E-05	6.5E-05
NNE	3.4E-04	2.0E-04	1.7E-04	1.5E-04	1.3E-04	1.1E-04	8.6E-05

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	1.3E-04	1.1E-04	7.5E-06	7.2E-06	6.9E-06	4.2E-06	3.4E-06
NNW	2.3E-04	2.0E-04	1.4E-05	1.4E-05	1.3E-05	8.2E-06	6.5E-06
NW	3.6E-04	3.1E-04	2.4E-05	2.3E-05	2.2E-05	1.4E-05	1.1E-05
WNW	2.8E-04	2.4E-04	1.9E-05	1.9E-05	1.8E-05	1.1E-05	8.8E-06
W	1.4E-04	1.2E-04	8.8E-06	8.5E-06	8.1E-06	5.1E-06	4.0E-06
WSW	1.0E-04	8.7E-05	6.6E-06	6.3E-06	6.1E-06	3.8E-06	3.0E-06
SW	9.7E-05	8.3E-05	6.4E-06	6.1E-06	5.9E-06	3.7E-06	2.9E-06
SSW	8.9E-05	7.7E-05	5.9E-06	5.7E-06	5.4E-06	3.4E-06	2.7E-06
S	5.6E-05	4.8E-05	3.2E-06	3.1E-06	2.9E-06	1.8E-06	1.4E-06
SSE	6.7E-05	5.7E-05	3.9E-06	3.8E-06	3.6E-06	2.2E-06	1.8E-06
SSE	6.2E-05	5.4E-05	3.8E-06	3.7E-06	3.5E-06	2.2E-06	1.7E-06
ESE	5.4E-05	4.6E-05	3.1E-06	2.9E-06	2.8E-06	1.8E-06	1.4E-06
E	5.5E-05	4.7E-05	3.0E-06	2.9E-06	2.8E-06	1.7E-06	1.4E-06
ENE	6.5E-05	5.5E-05	3.5E-06	3.3E-06	3.2E-06	2.0E-06	1.6E-06
NE	6.0E-05	5.1E-05	3.2E-06	3.1E-06	2.9E-06	1.8E-06	1.5E-06
NNE	8.0E-05	6.8E-05	4.5E-06	4.3E-06	4.1E-06	2.5E-06	2.0E-06

INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	11520	15610	16670	47000	70000
N	2.3E-06	1.6E-06	1.4E-06	3.6E-07	2.0E-07
NNW	4.5E-06	3.1E-06	2.8E-06	7.3E-07	4.0E-07
NW	7.8E-06	5.3E-06	4.8E-06	1.2E-06	6.8E-07
WNW	6.2E-06	4.3E-06	3.9E-06	1.0E-06	5.7E-07
W	2.8E-06	1.9E-06	1.7E-06	4.5E-07	2.5E-07
WSW	2.1E-06	1.4E-06	1.3E-06	3.4E-07	1.9E-07
SW	2.0E-06	1.4E-06	1.2E-06	3.1E-07	1.7E-07
SSW	1.9E-06	1.3E-06	1.2E-06	3.0E-07	1.6E-07
S	1.0E-06	6.7E-07	6.1E-07	1.6E-07	8.9E-08
SSE	1.2E-06	8.3E-07	7.6E-07	1.9E-07	1.1E-07
SSE	1.2E-06	8.0E-07	7.4E-07	1.8E-07	9.9E-08
ESE	9.7E-07	6.6E-07	6.0E-07	1.5E-07	8.6E-08
E	9.8E-07	6.6E-07	6.1E-07	1.6E-07	9.2E-08
ENE	1.1E-06	7.5E-07	6.9E-07	1.8E-07	1.1E-07
NE	1.0E-06	7.0E-07	6.4E-07	1.7E-07	1.0E-07
NNE	1.4E-06	9.5E-07	8.7E-07	2.3E-07	1.3E-07

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	5.3E-11	3.3E-11	2.9E-11	2.5E-11	2.2E-11	1.9E-11	1.5E-11
NNW	8.7E-11	5.7E-11	5.1E-11	4.4E-11	3.9E-11	3.4E-11	2.7E-11
NW	1.2E-10	8.5E-11	7.6E-11	6.7E-11	5.9E-11	5.3E-11	4.3E-11
WNW	8.9E-11	6.3E-11	5.7E-11	5.1E-11	4.5E-11	4.0E-11	3.3E-11
W	5.1E-11	3.4E-11	3.0E-11	2.6E-11	2.3E-11	2.0E-11	1.6E-11
WSW	3.8E-11	2.5E-11	2.2E-11	1.9E-11	1.7E-11	1.5E-11	1.2E-11
SW	3.7E-11	2.4E-11	2.1E-11	1.9E-11	1.6E-11	1.4E-11	1.2E-11
SSW	3.4E-11	2.2E-11	1.9E-11	1.7E-11	1.5E-11	1.3E-11	1.1E-11
S	2.5E-11	1.6E-11	1.3E-11	1.2E-11	1.0E-11	8.8E-12	6.9E-12
SSE	2.9E-11	1.8E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.1E-12
SSE	2.5E-11	1.6E-11	1.4E-11	1.2E-11	1.1E-11	9.6E-12	7.6E-12
ESE	2.5E-11	1.5E-11	1.3E-11	1.1E-11	9.8E-12	8.6E-12	6.7E-12
E	2.7E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.8E-12	6.8E-12
ENE	3.2E-11	1.9E-11	1.6E-11	1.4E-11	1.2E-11	1.0E-11	8.1E-12
NE	3.0E-11	1.8E-11	1.5E-11	1.3E-11	1.1E-11	9.7E-12	7.5E-12
NNE	3.7E-11	2.3E-11	1.9E-11	1.7E-11	1.4E-11	1.3E-11	9.9E-12

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	1.4E-11	1.2E-11	9.2E-13	8.9E-13	8.5E-13	5.4E-13	4.3E-13
NNW	2.6E-11	2.2E-11	1.7E-12	1.7E-12	1.6E-12	1.0E-12	8.0E-13
NW	4.0E-11	3.5E-11	2.9E-12	2.8E-12	2.7E-12	1.7E-12	1.3E-12
WNW	3.1E-11	2.7E-11	2.3E-12	2.2E-12	2.1E-12	1.3E-12	1.1E-12
W	1.5E-11	1.3E-11	1.1E-12	1.0E-12	9.7E-13	6.1E-13	4.9E-13
WSW	1.1E-11	9.8E-12	7.9E-13	7.6E-13	7.3E-13	4.6E-13	3.7E-13
SW	1.1E-11	9.4E-12	7.6E-13	7.3E-13	7.0E-13	4.4E-13	3.5E-13
SSW	1.0E-11	8.7E-12	7.1E-13	6.8E-13	6.6E-13	4.2E-13	3.3E-13
S	6.4E-12	5.5E-12	4.0E-13	3.9E-13	3.7E-13	2.3E-13	1.9E-13
SSE	7.6E-12	6.5E-12	4.9E-13	4.7E-13	4.5E-13	2.8E-13	2.3E-13
SSE	7.1E-12	6.1E-12	4.7E-13	4.5E-13	4.4E-13	2.7E-13	2.2E-13
ESE	6.2E-12	5.3E-12	3.9E-13	3.7E-13	3.6E-13	2.3E-13	1.8E-13
E	6.3E-12	5.4E-12	3.9E-13	3.7E-13	3.6E-13	2.3E-13	1.8E-13
ENE	7.5E-12	6.4E-12	4.5E-13	4.3E-13	4.1E-13	2.6E-13	2.1E-13
NE	7.0E-12	5.9E-12	4.2E-13	4.0E-13	3.9E-13	2.5E-13	2.0E-13
NNE	9.2E-12	7.9E-12	5.7E-13	5.5E-13	5.3E-13	3.3E-13	2.7E-13

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	11520	15610	16670	47000	70000
N	3.0E-13	2.0E-13	1.9E-13	5.0E-14	2.8E-14
NNW	5.7E-13	3.9E-13	3.5E-13	9.4E-14	5.3E-14
NW	9.4E-13	6.4E-13	5.9E-13	1.6E-13	8.7E-14
WNW	7.5E-13	5.2E-13	4.8E-13	1.3E-13	7.1E-14
W	3.4E-13	2.4E-13	2.2E-13	5.8E-14	3.2E-14
WSW	2.6E-13	1.8E-13	1.7E-13	4.4E-14	2.4E-14
SW	2.5E-13	1.7E-13	1.6E-13	4.1E-14	2.2E-14
SSW	2.3E-13	1.6E-13	1.5E-13	3.9E-14	2.1E-14
S	1.3E-13	9.0E-14	8.2E-14	2.2E-14	1.3E-14
SSE	1.6E-13	1.1E-13	1.0E-13	2.6E-14	1.5E-14
SSE	1.5E-13	1.0E-13	9.6E-14	2.5E-14	1.4E-14
ESE	1.3E-13	8.8E-14	8.1E-14	2.1E-14	1.2E-14
E	1.3E-13	9.0E-14	8.3E-14	2.3E-14	1.3E-14
ENE	1.5E-13	1.0E-13	9.5E-14	2.6E-14	1.5E-14
NE	1.4E-13	9.8E-14	9.0E-14	2.5E-14	1.5E-14
NNE	1.9E-13	1.3E-13	1.2E-13	3.2E-14	1.9E-14

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Wed Apr 27 12:05:22 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15m_edp.
Dataset Date: Apr 27, 2016 12:05 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	2.272	2.854	2.975	3.359	2.759	2.753	0.000	0.072
NNW	1.981	2.865	3.200	4.000	3.639	2.886	0.000	0.123
NW	1.905	2.763	2.860	4.448	3.784	3.178	0.000	0.179
WNW	1.722	2.020	2.294	3.609	4.037	3.320	0.000	0.124
W	1.585	1.868	2.251	4.050	4.069	3.256	0.000	0.066
WSW	1.406	1.725	2.079	4.049	3.483	3.236	0.000	0.048
SW	1.491	2.737	2.949	4.294	3.403	3.302	0.000	0.050
SSW	1.441	2.309	2.759	3.615	3.275	3.205	0.000	0.043
S	1.427	2.596	3.888	3.040	2.594	2.838	0.000	0.034
SSE	1.411	1.925	2.701	3.271	3.590	2.587	0.000	0.033
SE	1.562	1.979	2.561	2.655	2.278	2.345	0.000	0.028
ESE	1.505	1.989	2.111	2.820	2.421	1.187	0.000	0.026
E	1.580	2.453	2.985	4.502	3.729	2.174	0.000	0.036
ENE	1.818	2.521	3.317	4.495	2.861	2.572	0.000	0.046
NE	1.893	2.395	3.194	3.507	1.957	0.000	0.000	0.041
NNE	2.038	2.720	3.068	3.219	2.169	2.203	0.000	0.051

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	3.022	3.869	4.138	4.471	3.317	2.860	0.000
NNW	2.947	4.071	4.533	5.042	4.232	3.333	0.000
NW	2.885	3.904	4.403	5.432	4.385	3.590	0.000
WNW	2.659	3.297	3.662	4.839	4.550	3.875	0.000
W	2.542	3.077	3.408	5.472	5.146	3.894	0.000
WSW	2.217	2.863	3.769	5.390	4.650	3.646	0.000
SW	2.319	3.904	4.431	6.152	4.458	3.698	0.000
SSW	2.356	3.815	4.630	5.332	4.048	3.673	0.000
S	2.306	4.672	5.355	3.927	3.292	3.571	0.000
SSE	2.284	2.880	3.921	4.693	4.679	3.318	0.000

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
SE	2.421	2.929	3.641	3.751	3.187	2.890	0.000
ESE	2.238	2.921	3.340	5.048	3.894	1.672	0.000
E	2.346	3.552	4.778	6.827	4.784	3.172	0.000
ENE	2.581	3.650	4.765	6.131	3.626	2.572	0.000
NE	2.641	3.518	4.529	4.733	2.887	0.000	0.000
NNE	2.831	3.616	4.167	4.730	2.905	2.772	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.2186	0.1264	0.2158	0.3211	0.1051	0.0130	0.0000
NNW	0.1251	0.0835	0.1540	0.3797	0.2361	0.0217	0.0000
NW	0.0737	0.0387	0.0787	0.4343	0.3270	0.0475	0.0000
WNW	0.0793	0.0340	0.0618	0.2931	0.4633	0.0685	0.0000
W	0.1048	0.0468	0.0762	0.4173	0.3151	0.0398	0.0000
WSW	0.1485	0.0581	0.1132	0.3840	0.2363	0.0600	0.0000
SW	0.1155	0.0582	0.1197	0.4743	0.1691	0.0632	0.0000
SSW	0.1464	0.0779	0.1741	0.3599	0.1635	0.0782	0.0000
S	0.1778	0.1133	0.3982	0.2336	0.0622	0.0149	0.0000
SSE	0.1780	0.1018	0.2030	0.3601	0.1361	0.0211	0.0000
SE	0.2133	0.1248	0.2185	0.2964	0.1230	0.0240	0.0000
ESE	0.3078	0.1105	0.1868	0.2857	0.1070	0.0023	0.0000
E	0.2796	0.1079	0.1792	0.3559	0.0724	0.0050	0.0000
ENE	0.2831	0.1286	0.2090	0.3432	0.0355	0.0007	0.0000
NE	0.3552	0.1499	0.2354	0.2266	0.0330	0.0000	0.0000
NNE	0.3089	0.1395	0.2520	0.2430	0.0513	0.0053	0.0000
TOTAL	0.1596	0.0793	0.1501	0.3548	0.2210	0.0350	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 17.3 degrees C
290.42 K
Precipitation: 44.4 cm/y
Humidity: 8.0 g/cu m
Lid Height: 1000.0 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 4.314 m/s

Vertical Temperature Gradients:
STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Wed Apr 27 12:05:22 2016

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
Lat. 32.372, Long. -103.792
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2015

Comments:

Dataset Name: B_Ind15m_edp.
Dataset Date: Apr 27, 2016 12:05 PM
Wind File: C:\Users\CAP88\Documents\CAP88\Wind Files\WIPP_15.WND

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.988E-06	2.497E-06	2.172E-06	1.887E-06	1.627E-06	1.433E-06	1.125E-06
NNW	6.621E-06	4.336E-06	3.809E-06	3.337E-06	2.900E-06	2.569E-06	2.036E-06
NW	9.391E-06	6.467E-06	5.749E-06	5.093E-06	4.472E-06	3.994E-06	3.209E-06
WNW	6.785E-06	4.832E-06	4.327E-06	3.857E-06	3.406E-06	3.055E-06	2.470E-06
W	3.867E-06	2.559E-06	2.254E-06	1.980E-06	1.724E-06	1.531E-06	1.217E-06
WSW	2.908E-06	1.890E-06	1.661E-06	1.458E-06	1.270E-06	1.128E-06	8.982E-07
SW	2.784E-06	1.801E-06	1.584E-06	1.391E-06	1.212E-06	1.078E-06	8.600E-07
SSW	2.556E-06	1.646E-06	1.448E-06	1.272E-06	1.111E-06	9.884E-07	7.907E-07
S	1.912E-06	1.153E-06	9.958E-07	8.591E-07	7.360E-07	6.451E-07	5.023E-07
SSE	2.168E-06	1.339E-06	1.161E-06	1.006E-06	8.647E-07	7.601E-07	5.950E-07
SE	1.882E-06	1.203E-06	1.053E-06	9.191E-07	7.963E-07	7.042E-07	5.567E-07
ESE	1.855E-06	1.127E-06	9.722E-07	8.377E-07	7.162E-07	6.265E-07	4.859E-07
E	2.016E-06	1.175E-06	1.005E-06	8.598E-07	7.305E-07	6.362E-07	4.902E-07
ENE	2.421E-06	1.402E-06	1.197E-06	1.022E-06	8.666E-07	7.533E-07	5.783E-07
NE	2.228E-06	1.293E-06	1.106E-06	9.449E-07	8.019E-07	6.975E-07	5.359E-07
NNE	2.796E-06	1.668E-06	1.435E-06	1.234E-06	1.054E-06	9.218E-07	7.148E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.044E-06	8.934E-07	5.874E-08	5.622E-08	5.388E-08	3.273E-08	2.569E-08
NNW	1.896E-06	1.630E-06	1.159E-07	1.111E-07	1.065E-07	6.533E-08	5.130E-08
NW	2.999E-06	2.597E-06	1.998E-07	1.916E-07	1.839E-07	1.136E-07	8.926E-08
WNW	2.313E-06	2.008E-06	1.588E-07	1.523E-07	1.462E-07	9.074E-08	7.143E-08
W	1.134E-06	9.766E-07	7.156E-08	6.859E-08	6.582E-08	4.059E-08	3.191E-08
WSW	8.376E-07	7.224E-07	5.274E-08	5.056E-08	4.851E-08	2.992E-08	2.355E-08
SW	8.025E-07	6.931E-07	5.138E-08	4.925E-08	4.726E-08	2.912E-08	2.288E-08
SSW	7.384E-07	6.386E-07	4.721E-08	4.524E-08	4.341E-08	2.673E-08	2.102E-08
S	4.655E-07	3.965E-07	2.454E-08	2.347E-08	2.248E-08	1.358E-08	1.064E-08
SSE	5.522E-07	4.718E-07	3.089E-08	2.957E-08	2.834E-08	1.726E-08	1.357E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.180E-07	4.449E-07	2.999E-08	2.871E-08	2.752E-08	1.673E-08	1.314E-08
ESE	4.497E-07	3.822E-07	2.353E-08	2.252E-08	2.159E-08	1.316E-08	1.036E-08
E	4.529E-07	3.837E-07	2.299E-08	2.201E-08	2.111E-08	1.294E-08	1.023E-08
ENE	5.338E-07	4.513E-07	2.603E-08	2.491E-08	2.387E-08	1.452E-08	1.149E-08
NE	4.947E-07	4.183E-07	2.360E-08	2.258E-08	2.163E-08	1.315E-08	1.043E-08
NNE	6.616E-07	5.623E-07	3.393E-08	3.247E-08	3.111E-08	1.886E-08	1.486E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.766E-08	1.168E-08	1.067E-08	2.582E-09	1.408E-09
NNW	3.555E-08	2.382E-08	2.183E-08	5.440E-09	2.970E-09
NW	6.218E-08	4.201E-08	3.857E-08	9.722E-09	5.245E-09
WNW	5.011E-08	3.425E-08	3.152E-08	8.193E-09	4.445E-09
W	2.220E-08	1.496E-08	1.373E-08	3.457E-09	1.885E-09
WSW	1.640E-08	1.107E-08	1.015E-08	2.551E-09	1.370E-09
SW	1.585E-08	1.060E-08	9.707E-09	2.373E-09	1.262E-09
SSW	1.460E-08	9.807E-09	8.991E-09	2.227E-09	1.181E-09
S	7.302E-09	4.817E-09	4.400E-09	1.076E-09	5.940E-10
SSE	9.343E-09	6.188E-09	5.657E-09	1.370E-09	7.456E-10
SE	9.056E-09	6.008E-09	5.492E-09	1.306E-09	6.865E-10
ESE	7.146E-09	4.739E-09	4.333E-09	1.052E-09	5.741E-10
E	7.081E-09	4.701E-09	4.302E-09	1.073E-09	6.064E-10
ENE	7.917E-09	5.219E-09	4.769E-09	1.180E-09	6.739E-10
NE	7.226E-09	4.799E-09	4.391E-09	1.106E-09	6.293E-10
NNE	1.023E-08	6.766E-09	6.184E-09	1.518E-09	8.431E-10

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	4.233E-06	2.611E-06	2.262E-06	1.958E-06	1.681E-06	1.477E-06	1.153E-06
NNW	7.153E-06	4.598E-06	4.018E-06	3.503E-06	3.030E-06	2.674E-06	2.106E-06
NW	1.029E-05	6.933E-06	6.127E-06	5.398E-06	4.714E-06	4.193E-06	3.344E-06
WNW	7.468E-06	5.208E-06	4.636E-06	4.109E-06	3.609E-06	3.222E-06	2.586E-06
W	4.213E-06	2.732E-06	2.393E-06	2.091E-06	1.812E-06	1.602E-06	1.265E-06
WSW	3.133E-06	2.003E-06	1.753E-06	1.532E-06	1.329E-06	1.177E-06	9.321E-07
SW	3.007E-06	1.911E-06	1.672E-06	1.462E-06	1.270E-06	1.125E-06	8.931E-07
SSW	2.737E-06	1.738E-06	1.523E-06	1.334E-06	1.161E-06	1.031E-06	8.207E-07
S	2.008E-06	1.197E-06	1.030E-06	8.859E-07	7.568E-07	6.618E-07	5.134E-07
SSE	2.306E-06	1.402E-06	1.211E-06	1.045E-06	8.951E-07	7.847E-07	6.112E-07
SE	1.992E-06	1.257E-06	1.096E-06	9.535E-07	8.234E-07	7.263E-07	5.715E-07
ESE	1.959E-06	1.174E-06	1.009E-06	8.661E-07	7.378E-07	6.436E-07	4.967E-07
E	2.126E-06	1.221E-06	1.040E-06	8.870E-07	7.512E-07	6.525E-07	5.006E-07
ENE	2.543E-06	1.451E-06	1.235E-06	1.051E-06	8.881E-07	7.701E-07	5.888E-07
NE	2.323E-06	1.333E-06	1.136E-06	9.684E-07	8.196E-07	7.114E-07	5.446E-07
NNE	2.933E-06	1.727E-06	1.481E-06	1.270E-06	1.082E-06	9.437E-07	7.289E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.070E-06	9.125E-07	5.894E-08	5.640E-08	5.404E-08	3.279E-08	2.573E-08
NNW	1.957E-06	1.676E-06	1.165E-07	1.116E-07	1.070E-07	6.553E-08	5.143E-08
NW	3.119E-06	2.690E-06	2.011E-07	1.927E-07	1.850E-07	1.141E-07	8.957E-08
WNW	2.415E-06	2.088E-06	1.599E-07	1.533E-07	1.472E-07	9.117E-08	7.171E-08
W	1.176E-06	1.009E-06	7.196E-08	6.896E-08	6.617E-08	4.074E-08	3.201E-08
WSW	8.679E-07	7.460E-07	5.307E-08	5.086E-08	4.880E-08	3.004E-08	2.363E-08
SW	8.321E-07	7.163E-07	5.171E-08	4.956E-08	4.755E-08	2.925E-08	2.296E-08
SSW	7.653E-07	6.600E-07	4.754E-08	4.555E-08	4.370E-08	2.685E-08	2.111E-08
S	4.753E-07	4.040E-07	2.461E-08	2.354E-08	2.254E-08	1.360E-08	1.066E-08
SSE	5.665E-07	4.827E-07	3.101E-08	2.968E-08	2.844E-08	1.730E-08	1.359E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.311E-07	4.550E-07	3.010E-08	2.882E-08	2.761E-08	1.677E-08	1.317E-08
ESE	4.591E-07	3.892E-07	2.358E-08	2.257E-08	2.163E-08	1.317E-08	1.036E-08
E	4.620E-07	3.905E-07	2.305E-08	2.207E-08	2.116E-08	1.295E-08	1.024E-08
ENE	5.429E-07	4.580E-07	2.608E-08	2.495E-08	2.391E-08	1.454E-08	1.149E-08
NE	5.023E-07	4.238E-07	2.363E-08	2.261E-08	2.166E-08	1.316E-08	1.044E-08
NNE	6.739E-07	5.715E-07	3.401E-08	3.254E-08	3.117E-08	1.889E-08	1.487E-08

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.768E-08	1.169E-08	1.068E-08	2.582E-09	1.407E-09
NNW	3.562E-08	2.386E-08	2.186E-08	5.443E-09	2.969E-09
NW	6.234E-08	4.211E-08	3.866E-08	9.732E-09	5.244E-09
WNW	5.027E-08	3.435E-08	3.160E-08	8.204E-09	4.446E-09
W	2.225E-08	1.499E-08	1.375E-08	3.460E-09	1.885E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.554E-09	1.369E-09
SW	1.589E-08	1.062E-08	9.731E-09	2.375E-09	1.261E-09
SSW	1.464E-08	9.835E-09	9.016E-09	2.230E-09	1.180E-09
S	7.310E-09	4.821E-09	4.404E-09	1.076E-09	5.936E-10
SSE	9.356E-09	6.195E-09	5.663E-09	1.370E-09	7.452E-10
SE	9.068E-09	6.014E-09	5.498E-09	1.306E-09	6.859E-10
ESE	7.149E-09	4.739E-09	4.333E-09	1.051E-09	5.737E-10
E	7.086E-09	4.704E-09	4.304E-09	1.073E-09	6.061E-10
ENE	7.920E-09	5.220E-09	4.769E-09	1.179E-09	6.736E-10
NE	7.227E-09	4.799E-09	4.391E-09	1.105E-09	6.289E-10
NNE	1.024E-08	6.768E-09	6.186E-09	1.517E-09	8.425E-10

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	4.249E-06	2.618E-06	2.268E-06	1.962E-06	1.685E-06	1.479E-06	1.155E-06
NNW	7.187E-06	4.614E-06	4.031E-06	3.514E-06	3.038E-06	2.681E-06	2.110E-06
NW	1.034E-05	6.963E-06	6.151E-06	5.417E-06	4.730E-06	4.206E-06	3.353E-06
WNW	7.511E-06	5.232E-06	4.655E-06	4.125E-06	3.621E-06	3.233E-06	2.593E-06
W	4.235E-06	2.743E-06	2.402E-06	2.098E-06	1.817E-06	1.606E-06	1.268E-06
WSW	3.147E-06	2.010E-06	1.759E-06	1.537E-06	1.333E-06	1.180E-06	9.343E-07
SW	3.021E-06	1.918E-06	1.678E-06	1.467E-06	1.273E-06	1.128E-06	8.952E-07
SSW	2.748E-06	1.744E-06	1.528E-06	1.338E-06	1.164E-06	1.033E-06	8.226E-07
S	2.014E-06	1.199E-06	1.032E-06	8.876E-07	7.581E-07	6.629E-07	5.141E-07
SSE	2.315E-06	1.406E-06	1.214E-06	1.047E-06	8.971E-07	7.862E-07	6.122E-07
SE	1.999E-06	1.260E-06	1.098E-06	9.556E-07	8.251E-07	7.276E-07	5.724E-07
ESE	1.966E-06	1.177E-06	1.011E-06	8.679E-07	7.392E-07	6.446E-07	4.974E-07
E	2.133E-06	1.224E-06	1.043E-06	8.887E-07	7.525E-07	6.536E-07	5.012E-07
ENE	2.551E-06	1.454E-06	1.237E-06	1.053E-06	8.895E-07	7.712E-07	5.895E-07
NE	2.329E-06	1.336E-06	1.138E-06	9.698E-07	8.207E-07	7.122E-07	5.451E-07
NNE	2.942E-06	1.731E-06	1.484E-06	1.273E-06	1.084E-06	9.450E-07	7.297E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.071E-06	9.137E-07	5.895E-08	5.641E-08	5.405E-08	3.280E-08	2.573E-08
NNW	1.961E-06	1.679E-06	1.165E-07	1.116E-07	1.070E-07	6.554E-08	5.143E-08
NW	3.127E-06	2.696E-06	2.011E-07	1.928E-07	1.850E-07	1.141E-07	8.958E-08
WNW	2.421E-06	2.093E-06	1.600E-07	1.534E-07	1.473E-07	9.119E-08	7.172E-08
W	1.179E-06	1.011E-06	7.198E-08	6.899E-08	6.619E-08	4.075E-08	3.201E-08
WSW	8.698E-07	7.475E-07	5.309E-08	5.088E-08	4.882E-08	3.005E-08	2.364E-08
SW	8.339E-07	7.177E-07	5.173E-08	4.958E-08	4.756E-08	2.925E-08	2.297E-08
SSW	7.670E-07	6.614E-07	4.756E-08	4.557E-08	4.372E-08	2.686E-08	2.111E-08
S	4.759E-07	4.045E-07	2.462E-08	2.355E-08	2.255E-08	1.361E-08	1.066E-08
SSE	5.674E-07	4.834E-07	3.101E-08	2.969E-08	2.845E-08	1.730E-08	1.359E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	5.320E-07	4.556E-07	3.011E-08	2.882E-08	2.762E-08	1.677E-08	1.317E-08
ESE	4.597E-07	3.896E-07	2.358E-08	2.257E-08	2.163E-08	1.317E-08	1.036E-08
E	4.626E-07	3.909E-07	2.305E-08	2.207E-08	2.116E-08	1.296E-08	1.024E-08
ENE	5.435E-07	4.584E-07	2.608E-08	2.496E-08	2.391E-08	1.454E-08	1.149E-08
NE	5.027E-07	4.242E-07	2.363E-08	2.261E-08	2.166E-08	1.316E-08	1.044E-08
NNE	6.747E-07	5.721E-07	3.402E-08	3.254E-08	3.117E-08	1.889E-08	1.487E-08

GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.768E-08	1.169E-08	1.068E-08	2.582E-09	1.407E-09
NNW	3.562E-08	2.386E-08	2.187E-08	5.443E-09	2.969E-09
NW	6.235E-08	4.212E-08	3.866E-08	9.733E-09	5.244E-09
WNW	5.028E-08	3.435E-08	3.161E-08	8.205E-09	4.446E-09
W	2.226E-08	1.499E-08	1.376E-08	3.461E-09	1.885E-09
WSW	1.645E-08	1.109E-08	1.018E-08	2.554E-09	1.369E-09
SW	1.589E-08	1.063E-08	9.733E-09	2.375E-09	1.261E-09
SSW	1.465E-08	9.837E-09	9.017E-09	2.230E-09	1.180E-09
S	7.311E-09	4.821E-09	4.404E-09	1.076E-09	5.936E-10
SSE	9.357E-09	6.195E-09	5.664E-09	1.370E-09	7.451E-10
SE	9.068E-09	6.015E-09	5.498E-09	1.306E-09	6.858E-10
ESE	7.149E-09	4.739E-09	4.333E-09	1.051E-09	5.736E-10
E	7.087E-09	4.704E-09	4.304E-09	1.073E-09	6.061E-10
ENE	7.920E-09	5.220E-09	4.770E-09	1.179E-09	6.735E-10
NE	7.227E-09	4.799E-09	4.391E-09	1.105E-09	6.289E-10
NNE	1.024E-08	6.769E-09	6.186E-09	1.517E-09	8.424E-10

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.590E-06	2.313E-06	2.027E-06	1.773E-06	1.538E-06	1.362E-06	1.078E-06
NNW	5.758E-06	3.911E-06	3.469E-06	3.068E-06	2.689E-06	2.399E-06	1.923E-06
NW	7.935E-06	5.712E-06	5.136E-06	4.598E-06	4.078E-06	3.672E-06	2.990E-06
WNW	5.677E-06	4.223E-06	3.826E-06	3.448E-06	3.077E-06	2.783E-06	2.283E-06
W	3.305E-06	2.279E-06	2.029E-06	1.800E-06	1.582E-06	1.415E-06	1.140E-06
WSW	2.544E-06	1.706E-06	1.512E-06	1.337E-06	1.173E-06	1.048E-06	8.431E-07
SW	2.423E-06	1.624E-06	1.440E-06	1.274E-06	1.119E-06	1.000E-06	8.062E-07
SSW	2.263E-06	1.498E-06	1.326E-06	1.172E-06	1.029E-06	9.199E-07	7.421E-07
S	1.755E-06	1.084E-06	9.407E-07	8.158E-07	7.023E-07	6.179E-07	4.843E-07
SSE	1.944E-06	1.237E-06	1.080E-06	9.421E-07	8.153E-07	7.204E-07	5.687E-07
SE	1.704E-06	1.116E-06	9.827E-07	8.633E-07	7.524E-07	6.685E-07	5.326E-07
ESE	1.685E-06	1.050E-06	9.125E-07	7.915E-07	6.811E-07	5.988E-07	4.684E-07
E	1.838E-06	1.100E-06	9.474E-07	8.155E-07	6.970E-07	6.097E-07	4.733E-07
ENE	2.224E-06	1.322E-06	1.136E-06	9.755E-07	8.317E-07	7.260E-07	5.613E-07
NE	2.073E-06	1.229E-06	1.056E-06	9.068E-07	7.732E-07	6.750E-07	5.218E-07
NNE	2.574E-06	1.571E-06	1.360E-06	1.176E-06	1.010E-06	8.864E-07	6.920E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.004E-06	8.624E-07	5.843E-08	5.593E-08	5.361E-08	3.262E-08	2.562E-08
NNW	1.796E-06	1.554E-06	1.151E-07	1.103E-07	1.058E-07	6.502E-08	5.110E-08
NW	2.805E-06	2.447E-06	1.978E-07	1.897E-07	1.821E-07	1.129E-07	8.878E-08
WNW	2.146E-06	1.879E-06	1.570E-07	1.506E-07	1.447E-07	9.004E-08	7.097E-08
W	1.066E-06	9.241E-07	7.091E-08	6.798E-08	6.525E-08	4.034E-08	3.175E-08
WSW	7.886E-07	6.841E-07	5.221E-08	5.006E-08	4.805E-08	2.971E-08	2.342E-08
SW	7.545E-07	6.555E-07	5.084E-08	4.874E-08	4.679E-08	2.892E-08	2.275E-08
SSW	6.947E-07	6.040E-07	4.667E-08	4.474E-08	4.294E-08	2.652E-08	2.089E-08
S	4.497E-07	3.844E-07	2.441E-08	2.335E-08	2.237E-08	1.353E-08	1.062E-08
SSE	5.290E-07	4.541E-07	3.069E-08	2.939E-08	2.817E-08	1.719E-08	1.352E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.967E-07	4.285E-07	2.981E-08	2.854E-08	2.736E-08	1.667E-08	1.311E-08
ESE	4.345E-07	3.709E-07	2.345E-08	2.245E-08	2.152E-08	1.313E-08	1.034E-08
E	4.382E-07	3.727E-07	2.289E-08	2.192E-08	2.102E-08	1.290E-08	1.021E-08
ENE	5.191E-07	4.404E-07	2.596E-08	2.485E-08	2.381E-08	1.450E-08	1.148E-08
NE	4.825E-07	4.092E-07	2.354E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.417E-07	5.473E-07	3.381E-08	3.235E-08	3.100E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09
NNW	3.544E-08	2.376E-08	2.177E-08	5.435E-09	2.971E-09
NW	6.190E-08	4.185E-08	3.842E-08	9.706E-09	5.246E-09
WNW	4.985E-08	3.409E-08	3.137E-08	8.175E-09	4.445E-09
W	2.211E-08	1.491E-08	1.368E-08	3.452E-09	1.885E-09
WSW	1.633E-08	1.102E-08	1.011E-08	2.547E-09	1.370E-09
SW	1.577E-08	1.055E-08	9.668E-09	2.369E-09	1.262E-09
SSW	1.452E-08	9.762E-09	8.951E-09	2.223E-09	1.182E-09
S	7.289E-09	4.810E-09	4.394E-09	1.076E-09	5.946E-10
SSE	9.321E-09	6.176E-09	5.647E-09	1.369E-09	7.463E-10
SE	9.038E-09	5.998E-09	5.484E-09	1.306E-09	6.876E-10
ESE	7.142E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10
E	7.072E-09	4.697E-09	4.298E-09	1.073E-09	6.069E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.744E-10
NE	7.224E-09	4.799E-09	4.392E-09	1.106E-09	6.299E-10
NNE	1.022E-08	6.762E-09	6.181E-09	1.518E-09	8.440E-10

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	347	490	539	592	652	707	822
N	3.578E-06	2.307E-06	2.023E-06	1.770E-06	1.536E-06	1.360E-06	1.077E-06
NNW	5.732E-06	3.898E-06	3.459E-06	3.059E-06	2.682E-06	2.393E-06	1.920E-06
NW	7.891E-06	5.689E-06	5.117E-06	4.583E-06	4.066E-06	3.662E-06	2.983E-06
WNW	5.643E-06	4.204E-06	3.810E-06	3.435E-06	3.067E-06	2.775E-06	2.278E-06
W	3.288E-06	2.270E-06	2.022E-06	1.794E-06	1.578E-06	1.412E-06	1.137E-06
WSW	2.533E-06	1.700E-06	1.507E-06	1.333E-06	1.170E-06	1.045E-06	8.415E-07
SW	2.412E-06	1.619E-06	1.435E-06	1.270E-06	1.116E-06	9.977E-07	8.046E-07
SSW	2.254E-06	1.494E-06	1.322E-06	1.169E-06	1.026E-06	9.178E-07	7.406E-07
S	1.750E-06	1.082E-06	9.390E-07	8.145E-07	7.013E-07	6.171E-07	4.838E-07
SSE	1.937E-06	1.233E-06	1.078E-06	9.402E-07	8.138E-07	7.192E-07	5.679E-07
SE	1.698E-06	1.114E-06	9.806E-07	8.616E-07	7.511E-07	6.674E-07	5.319E-07
ESE	1.680E-06	1.048E-06	9.107E-07	7.901E-07	6.800E-07	5.979E-07	4.678E-07
E	1.833E-06	1.098E-06	9.457E-07	8.142E-07	6.959E-07	6.089E-07	4.727E-07
ENE	2.218E-06	1.319E-06	1.134E-06	9.740E-07	8.306E-07	7.252E-07	5.608E-07
NE	2.068E-06	1.227E-06	1.054E-06	9.057E-07	7.723E-07	6.743E-07	5.214E-07
NNE	2.567E-06	1.568E-06	1.358E-06	1.174E-06	1.008E-06	8.853E-07	6.913E-07

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
N	1.002E-06	8.614E-07	5.842E-08	5.592E-08	5.360E-08	3.262E-08	2.562E-08
NNW	1.793E-06	1.552E-06	1.150E-07	1.102E-07	1.057E-07	6.501E-08	5.110E-08
NW	2.799E-06	2.442E-06	1.978E-07	1.897E-07	1.821E-07	1.128E-07	8.876E-08
WNW	2.141E-06	1.875E-06	1.569E-07	1.506E-07	1.446E-07	9.002E-08	7.096E-08
W	1.064E-06	9.225E-07	7.089E-08	6.796E-08	6.523E-08	4.034E-08	3.175E-08
WSW	7.871E-07	6.830E-07	5.219E-08	5.004E-08	4.803E-08	2.971E-08	2.342E-08
SW	7.531E-07	6.543E-07	5.082E-08	4.873E-08	4.677E-08	2.891E-08	2.274E-08
SSW	6.934E-07	6.029E-07	4.666E-08	4.473E-08	4.293E-08	2.651E-08	2.089E-08
S	4.492E-07	3.841E-07	2.441E-08	2.335E-08	2.237E-08	1.353E-08	1.062E-08
SSE	5.283E-07	4.535E-07	3.069E-08	2.938E-08	2.817E-08	1.719E-08	1.352E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.961E-07	4.280E-07	2.980E-08	2.853E-08	2.735E-08	1.667E-08	1.310E-08
ESE	4.340E-07	3.705E-07	2.345E-08	2.245E-08	2.152E-08	1.313E-08	1.034E-08
E	4.377E-07	3.723E-07	2.289E-08	2.192E-08	2.102E-08	1.290E-08	1.021E-08
ENE	5.187E-07	4.401E-07	2.596E-08	2.484E-08	2.381E-08	1.450E-08	1.147E-08
NE	4.822E-07	4.090E-07	2.354E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.411E-07	5.468E-07	3.381E-08	3.235E-08	3.100E-08	1.882E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09
NNW	3.544E-08	2.376E-08	2.177E-08	5.435E-09	2.971E-09
NW	6.189E-08	4.184E-08	3.842E-08	9.705E-09	5.246E-09
WNW	4.985E-08	3.409E-08	3.137E-08	8.175E-09	4.445E-09
W	2.211E-08	1.491E-08	1.368E-08	3.452E-09	1.885E-09
WSW	1.633E-08	1.102E-08	1.011E-08	2.547E-09	1.370E-09
SW	1.577E-08	1.055E-08	9.667E-09	2.369E-09	1.262E-09
SSW	1.452E-08	9.761E-09	8.950E-09	2.223E-09	1.182E-09
S	7.289E-09	4.810E-09	4.394E-09	1.076E-09	5.946E-10
SSE	9.321E-09	6.176E-09	5.646E-09	1.369E-09	7.463E-10
SE	9.037E-09	5.998E-09	5.484E-09	1.306E-09	6.876E-10
ESE	7.142E-09	4.738E-09	4.332E-09	1.052E-09	5.749E-10
E	7.072E-09	4.697E-09	4.298E-09	1.073E-09	6.069E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.744E-10
NE	7.224E-09	4.799E-09	4.392E-09	1.106E-09	6.299E-10
NNE	1.022E-08	6.762E-09	6.181E-09	1.518E-09	8.441E-10

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.626E-06	2.330E-06	2.040E-06	1.783E-06	1.547E-06	1.368E-06	1.082E-06
NNW	5.837E-06	3.950E-06	3.500E-06	3.092E-06	2.708E-06	2.414E-06	1.933E-06
NW	8.068E-06	5.781E-06	5.192E-06	4.643E-06	4.114E-06	3.701E-06	3.010E-06
WNW	5.778E-06	4.278E-06	3.871E-06	3.485E-06	3.107E-06	2.808E-06	2.300E-06
W	3.356E-06	2.304E-06	2.049E-06	1.816E-06	1.595E-06	1.426E-06	1.147E-06
WSW	2.577E-06	1.723E-06	1.525E-06	1.348E-06	1.182E-06	1.055E-06	8.482E-07
SW	2.456E-06	1.640E-06	1.453E-06	1.285E-06	1.127E-06	1.007E-06	8.111E-07
SSW	2.290E-06	1.512E-06	1.337E-06	1.181E-06	1.036E-06	9.261E-07	7.465E-07
S	1.769E-06	1.090E-06	9.457E-07	8.198E-07	7.054E-07	6.204E-07	4.860E-07
SSE	1.964E-06	1.246E-06	1.088E-06	9.479E-07	8.198E-07	7.240E-07	5.711E-07
SE	1.720E-06	1.124E-06	9.891E-07	8.684E-07	7.564E-07	6.717E-07	5.348E-07
ESE	1.700E-06	1.057E-06	9.180E-07	7.957E-07	6.843E-07	6.013E-07	4.700E-07
E	1.854E-06	1.107E-06	9.527E-07	8.196E-07	7.000E-07	6.121E-07	4.748E-07
ENE	2.242E-06	1.329E-06	1.141E-06	9.797E-07	8.348E-07	7.285E-07	5.629E-07
NE	2.087E-06	1.235E-06	1.060E-06	9.103E-07	7.758E-07	6.770E-07	5.231E-07
NNE	2.594E-06	1.580E-06	1.367E-06	1.181E-06	1.014E-06	8.896E-07	6.940E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.007E-06	8.652E-07	5.846E-08	5.596E-08	5.363E-08	3.263E-08	2.563E-08
NNW	1.805E-06	1.561E-06	1.151E-07	1.103E-07	1.058E-07	6.504E-08	5.112E-08
NW	2.823E-06	2.460E-06	1.980E-07	1.899E-07	1.823E-07	1.129E-07	8.882E-08
WNW	2.161E-06	1.891E-06	1.571E-07	1.508E-07	1.448E-07	9.010E-08	7.101E-08
W	1.072E-06	9.289E-07	7.097E-08	6.804E-08	6.530E-08	4.036E-08	3.177E-08
WSW	7.931E-07	6.876E-07	5.226E-08	5.010E-08	4.809E-08	2.973E-08	2.343E-08
SW	7.589E-07	6.589E-07	5.089E-08	4.879E-08	4.683E-08	2.893E-08	2.276E-08
SSW	6.987E-07	6.071E-07	4.672E-08	4.479E-08	4.299E-08	2.654E-08	2.090E-08
S	4.511E-07	3.855E-07	2.442E-08	2.336E-08	2.238E-08	1.354E-08	1.062E-08
SSE	5.311E-07	4.557E-07	3.071E-08	2.940E-08	2.819E-08	1.720E-08	1.353E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.987E-07	4.300E-07	2.982E-08	2.855E-08	2.737E-08	1.667E-08	1.311E-08
ESE	4.359E-07	3.719E-07	2.346E-08	2.246E-08	2.153E-08	1.313E-08	1.034E-08
E	4.395E-07	3.737E-07	2.290E-08	2.193E-08	2.103E-08	1.291E-08	1.021E-08
ENE	5.205E-07	4.414E-07	2.597E-08	2.485E-08	2.381E-08	1.450E-08	1.148E-08
NE	4.836E-07	4.101E-07	2.355E-08	2.253E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.435E-07	5.487E-07	3.382E-08	3.236E-08	3.101E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09
NNW	3.545E-08	2.376E-08	2.178E-08	5.435E-09	2.971E-09
NW	6.193E-08	4.186E-08	3.843E-08	9.707E-09	5.246E-09
WNW	4.988E-08	3.411E-08	3.139E-08	8.177E-09	4.445E-09
W	2.212E-08	1.491E-08	1.368E-08	3.453E-09	1.885E-09
WSW	1.634E-08	1.103E-08	1.012E-08	2.547E-09	1.370E-09
SW	1.578E-08	1.056E-08	9.672E-09	2.369E-09	1.262E-09
SSW	1.453E-08	9.766E-09	8.954E-09	2.223E-09	1.182E-09
S	7.290E-09	4.811E-09	4.395E-09	1.076E-09	5.945E-10
SSE	9.323E-09	6.177E-09	5.648E-09	1.369E-09	7.462E-10
SE	9.039E-09	5.999E-09	5.485E-09	1.306E-09	6.875E-10
ESE	7.143E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10
E	7.073E-09	4.698E-09	4.299E-09	1.073E-09	6.068E-10
ENE	7.913E-09	5.218E-09	4.768E-09	1.180E-09	6.743E-10
NE	7.225E-09	4.799E-09	4.392E-09	1.106E-09	6.298E-10
NNE	1.022E-08	6.763E-09	6.181E-09	1.518E-09	8.440E-10

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	347	490	539	592	652	707	822
N	3.640E-06	2.336E-06	2.046E-06	1.788E-06	1.550E-06	1.371E-06	1.084E-06
NNW	5.869E-06	3.965E-06	3.513E-06	3.102E-06	2.716E-06	2.420E-06	1.937E-06
NW	8.121E-06	5.808E-06	5.214E-06	4.661E-06	4.128E-06	3.713E-06	3.018E-06
WNW	5.818E-06	4.301E-06	3.890E-06	3.500E-06	3.119E-06	2.818E-06	2.307E-06
W	3.377E-06	2.315E-06	2.057E-06	1.823E-06	1.601E-06	1.430E-06	1.149E-06
WSW	2.591E-06	1.729E-06	1.531E-06	1.352E-06	1.185E-06	1.058E-06	8.502E-07
SW	2.469E-06	1.647E-06	1.458E-06	1.289E-06	1.131E-06	1.010E-06	8.131E-07
SSW	2.301E-06	1.517E-06	1.342E-06	1.185E-06	1.039E-06	9.286E-07	7.483E-07
S	1.775E-06	1.093E-06	9.477E-07	8.213E-07	7.066E-07	6.214E-07	4.866E-07
SSE	1.972E-06	1.250E-06	1.091E-06	9.502E-07	8.216E-07	7.254E-07	5.720E-07
SE	1.727E-06	1.127E-06	9.916E-07	8.704E-07	7.581E-07	6.731E-07	5.357E-07
ESE	1.707E-06	1.060E-06	9.202E-07	7.974E-07	6.855E-07	6.023E-07	4.706E-07
E	1.861E-06	1.110E-06	9.548E-07	8.212E-07	7.013E-07	6.131E-07	4.754E-07
ENE	2.249E-06	1.332E-06	1.144E-06	9.814E-07	8.361E-07	7.295E-07	5.635E-07
NE	2.093E-06	1.237E-06	1.062E-06	9.117E-07	7.768E-07	6.779E-07	5.236E-07
NNE	2.603E-06	1.584E-06	1.370E-06	1.184E-06	1.015E-06	8.909E-07	6.949E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.009E-06	8.663E-07	5.847E-08	5.597E-08	5.364E-08	3.263E-08	2.563E-08
NNW	1.809E-06	1.564E-06	1.152E-07	1.104E-07	1.059E-07	6.506E-08	5.113E-08
NW	2.830E-06	2.466E-06	1.981E-07	1.900E-07	1.824E-07	1.130E-07	8.884E-08
WNW	2.167E-06	1.896E-06	1.572E-07	1.508E-07	1.449E-07	9.013E-08	7.103E-08
W	1.074E-06	9.308E-07	7.099E-08	6.806E-08	6.532E-08	4.037E-08	3.177E-08
WSW	7.948E-07	6.890E-07	5.228E-08	5.012E-08	4.811E-08	2.974E-08	2.344E-08
SW	7.607E-07	6.603E-07	5.091E-08	4.881E-08	4.685E-08	2.894E-08	2.276E-08
SSW	7.003E-07	6.084E-07	4.674E-08	4.481E-08	4.300E-08	2.655E-08	2.091E-08
S	4.517E-07	3.860E-07	2.443E-08	2.337E-08	2.238E-08	1.354E-08	1.062E-08
SSE	5.320E-07	4.563E-07	3.072E-08	2.941E-08	2.819E-08	1.720E-08	1.353E-08

Distance (meters)

Dir	860	945	5100	5250	5400	7500	8850
SE	4.995E-07	4.306E-07	2.983E-08	2.856E-08	2.738E-08	1.668E-08	1.311E-08
ESE	4.365E-07	3.723E-07	2.346E-08	2.246E-08	2.153E-08	1.314E-08	1.034E-08
E	4.401E-07	3.741E-07	2.290E-08	2.194E-08	2.104E-08	1.291E-08	1.021E-08
ENE	5.210E-07	4.418E-07	2.597E-08	2.485E-08	2.382E-08	1.451E-08	1.148E-08
NE	4.841E-07	4.104E-07	2.355E-08	2.254E-08	2.159E-08	1.314E-08	1.042E-08
NNE	6.442E-07	5.492E-07	3.383E-08	3.237E-08	3.101E-08	1.883E-08	1.484E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)				
Dir	11520	15610	16670	47000	70000
N	1.763E-08	1.166E-08	1.066E-08	2.581E-09	1.409E-09
NNW	3.546E-08	2.377E-08	2.178E-08	5.435E-09	2.971E-09
NW	6.194E-08	4.187E-08	3.844E-08	9.708E-09	5.246E-09
WNW	4.989E-08	3.411E-08	3.139E-08	8.178E-09	4.445E-09
W	2.212E-08	1.491E-08	1.369E-08	3.453E-09	1.885E-09
WSW	1.634E-08	1.103E-08	1.012E-08	2.548E-09	1.370E-09
SW	1.578E-08	1.056E-08	9.673E-09	2.369E-09	1.262E-09
SSW	1.453E-08	9.768E-09	8.956E-09	2.223E-09	1.182E-09
S	7.291E-09	4.811E-09	4.395E-09	1.076E-09	5.945E-10
SSE	9.324E-09	6.178E-09	5.648E-09	1.369E-09	7.462E-10
SE	9.040E-09	6.000E-09	5.485E-09	1.306E-09	6.874E-10
ESE	7.143E-09	4.738E-09	4.332E-09	1.052E-09	5.748E-10
E	7.073E-09	4.698E-09	4.299E-09	1.073E-09	6.068E-10
ENE	7.914E-09	5.218E-09	4.768E-09	1.180E-09	6.743E-10
NE	7.225E-09	4.799E-09	4.392E-09	1.106E-09	6.298E-10
NNE	1.023E-08	6.763E-09	6.181E-09	1.518E-09	8.439E-10