Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

October 30, 2024

Mr. Harry Shah, Chief
Land, Chemical, and Redevelopment Division
U. S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, TX, 75270

Subject: Waste Isolation Pilot Plant Biennial Environmental Compliance Report for reporting period April 1, 2022, through March 31, 2024

Dear Mr. Shah:

Enclosed is a copy of the 2024 Waste Isolation Pilot Plant Biennial Environmental Compliance Report (BECR) for reporting period April 1, 2022, through March 31, 2024. As required by Section 9(a)(2) of the WIPP Land Withdrawal Act (LWA), the U.S. Department of Energy (DOE) must submit, every two years, documentation of continued compliance with applicable laws in Section 9(a)(1) of the LWA, pertaining to public health and the environment to the Administrator of the U.S. Environmental Protection Agency (EPA), and, with regard to compliance with the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.), to the State of New Mexico.

Copies of the BECR have also been sent to the U.S. Nuclear Regulatory Commission, the U.S. Department of Transportation, the U.S. Department of the Interior Bureau of Land Management, the U.S. Fish and Wildlife Service, and DOE Office of National Environmental Policy Act Policy and Compliance for their review, comment, and confirmation of compliance with respect to laws they enforce. I have requested that replies be sent to you at EPA Region 6.

If you need any additional information or have any comments, please contact Michael Gerle of the DOE Carlsbad Field Office at (575) 988-5372.

Sincerely,

MARK BOLLINGER

Digitally signed by MARK BOLLINGER
Date: 2024.10.30 14:00:29 -06'00'

Mark Bollinger
Manager
Carlsbad Field Office

Enclosure

CBFO:ERCD:SV:24-0740

ISSUED

DOE/WIPP-24-3526 Rev. 0

Waste Isolation Pilot Plant Biennial Environmental Compliance Report for Reporting Period April 1, 2022 through March 31, 2024

Effective: October 30, 2024

United States Department of Energy
Carlsbad Field Office
Waste Isolation Pilot Plant
Carlsbad, New Mexico

Waste Isolation Pilot Plant Biennial Environmental Compliance Report for Reporting Period April 1, 2022 through March 31, 2024

U.S. Department of Energy
Carlsbad Field Office

DOE/WIPP-24-3526
Revision 0
October 2024

Approved by: MICHAEL GERLE Digitally signed by MICHAEL GERLE Date: 2024.10.30 08:28:04 -06'00'

Michael Gerle
Director, Environmental Regulatory
Compliance Division

Date

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CHANGE HISTORY SUMMARY

REVISION NUMBER	DATE ISSUED	DESCRIPTION OF CHANGES
0	10/30/24	• Initial issue. Document is required by the WIPP Land Withdrawal Act, Pub.L. 102–579, as amended by Pub.L. 104–201, to provide evidence of continued compliance with applicable laws, regulations, and permit requirements. The previous periodic review is found in DOE/WIPP-22-3526. Processing and final preparation of this report was performed by the Waste Isolation Pilot Plant Management and Operating Contractor for the U.S. Department of Energy under Contract No. 89303322DEM000077.

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ABBREVIATIONS, ACRONYMS, AND UNITS OF MEASURE

ACO	administrative compliance order
AEA	*Atomic Energy Act*
AFR	air fuel ratio
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
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-PC	*Clean Air Act Assessment Package-1988* for use on personal computers
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
Cl	chloride
CMR	Central Monitoring Room
CO	Compliance Order
COA	conditions of approval
CRA	compliance recertification application
CX	categorical exclusion
CY	calendar year (when used with a specific year)
DMW	detection monitoring well
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
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
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
gal/d	gallons per day [gpd in quoted text]
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
HWFP	Hazardous Waste Facility Permit (for WIPP, the Permit)
HWN	EPA hazardous waste number
ISO	International Organization for Standardization
kg	kilogram
LEPC	Local Emergency Planning Committee
LDCRS	leak detection, collection, and recovery systems
LDR	land disposal restriction
LMP	Waste Isolation Pilot Plant Land Management Plan
LWA	*Land Withdrawal Act*
MEI	maximally exposed individual
MEOSI	maximally exposed off-site individual
µm	micrometer
mg/L	milligram per liter
MOC	management and operating contractor
MOU	memorandum of understanding
mrem	millirem
MSDS	Material Safety Data Sheet (defunct)

MTRU	mixed transuranic waste
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
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NO_3-N	nitrate nitrogen
NOI	notice of intent
NRC	U.S. Nuclear Regulatory Commission
NSPS	New Source Performance Standards
NSR	new source review
NWP	Nuclear Waste Partnership LLC (defunct)
NWPA	Nuclear Waste Policy Act
ODS	ozone-depleting substance
PA	performance assessment
PAAA	*Price-Anderson Amendments Act of 1988*
PAS	portable air sampler
PCB	polychlorinated biphenyl
Permit	WIPP Hazardous Waste Facility Permit
PIC	Potential Impact Category
PMR	permit modification request
PSD	prevention of significant deterioration
Pub.L.	Public Law
QA/QA	quality assurance/quality control
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	settlement agreement
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
SFO	stipulated final order
SHPO	State Historic Preservation Officer (or Office)
SHS	Salt Handling Shaft
SIMCO	Salado Isolation Mining Contractors
SO_4	sulfate
SOP	standard operating procedure
SPDV	Site and Preliminary Design Validation
SSA	salt storage area
SSCVS	Safety Significant Confinement Ventilation System
SSP	Site Sustainability Plan
Stat.	statutes at large
SVS	Supplemental Ventilation System
SWDA	*Solid Waste Disposal Act*
SWMR	Solid Waste Management Regulations
SWMU	solid waste management unit
TBq	terabequerel
TDS	total dissolved solids
TE	transportation engineer
TKN	total Kjeldahl nitrogen
TPQ	threshold planning quantity
Tons/yr	tons per year
TRAMPAC	Transuranic Waste Authorized Methods for Payload Control
TRANSCOM	Transportation Tracking and Communication System
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
WDS	Waste Data System
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant
WQSP	Water Quality Sampling Program (defunct)
WRES	Washington Regulatory and Environmental Services (defunct)

1.0 INTRODUCTION

The Biennial Environmental Compliance Report (BECR) documents United States (U.S.) Department of Energy (DOE) compliance with laws, regulations, and permit requirements applicable to the Waste Isolation Pilot Plant (WIPP) Project, a facility designed and authorized for the safe disposal of defense -related transuranic (TRU) and mixed transuranic waste (MTRU). Radioactive waste that contains alpha -emitting radionuclides of an 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 is defined as TRU waste. Mixed TRU waste is waste containing both TRU and hazardous wastes.

This BECR meets the requirements of the 1992 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 2 years, in even numbered years, and is due by October 30 to the U.S. Environmental Protection Agency (EPA), the State of New Mexico, and other designated agencies. Specifically, this BECR documents the DOE's compliance at the WIPP Project with environmental regulations and permits listed in the LWA section 9(a)(1) 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, 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 above

This BECR addresses the reporting period of April 1, 2022, through March 31, 2024, and includes annual radiation doses to the public for calendar year (CY) 2022 and CY 2023.

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 Project. 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 Project. 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 DOE is compliant.

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

For activities through the date of February 3, 2023, the WIPP Hazardous Waste Facility Permit (HWFP, or Permit), the DOE and Nuclear Waste Partnership LLC (NWP) are collectively referred to as the Permittees. On February 4, 2023, the contractor permittee was changed to Salado Isolation Mining Contractors, LLC (SIMCO). For other permits, such as DP-831, either the DOE or NWP/SIMCO is the Permittee.

In this reporting period there were two separate entities serving sequential DOE contracts to manage and operate the WIPP facility. Reference to the management and operating contractor (MOC) within this report applies to NWP (pre-2023) or SIMCO (2023 to present), for the applicable subject in this report during each respective contract period.

Federal Register (FR) references are shown with the volume number preceding “FR” and ending with the first page number of the document. An example is 63 FR 3624. Even though this document consists of multiple pages, this format is used for citation searches of the FR database.

1.2 Compliance Management at the WIPP Project

The DOE and contractors are committed to conducting operations at the WIPP Project 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 compliance with environmental requirements. The WIPP EMS is certified under the International Organization for Standardization (ISO) 14001:2015(E), 2015. *Environmental management systems – Requirements with guidance for use* 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 Project 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, 2023a), *the CBFO Contractor Oversight Plan* (DOE, 2019a), and the *Waste Isolation Pilot Plant Quality Assurance Program Description* (WIPP QAPD) (SIMCO, 2023a).
- The *Waste Isolation Pilot Plant Environmental Monitoring Plan* (DOE/WIPP-99-2194) (DOE, 2023a) directs the programs for monitoring radiological and non-radiological impacts and compliance with land management requirements.
- As part of the *CBFO Contractor Oversight Plan* (DOE, 2019a) and WIPP QAPD (SIMCO, 2023a), assessments, surveillances, and audits of the WIPP Project compliance status are performed by the U.S. Department of Energy Carlsbad Field Office (CBFO) and the MOC. 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 Project compliance programs.
- Rigorous processes are employed to implement corrective actions and verify effectiveness.

- Certification to the ISO (International Organization for Standardization) 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 MOC returned an original underground ventilation system fan to service to periodically increase air flow for workers underground during mining activities. A fifth shaft was completed during the reporting period. This shaft was designed to provide intake air for the increased ventilation flow from the Safety Significant Confinement Ventilation System (SSCVS). The underground repository footprint was extended to the west to intersect the new shaft and prepare for additional mining of disposal panels.

1.4 Compliance Issues for Reporting Period

During previous reporting periods, the WIPP Project had received and closed three administrative orders (AO1, AO2, and AO3) and one Administrative Compliance Order (ACO) from the New Mexico Environment Department (NMED).

The NMED issued Compliance Order (CO) HWB-14-21 on December 6, 2014, for violations of the HWA, the Hazardous Waste Management Regulation and the Permit (NMED, 2014a).

The CO provided a schedule for compliance that required the Permittees (DOE and the MOC), within 60 days after the CO 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 the Central Characterization Program 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 and Permittees executed a document entitled *General Principles of Agreement HWB-14-20 and HWB-14-21* (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 Project included:

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

Following the General Principles of Agreement, the NMED and Permittees entered into the Settlement Agreement and Stipulated Final Order (SA and SFO) to address the CO HWB-14-21 on January 21, 2016 (NMED, 2016). The purpose of the SA and SFO was to settle and completely resolve the alleged violation contained in the CO, and any further NMED claims, penalties, fines, liabilities or other sanctions against the Permittees arising from, or related to, the fire in the WIPP underground on February 5, 2014, and the radiological event on February 14, 2014. The SA and SFO delineated corrective actions and corrective action schedules. The Permittees were required to keep the NMED apprised of the progress made on the corrective actions on a monthly basis. In addition, the SA and SFO delineated supplemental environmental projects the Permittees were required to complete, which included a triennial review of environmental regulatory compliance and operations at the WIPP to ensure any regulatory deficiencies are identified. During a previous reporting period, the Permittees provided the following submissions in response to the SA and SFO:

- Notification of Completion and Public Posting of the Triennial Review Report, Waste Isolation Pilot Plant EPA I.D. Number: NM4890139088, Todd Shrader/CBFO and Bruce C. Covert/NWP, dated September 19, 2018.
- Certificate of Completion for Supplemental Environmental Projects Paragraph 34 and Request for Termination of Settlement Agreement and Stipulated Final Order No. HWB-14-21, Waste Isolation Pilot Plant, EPA I.D. Number NM4890139088, Todd Shrader/CBFO and Bruce C. Covert/NWP, dated October 19, 2018.
- 2018 First Triennial Review for the Waste Isolation Pilot Plant, Findings and Observations Status Report, Waste Isolation Pilot Plant Hazardous Waste Facility Permit Number: NM4890139088-TSDF, Todd Shrader/CBFO and Bruce C. Covert/NWP, dated April 29, 2019.

The Permittees requested termination of the CO in a letter dated October 19, 2018 (DOE, 2018a). The NMED has indicated that they would consider termination of the order after the completion of a second review. In CY 2021, the Second Triennial Review was conducted, and the notification of completion was transmitted to NMED on December 15, 2021 (DOE, 2021a). In October 2023, the NMED requested a Third Triennial Review be completed. Scope and schedule activities for the Third Triennial Review are being developed. In Q1 of CY2024, a request for an extension of time to complete the Third Triennial Review was being developed.

1.5 Background of the Waste Isolation Pilot Plant

The WIPP Project 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 (SPDV) phase, the construction phase at the WIPP facility 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 five 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 Supplemental 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 facility, in light of additional information, circumstances that had changed since 1990, and assessed alternatives for disposing of TRU waste at the WIPP facility.

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*), was published in 63 FR 3624 on 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 rail transport option is currently off-the-table after DOE approved the decommissioning of the rail facility (previously located south of the WHB) and the removal of related components.

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 subsequently suspended after the February 14, 2014, radiological event that resulted in contamination of parts of the WIPP underground. After a recovery phase and extensive preparations, waste emplacement was restarted in January 2017.

To increase the capability and safety of future WIPP operations, Capital Projects continued during this reporting period. Sinking of the Utility Shaft and extension of the underground footprint to intersect the new shaft is complete, including milestone progress on final system testing in the new SSCVS to increase filtered underground exhaust capacity.

The documents noted above, as well as other related documents, may be accessed electronically in the WIPP Information Repository at https://wipp.energy.gov/information-repository-index.asp, or on the WIPP Home Page at http://wipp.energy.gov/documents-library-by-title.asp.

The disposal phase will be followed by facility 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, among other things, “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 treatment, storage, and disposal facilities (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 1976, 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, giving the EPA and states that implement RCRA the authority to require federal agencies to comply with substantive and procedural requirements of the RCRA. 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 with an effective date of January 2, 1996 (60 FR 53708). 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 the 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 for a 10-year period in 2010 (NMED, 2010). The Permittees submitted a *Resource Conservation and Recovery Act Ten -Year Renewal Application for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit* on March 31, 2020 (DOE, 2020a). The NMED issued a final order on October 4, 2023 (NMED, 2023a), granting a renewed permit for a 10-year term. The renewed Permit became effective on November 3, 2023. 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. In November 2016, the EPA issued the “Hazardous Waste Generator Improvements Rule,” which promulgates a number of revisions and new provisions to the hazardous waste generator regulatory program. Also, a number of hazardous waste generator regulations that were located in other parts of the hazardous waste standards were moved into 40 CFR Part 262 so that all of the generator regulations are in one place (note: this is consistent with EPA’s Rule Summary and Fact Sheet for the November 2016 rule). This final rule became effective on May 30, 2017, and was adopted by the New Mexico Environmental Improvement Board on December 1, 2018.

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 Project on five separate occasions:

- In 1984, as part of the HSWA, Congress exempted the WIPP Project 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 the land disposal restrictions (LDRs).
- In response to the imposition of the RCRA Financial Assurance Requirements in the October 1999 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

Some facility upgrades are ongoing as a result of the radiological release event of February 14, 2014. The underground disposal area ventilation system was operated in filtration mode through most of this reporting period. The underground disposal area ventilation system was operated in unfiltered mode using the 41-B-700C fan approximately 3% of CY 2022 and 3% of CY 2023. Construction of the SSCVS continued during this reporting period. During this period, Panel 7 emplacement was completed on September 21, 2022, and emplacement in Panel 8 commenced on October 8, 2022.

Table 2-1 provides general information on the RCRA requirements and the EPA regulations implementing those requirements.

Table 2-1 – Status of Compliance with the Regulatory Requirements of the Resource Conservation and Recovery Act and Solid Waste Disposal Act

Regulatory Requirement	WIPP Compliance Table 2-1
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 2024 (DOE, 2024a).
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 facility 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 facility. For hazardous and mixed waste generated at the WIPP facility, 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 Parts 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 facility both receives hazardous waste and is a large quantity generator. The 2023 Biennial Hazardous Waste Report was submitted to the NMED Hazardous Waste Bureau February 27, 2024 (SIMCO, 2024a).

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 determining 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 DOE is 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 will be made to the National Response Center and other appropriate agencies by DOE 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 have been released. This information is submitted to the EPA by federal facilities under 42 U.S.C. § 9603 or under RCRA § 3016 of the Solid Waste Disposal, Title II – Solid Waste Disposal Act, Subtitle A- General Provisions (42 U.S.C. § 6901, et seq.). 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 structure 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 Section 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 3-1 provides general information on CERCLA requirements and the EPA regulations implementing those requirements.

Table 3-1 – Status of Compliance with the Regulatory Requirements of the Comprehensive Environmental Response, Compensation, and Liability Act

Regulatory Requirement	WIPP Compliance Table 3-1
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 at 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 EPA hazardous waste numbers (HWNs), 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), formerly Material Safety Data Sheets (MSDSs). The SDSs 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 when 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 substance releases that exceeded an RQ at the WIPP facility during this reporting period.
4. Releases of Mixtures or Solutions, 40 CFR § 302.6(b)(1)(i) and (ii)	*If the quantity of all 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 constituent(s) 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 constituent(s).

Regulatory Requirement	WIPP Compliance Table 3-1
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 section's 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 section's 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 from the WIPP facility in excess of RQs during this reporting period.
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 facility 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 4-1 provides general information relating to EPCRA requirements and the EPA regulations implementing those requirements.

Table 4-1 – Status of Compliance with the Regulatory Requirements of the Emergency Planning and Community Right-To-Know Act

Regulatory Requirement	WIPP Compliance Table 4-1
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 DOE 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 they are 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 DOE has representatives on the Eddy County LEPC, which was formed in 1994. The Eddy County LEPC meets bi-monthly. The DOE also has representation on the Lea County LEPC which meets as needed. The DOE is 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 dedicated Emergency Operations Center was established at the Skeen-Whitlock Building, and LEPC personnel from Eddy and Lea Counties are aware that the center is operational and available to support regional partners.

Regulatory Requirement	WIPP Compliance Table 4-1
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.* No notifications were necessary during the reporting period.
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. 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 2024, the DOE submitted the latest (CY 2023) Tier II Emergency and Hazardous Chemical Inventory Report (SIMCO, 2024b) 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 2022 was submitted in February 2023 (SIMCO, 2023b).
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 facility were submitted to the EPA and the New Mexico Department of Homeland Security & Emergency Management. The reports for CY 2022 were submitted in June 2023 (DOE, 2023b). The reports for CY 2021 were submitted in June 2022 (DOE, 2022a).

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 40 CFR Part 191 standards 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 the EPA promulgated these standards, 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 of 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 2021, the DOE updated the Implementation Plan for 40 CFR Part 191, Subpart A (DOE/WIPP 00-3121) (DOE, 2021b), which continues to implement the EPA guidance and outlines the 40 CFR Part 191, Subpart A, compliance program.

tThe WIPP LWA, Pub.L. 102–579, as amended by Pub L. 104-201, 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, regarding the WIPP. In addition, 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 DOE continues to comply with disposal regulations concerning the WIPP disposal system. On February 9, 1996, the EPA published a final rule in 61 FR 5224, *Criteria for the Certification and Re-certification of the Waste Isolation Pilot Plant's Compliance With the 40 CFR Part 191 Disposal Regulations*, establishing certification and recertification criteria in 40 CFR Part 194 (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. Recertification Applications were submitted in 2004, 2009, and 2014 and resulted in recertification of the DOE compliance (DOE, 2004a; DOE, 2009; DOE, 2014a; EPA, 2017). The most recent Recertification Application was submitted to the EPA in 2019 (DOE, 2019b; DOE, 2019c). The EPA notified DOE that the application was complete, and the compliance recertification application (CRA) approval was received in May 2022 (EPA, 2022).

Table 5-1 provides general information on the regulatory requirements of the AEA and the EPA standards implementing those requirements.

Table 5-1 – Status of Compliance with the Regulatory Requirements of the Atomic Energy Act and the U.S. Environmental Protection Agency

Regulatory Requirement	WIPP Compliance Table 5-1
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 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. With regard to the WIPP Environmental Monitoring Plan design, the DOE emphasizes doses from releases through the air pathway because it is the only plausible pathway for radionuclide transport during receipt and emplacement of waste at the WIPP facility. 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 facility. 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 as the result of normal operation of the facility during the annual dose reporting periods, and is attached as

Regulatory Requirement	WIPP Compliance Table 5-1
	Appendix A to this report. The CAP88-PC software provides the capability for assessments of both collective populations and maximally exposed individual members of the public (MEIs). For both assessments, the DOE has examined radiation doses to individuals at locations where there is a residence, school, business, or office routinely accessed by members of the public. At the WIPP, consideration of businesses includes activities such as grazing, mining, construction, or oil drilling in the vicinity of the site. Consequently, individual assessments at several locations (nominally 652 meters, 812 meters, and 8,850 meters distant from the primary air emission point) are performed for compliance with 40 CFR Part 191, Subpart A, and 40 CFR Part 61, Subpart H, respectively, depending upon presence of un-badged members of the public in the vicinity of the current capital project construction. 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 6-1 of this report). For CY 2022, the maximum EDE at the WIPP facility exclusive use area fence line located 652 meters from the point of release was calculated to be 9.35E-05 mrem per year to the whole body, and 1.56E-03 mrem per year to the critical organ. In addition, for CY 2022, the EDE from facility operations to the MEOSI (maximally exposed off-site individual) beyond the WIPP land withdrawal area located 8,850 meters from the point of release was a calculated 2.49E-06 mrem per year to the whole body, and calculated to be 3.88E-05 mrem per year to the critical organ. Occupation of a construction office for the Utility Shaft inside the west-northwest Off-Limits Area fence required careful assessment of the maximally-exposed individual location. Since the office occupants were not WIPP employees or trained in general radiation protection, their status was that of a general member of the public, and that office location was the MEI point at 812 meters WNW of the air emission point. That MEI received a calculated 7.20E-05 mrem/yr., and an estimated 1.20E-03 mrem/yr. to the critical organ (bone surface). For CY 2023, the maximum EDE at the WIPP facility exclusive use area fence line located 822 meters NW from the point of release was calculated to be 9.44E-05 mrem per year to the whole body, and 2.61E-03 mrem per year to the critical organ. In addition, for CY 2023, the EDE from facility operations to the MEOSI beyond the WIPP land withdrawal area located 8,850 meters from the point of release was a calculated 1.98E-06 mrem per year to the whole body, and calculated to be 5.25E-05 mrem per year to the critical organ. For CY 2023, the EDE from facility operations to the MEI in the SSCVS construction office trailer 330 meters from the point of release (a change from CY 2022) was a calculated 6.30E-05 mrem per year to the whole body, and calculated to be 1.75E-03 mrem per year to the critical organ. The results from CY 2022 and 2023 are each 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

Regulatory Requirement	WIPP Compliance Table 5-1
	40 CFR § 191.03, Subpart A, respectively. The EPA conducts routine site inspections of the WIPP facility systems and program implementation for compliance with the 40 CFR 191 Subpart A requirements. The EPA inspected the WIPP facility in May of 2022 and in May of 2023. During the 2022 Annual Inspection, EPA found one minor issue with the tracking of magnesium oxide (MgO) in the Waste Data System (WDS). The EPA noted a discrepancy between the calculated MgO excess factor in the WDS and the Summary of Waste Emplacement Inventory Reports generated in the WDS. The DOE addressed this discrepancy by directing the MOC to include a calculation correction in the updated version of WDS, Version 3.5. The EPA found no findings of significance during the 2023 inspection.
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 1 (Appendix A) and less than one chance in 1,000 of exceeding ten times the quantities calculated in accordance with Table 1.* These requirements were addressed in the CCA (DOE, 1996a) and CRAs (DOE, 2004a; DOE, 2009; DOE, 2014a; DOE, 2019b; and DOE, 2019c)).
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; DOE, 2014a; DOE, 2019b; and DOE, 2019c)).
5. Environmental Standards for Ground Water Protection, Disposal Standards, 40 CFR § 191.24 (Subpart C)	*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 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; DOE, 2014a; DOE, 2019b; and DOE, 2019c).

Regulatory Requirement	WIPP Compliance Table 5-1
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 published in 63 FR. 27354, 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 DOE compliance, 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 indicate the disposal system is not deviating adversely from expected performance. The monitoring parameters are: • Waste activity • Change in 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 The organizations responsible for monitoring and the frequency of monitoring and reporting results are outlined in DOE/WIPP-99-3119, Compliance Monitoring Implementation Plan for 40 CFR § 191.14(b), Assurance Requirement (DOE, 2014b). Nonsignificant changes and updates that differ from information contained in the most recent compliance certification are reported annually, by November 18, in accordance with the criteria of 40 CFR § 194.4(b)(4). Annual Change Reports were submitted to EPA on November 3,

Regulatory Requirement	WIPP Compliance Table 5-1
	2022, and November 16, 2023. A correction revision to the 2022 Annual Change Report was transmitted to EPA on February 5, 2024 (Annual Change Report – 2021/2022, 2021/2022 Rev.1 and 2022/2023) (DOE, 2022b; DOE, 2023d; DOE, 2024b). 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 about the disposal system that differ significantly from the most recent compliance application. The EPA evaluates reported changes and determines if the changes differ significantly. Three planned change notices 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. The DOE submitted the fourth CRA to EPA on March 19, 2019 (DOE, 2019b). Due to a delay in the CRA-2014 recertification decision which left a shortened interval between the EPA decision and the submittal of the next CRA, a decision was made to defer the submittal of the CRA-2019 Performance Assessment (PA) to late 2019 and to delay submittal of some of the PA related material until that time. The deferred PA 2019 was submitted on December 20, 2019 (DOE, 2019c). During this reporting period, the EPA recertified DOE compliance for the fourth CRA. Notification of recertification approval was received in May 2022.

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 (42 U.S.C. § 7401, et seq.) 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 facility 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 New Mexico Ambient Air Quality Standards superseded the federal NAAQS 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 (tons/yr) emission limit for an individual HAP, the 25 -tons/yr limit for a combination of HAP emissions, or the 10 -tons/yr 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 managing 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. The DOE reviews proposed facility modifications on a per project basis 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 facility. 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 facility. 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 (Washington Regulatory and Environmental Services [WRES], 2003).

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 facility 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 by the DOE 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 permit requiring opacity readings and maximum runtime hours for five diesel generators regulates these emissions from the WIPP facility construction

sites. The requirements and the compliance status associated with the operating permit for these generators are presented in section 28.0.

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 facility does not emit HAPs at levels subject to regulation under NESHAP. The WIPP facility 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 WIPP facility 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 A. 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 (DOE, 1995).

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 facility exceed the regulatory threshold levels for chemicals listed in the final rule. The two sources are the *Air Emissions Inventory Report for WIPP* (WRES, 2003) and the *WIPP Tier II Emergency and Hazardous Chemical Inventory Report* (SIMCO, 2024b). Of the 162 substances listed, none at the WIPP meet or exceed the final threshold levels. Consequently, the WIPP facility 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 large population center to the WIPP facility. 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 DOE complies with these regulations at the WIPP facility.

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 facility.

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 tons/yr of any pollutant, 10 tons/yr of any single HAP, or 25 tons/yr of any combination of HAPs. Based on inventory emission calculations, the WIPP facility 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 by the DOE 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 facility 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 repository 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 6-1 provides general information on CAA requirements and the EPA and NMED regulations implementing those requirements.

Table 6-1 – Status of Compliance with the Regulatory Requirements of the *Clean Air Act*

Regulatory Requirement	WIPP Compliance Table 6-1
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

Regulatory Requirement	WIPP Compliance Table 6-1
	(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.* No notifications were required during the reporting period.
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 2022 and 2023 (DOE, 2023e; DOE, 2024c). 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 2022 and 2023 effluent air emissions monitoring results were reported, and the EDE values to the members of the public were calculated using the EPA -approved sampling procedures and computer model CAP88-PC, Version 4.1.1. The CY 2022 and CY 2023 doses to the maximally exposed individual members of the public were 7.20E-05 mrem and 6.30E-05 mrem, respectively. Detailed reports for both CYs, including CAP88-PC printouts, are provided in 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.* The WIPP facility has three effluent radiological air emissions compliance monitoring stations: Stations B, C, and H. 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 facility 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. Station H FAS filter samples are collected at least daily during the operation of the 41-B-700C fan, which is an unfiltered underground ventilation exhaust point. In 2017, an additional underground exhaust point at the Salt Handling Shaft was added to enhance the ventilation rates using the Supplemental Ventilation System (SVS). The SVS exhaust is not from a potentially radioactively contaminated source and, therefore, is not considered to be an effluent air emission point per 40 CFR 61. The MOC continues to conduct an annual administrative review of the facility's uses of this system to ensure consistency with our annual rad air emissions report. The SVS was operated in CY 2022, 2023, and through March 2024. The results of screening and analytical results, at or near background level, are summarized in each CY 2022 and CY 2023 Periodic Confirmatory

Regulatory Requirement	WIPP Compliance Table 6-1
	Measurements Report description in Appendix A. Air emissions samples are composited monthly or quarterly, 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 radiological air emission sampling 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 station. These detected radionuclide values are used as input into the CAP88-PC software package to calculate the EDE to members of the public to demonstrate compliance with 40 CFR § 61.92. Pu-242 was left off the list of analytes for emissions testing because there were homologues that would serve as indicators if Pu-242 were a significant dose issue, and Pu-242 is a laboratory tracer, not easily replaced in the radioanalytical process. Underground disposal area ventilation for this reporting period was mostly directed through the underground ventilation filters, which is monitored at Station B through daily sample filter collection. To support increased ventilation flow needs underground, the unfiltered 41-B-700C fan was periodically operated during CY 2022, CY 2023, and CY 2024 to support underground mining activities. Station C monitors only the WHB and is physically separate from the underground ventilation circuits. This configuration has remained in place for CY 2022, CY 2023, and CY 2024. Station A remained operable, being used for non-emission underground air quality screening purposes only, but also serving as a backup air sample location during 41-B-700C fan operations.
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 facility is in place (SIMCO, 2023c).
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, 2023e; DOE, 2024c) by June 30 of each following year in this reporting period.
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 facility since 1998. Applicable records are maintained on-site for at leastfive 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. The EPA conducted inspections of the WIPP facility 40 CFR 191 Subpart A implementing processes, including the rad air emission

Regulatory Requirement	WIPP Compliance Table 6-1
	program, in May of 2022 and May of 2023. No findings of significance were noted during either inspection.
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 facility. 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 2022, CY 2023, or the first quarter of CY 2024. Total estimated annual EDE values for the WIPP facility remained at less than 1 percent of the standard for this 2 -year period.
10. Regulation of Fuel and Fuel Additives, 40 CFR Part 80	Regulation regarding fuels and fuel additives pertaining to the WIPP facility is included in 40 CFR Part 80. See section 28.0 for more detail regarding the State of New Mexico implementation of the CAA.
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 DOE 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 DOE 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 DOE 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 purchase and only if no alternatives are available. No new CFCs or ODSs have been approved for this reporting period.

Regulatory Requirement	WIPP Compliance Table 6-1
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 DOE or MOC employees. The DOE maintains a qualified vendor list and has procurement procedures in place to ensure that trained and certified vendors service equipment.
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 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 conditioners. In addition, this subpart applies to refrigerant reclaimers, appliance owners, and manufacturers of appliances and recycling and recovery equipment.* Neither DOE nor MOC employees service, maintain, or repair appliances. However, the DOE 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 properly trained and certified vendors service equipment. 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.

Regulatory Requirement	WIPP Compliance Table 6-1
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 use of 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 and an NSPS permit for five diesel generators for the construction projects are the only CAA -related permits 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 DOE complies with both of these permits. On June 9, 2023, the NSR Permit Number 0310-M3 for five generators for the construction projects was cancelled.

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 do not apply to activities conducted at the WIPP facility 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 Regulations 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 8-1 provides general information and compliance with the regulatory requirements of the SDWA.

Table 8-1 – Status of Compliance with the Regulatory Requirements of the *Safe Drinking Water Act*

Regulatory Requirement	WIPP Compliance Table 8-1
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 facility are injected underground, nor is TRU waste disposed of by underground injection at the WIPP facility. The EPA requirements for underground injection control are not applicable to the WIPP facility.

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 DOE is not a manufacturer or a processor of chemical products at the WIPP facility; 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 facility 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. Management controls will be reinstated if the sampling results warrant them.

Maintenance activities on this system are planned for the near future. Personal and area samples will be collected during this activity. Air samples are analyzed by an ISO/IEC 17025 compliant laboratory accredited by the American Industrial Hygiene Association Laboratory Accreditation Program (AIHA LAP, LLC). Sample analysis follows National Institute for Occupational Safety and Health (NIOSH) method 7402, *Asbestos by Transmission Electron Microscope* (TEM).

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 that 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 the *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. A DOE policy prohibits using 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 facility.

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 fiveyears from the date of issuance. On February 5, 2005, the WIPP facility received the first shipment of PCB -contaminated TRU waste.

On July 20, 2022, the DOE submitted a request (DOE, 2022c) to EPA Region 6 to modify and reauthorize PCB disposal at the WIPP, in compliance with the COA. On April 11, 2024, (after the close of this reporting period), the EPA Region 6 approved the modification and reauthorized the DOE chemical waste landfill permit (EPA, 2024). This reauthorization enables the DOE to continue to dispose of PCBs in accordance with the revised COA. During annual inspections, the EPA determined that operation of the WIPP facility 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.

9.2 Status of Compliance with the Regulatory Requirements

During this reporting period, the WIPP was in compliance with requirements for PCB marking, storage, records, and monitoring. Table 9-1 provides the compliance status of key requirements.

Table 9-1 – Status of Compliance with the Regulatory Requirements of the *Toxic Substances Control Act*

Regulatory Requirement	WIPP Compliance Table 9-1
1. Study of Radon in Federal Buildings, 15 U.S. Code § 2669	*The head of each Federal department or agency that owns a Federal building shall conduct a study for the purpose of determining the extent of radon contamination in such buildings.* 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, 40CFR § 761.20(a)	*No persons 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 are used at the WIPP.
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 DOE 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. Waste containing PCBs is being disposed of in the underground disposal unit.
4. Unmanifested Waste Report, 40 CFR §761.216	*If a facility accepts for storage or disposal any PCB waste from an off-site source without an accompanying manifest, or without an accompanying shipping paper as described by §761.211(e), and the owner or operator of the commercial storage or disposal facility cannot contact the generator of the PCB waste, then he shall notify the Regional Administrator of the EPA region in which his facility is located of the unmanifested PCB waste so that the Regional Administrator can determine whether further actions are required before the owner or operator may store or dispose of the unmanifested PCB waste, and additionally the owner or operator must prepare and submit a letter to the Regional Administrator within 15 days after receiving the waste.* No unmanifested PCB waste was received during this reporting period.

Regulatory Requirement	WIPP Compliance Table 9-1
5. 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.* Certificates of Disposal are created from the Waste Data System (WDS) every two weeks, automating the process. No discrepancies were noted during this reporting period.
6. 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 June 5, 2023, for 2022, and the report for 2021 was sent on June 23, 2022 (DOE, 2023c, DOE, 2022d).
7. 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 April 11, 2024 (after this BECR reporting period), EPA Region 6 approved and reauthorized DOE for disposal of PCBs at the WIPP (EPA, 2024). This approval is effective for five years.
8. 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 April 11, 2024, EPA Region 6 approved and reauthorized DOE for disposal of PCBs at the WIPP repository (EPA, 2024). 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 pesticide 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 to service the WIPP facility to comply with the New Mexico *Pesticide Control Act* requirements and the implementing regulations set forth in 21.17.50 NMAC. More information on the State requirements is provided in section 37.0.

10.2 Status of Compliance with the Regulatory Requirements

The two major requirements of the FIFRA and the compliance status are summarized in Table 10-1.

Table 10-1 – Status of Compliance with the Regulatory Requirement of the *Federal Insecticide, Fungicide, and Rodenticide Act*

Regulatory Requirement	WIPP Compliance Table 10-1
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 DOE 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 DOE 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.), Congress declared it is the policy of the United States to promote an environment for all Americans 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 anticipated to be created by the construction and operation of the WIPP facility was performed 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 facilities or operations 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 facility during this reporting period that modified the noise level beyond that anticipated in the FEIS.

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 the 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 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 Congress charges to advise the President regarding 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 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 in 40 CFR Parts 1500 through 1508. DOE regulations also require mitigation action plans and supplement analyses (SAs) and delineate specific categorical exclusions (CXs) for DOE facility operations. DOE Order 451.1B was replaced in December 2017 with DOE Policy 451.1.

The DOE regulations describe the process for the preparation of DOE NEPA documents. In general, an EIS is prepared for proposed actions where the action’s environmental impacts are not 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. An EIS is prepared if the analyses in an EA identify potentially significant impacts. Records of Decision 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 implemented and effective. An SA examines 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 (i.e., 10 CFR Part 1021) 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's 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, including criteria (e.g., acreage, location, and height limitations) that limit the covered actions. These CXs address storm water runoff control, alternative fuel vehicle fueling stations and electric vehicle charging stations, and small -scale renewable energy projects.

On July 16, 2020, the CEQ issued an *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* (85 FR 43304). In accordance with Title 40 Code of Federal Regulations (CFR) Section 1506.13, the updated regulations apply to NEPA processes after September 14, 2020. This final rule comprehensively updates, modernizes, and clarifies the regulations to facilitate more efficient, effective, and timely NEPA reviews by Federal agencies in connection with proposals for agency action. The rule will improve interagency coordination in the environmental review process, promote earlier public involvement, increase transparency, and enhance the participation of States, Tribes, and localities. The amendments will advance the original goals of the CEQ regulations to reduce paperwork and delays and promote better decisions consistent with the national environmental policy outlined in section 101 of NEPA.

12.2 Status of Compliance with the Regulatory Requirements

Table 12-1 provides general information on the regulatory requirements of NEPA and how those requirements are implemented.

Table 12-1 – Status of Compliance with the Regulatory Requirements of the *National Environmental Policy Act*

Regulatory Requirement	WIPP Compliance Table 12-1
1. Status of Compliance with the Regulatory Requirements (NEPA)	The DOE NEPA history with regard to the WIPP facility is in section 1.5 of this BECR. The Annual Mitigation Report is issued to track the status of each commitment not yet completed.
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 facility 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. A supplement analysis was performed in compliance with 10 CFR 1021.330(d), which requires DOE to evaluate site-wide EISs at least every five years by means of a SA. Based on the SA, the DOE determined that no further NEPA documentation was required (DOE, 2021c).
3. Operational Compliance with NEPA at WIPP	Day -to -day operational compliance with the NEPA at the WIPP facility 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 Project), the CBFO NEPA Compliance Officer may make a determination that the proposed action is a CX. If the action is not covered by WIPP NEPA documentation and is not a CX, the CBFO NEPA Compliance Officer submits a recommendation to the appropriate official as delineated by DOE Policy 451.1 regarding the need to prepare an SA, EA, or EIS to address the proposed action and oversees designated activities. The DOE made no CX determinations during this reporting period.

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 about 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 repository are regulated under the AEA by the DOE. Regulation is accomplished through orders, notices, directives, and policies and the DOE regulations in 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 the 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 13-1 provides information on the WIPP facility 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 13-1 – Status of Compliance through DOE Orders

Regulatory Requirement	WIPP Compliance Table 13-1
1. DOE Order 151.1D, *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 Plan (DOE/WIPP-17- 3573), including the emergency response program, training program, emergency readiness assurance program, and the records management program. The WIPP Emergency Management Plan also outlines Emergency Management responsibilities from the Permit Attachment D, the RCRA Contingency Plan. Additional driving documents include other DOE orders and guides, applicable federal regulations, and state and local laws, regulations, and ordinances. The WIPP Emergency Management Plan includes consistent response actions for the MOC 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 (DOE, 2021d).
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-CA1007, *Event Investigation* (SIMCO, 2023d).
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, the MOC's standard operating procedures, recordkeeping and reporting of occupational injuries and illnesses, and preparation and publication of the Annual Site Environmental Report.

Regulatory Requirement	WIPP Compliance Table 13-1
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, 2017]) and the MOC's QAPs (WP 13-1, *Waste Isolation Pilot Plant Quality Assurance Program Description* [SIMCO, 2023a).
5. DOE Order 420.1C, *Facility Safety*	This order specifies requirements for nuclear safety, criticality safety, fire protection, and natural phenomena hazard mitigation. Site emergency plans, fire hazards analyses, and the *Waste Isolation Pilot Plant Documented Safety Analysis* (DSA) (DOE/WIPP-07-3372) (DOE, 2020b) 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, 2018b); and the DSA (DOE/WIPP-07-3372).
6. DOE Order 435.1, Change 1, *Radioactive Waste Management*	This order aims to ensure that DOE radioactive waste is managed in a manner that protects workers, public health and safety, and the environment. In the event that a conflict exists between the 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 the MOC's 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 Key implementing documents include the *Waste Isolation Pilot Plant Radiation Safety Manual* (NWP, 2022a), *CH Waste Downloading and Emplacement* (SIMCO, 2023e), the *Waste Handling System Design Description* (NWP, 2021a), and *Shipment of Waste* (NWP, 2020a).
7. DOE Order 436.1A, *Departmental Sustainability*	This order requires DOE sites to submit a site sustainability plan (SSP) to headquarters annually. The SSP establishes site progress toward meeting DOE's sustainability goals. It is the narrative that describes how DOE expectation is integrated and implemented into site operational policies, procedures, and plans. These actions are developed and monitored by the sites' EMS. The site's EMS is certified and conforms to the ISO 14001 standard (ISO 14001: 2015[E], 2015) which assists the DOE in tracking SSP-related objectives and targets. The WIPP SSP (DOE, 2023f) establishes progress toward meeting the DOE sustainability goals. It documents performance and progress related to energy, fuel, and water use, sustainable buildings, data center and electronics management, pollution prevention, fleet management, and sustainable acquisition. SSP actions are integrated into operations through the WIPP Ten-year Site Plan (DOE, 2016a) and the EMS environmental objectives and targets. The WIPP Project EMS maintained certification to the ISO 14001 EMS standard during this reporting period. The EMS processes provide that compliance with legal requirements is maintained, the environment is protected, and performance is continually improved.
8. DOE Order 458.1, Change 4, *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, 2020b). Directions regarding release of potentially radioactive materials are specified in WP 12-RE3003, *Radiological Release of Potentially Contaminated Materials, Waste, and Items* (NWP, 2022b). Monitoring activities to document compliance with the order are implemented

Regulatory Requirement	WIPP Compliance Table 13-1
	through the WIPP as low as reasonably achievable (ALARA) program, the environmental monitoring program, the records management program, the radiation safety program, and health physics and radiological engineering procedures. Since the 2014 radiological release event, the WIPP underground disposal area ventilation continues to operate mostly in filtration mode, which effectively removes respirable particulate from the effluent air stream. In addition, the DOE continued periodic operation of underground ventilation in the unfiltered mode to improve underground ventilation for specific non-emplacement operations.
9. DOE Order 460.1D, *Hazardous Materials 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. Order 460.1D replaced DOE Order 460.1C in December 2016. Requirements for portions of this order are addressed in the MOC's transportation and packaging 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, 2022e), and C of C No. 9218 (November 21, 2022) (NRC, 2022a) • Transuranic Package Transporter Model III (TRUPACT-III) SAR (DOE, 2013), and C of C No. 9305 (June 24, 2020) (NRC, 2020) • Half Package Transporter (HalfPACT) SAR (DOE, 2020c), and C of C No. 9279 (November 21, 2022) (NRC, 2022b) • RH-TRU 72-B Cask SAR (DOE, 2015a), and C of C No. 9212 (December 2, 2019) (NRC, 2019) The requirements are implemented through the DOE transportation program.
10. 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 MOC's transportation program. For TRU waste transportation incidents, emergency management is implemented through DOE/CBFO-98-3103, *TRU Waste Transportation Plan* (DOE, 2022f).

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, 59 FR 8123. Table 13-2 provides compliance status information on nuclear safety management regulations. These regulations are implemented principally through the MOC's programs, procedures, and policies.

Table 13-2 – Status of Compliance with the Nuclear Safety Management Regulations of the *Atomic Energy Act*

Regulatory Requirement	WIPP Compliance Table 13-2
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 MOC has implemented and is complying with the requirements of 10 CFR Part 830, Subpart A, Quality Assurance Requirements, through implementation of the MOC's QAPD (SIMCO, 2023a). Compliance with 10 CFR Part 830, Subpart B, Safety Basis Requirements, is achieved through the DSA, DOE/WIPP-07-3372 (DOE, 2020b), and DOE/WIPP 07-3373, *Waste Isolation Pilot Plant Technical Safety Requirements* (TSRs) (DOE, 2020d).
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.* The MOC 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 MOC's QAPD (SIMCO, 2023a).
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 MOC's 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 facility and the TRU transport packaging program. Procedure WP 09-CN3005, *Graded Approach to Application of QA Controls,* (SIMCO, 2023f) 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 MOC's QAPD.

Regulatory Requirement	WIPP Compliance Table 13-2
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 DOE/CBFO QAPD establishes QA program requirements for achieving quality for work sponsored by the CBFO, using a graded approach. The CBFO and organizations supporting the CBFO shall implement the applicable requirements of the QAPD within their systems for the management and control of these activities. The CBFO QA program complies with applicable Federal, State, and local regulations and with DOE orders and requirements. The MOC has developed a QAP as described in the MOC's QAPD (SIMCO, 2023a) using the criteria specified in 10 CFR § 830.122. The MOC's 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 MOC's QAPD are referenced in Table I-1 of the MOC's QAPD, QA Program Source Documents. Subcontractor/supplier controls are discussed in the MOC QAPD. The DOE approved the current MOC's QAPD in June 2023. The MOC conducts work in accordance with the QAP, as described in the MOC's QAPD and incorporated into implementing procedures that control work.
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 MOC developed and implemented the MOC's QAPD (SIMCO, 2023a) 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 MOC's QAPD. Personnel training and qualifications are described in the MOC's QAPD. The MOC's 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 MOC's QAPD. The MOC's QAPD addresses preparation, review, and approval of documents, and generation, classification, indexing, receipt, storage, preservation, disposition, retrieval, and correction of information in quality records.

Regulatory Requirement	WIPP Compliance Table 13-2
	The Performance Quality Assurance Requirements section of the MOC's 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 inspecting 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 is comprised of two subsections: Management Assessment and Independent Assessment. The Management Assessment section describes processes to identify, correct, and track problems that impede the 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 MOC's 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 MOC has implemented the requirements of 10 CFR § 830.202(a) through the DSA (DOE, 2020b) and TSRs (DOE, 2020d).
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 2, 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 MOC has implemented the requirements of 10 CFR § 830.203 through implementation of the MOC's Unreviewed Safety Question procedure WP 02-AR3001, *Unreviewed Safety Question Determination* (NWP, 2018a).
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, 2014c), is the approved methodology set forth in 10 CFR § 830.204[a] to meet 10 CFR Part 830, Subpart B. The MOC has implemented the requirements of 10 CFR § 830.204 by using DOE- STD-3009 to develop the DSA (DOE, 2020b). Supplemental guidance specific to TRU waste processing facilities, given

Regulatory Requirement	WIPP Compliance Table 13-2
	in DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities* (DOE, 2007), was also used to develop 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 MOC complies with the requirements of 10 CFR § 830.205 by using DOE G 423.1-1B to prepare the TSRs. The MOC also uses DOE-STD-1186-2004, *Specific Administrative Controls* (DOE, 2004b), to prepare the TSRs (DOE, 2020d).
11. Preliminary Documented Safety Analysis, 10 CFR § 830.206	*The contractor responsible for a hazard category 1, 2, or 3 new DOE nuclear facility or a major modification to a hazard category 1, 2, or 3 DOE nuclear facility must: (a) Prepare a preliminary documented safety analysis for the facility…* DOE-STD-1189, *Integration of Safety into the Design Process*, (DOE, 2016b), provides requirements and guidance for the integration of safety into the design process for DOE Hazard Category 1, 2, and 3 nuclear facilities as defined in 10 CFR Part 830, Nuclear Safety Management. This standard specifies the requirements and responsibilities for project management, engineering/design, and safety analysis, and their interactions essential for successful integration of safety into design and construction. WIPP integrates safety into facility design processes (SIMCO, 2023g).

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

Table 13-3 provides information on Nuclear Safety Noncompliance and the PAAA.

Table 13-3 – Status of Compliance with the Nuclear Safety Noncompliance and the *Price-Anderson Amendments Act*

Regulatory Requirement	WIPP Compliance Table 13-3
1. Nuclear Safety Noncompliance and the PAAA of 1988	*… DOE may either reduce or not impose the base civil penalty of up to $225,000 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 MOC 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 Project to assist personnel in determining and reporting noncompliance issues. The program uses the DOE Noncompliance Tracking System, a centralized data base, to report and track reportable PAAA nuclear safety noncompliance events. For the reporting period, there were no PAAA enforcement actions associated with the MOC.
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 $118,000 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 Noncompliance Tracking System, a centralized database, to report and track PAAA worker safety and health noncompliance events.

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 Project 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 WIPP LWA, Pub L. 102-579, as amended by Pub L. 104-201, required the DOE to use NRC-certified transportation packages to transport TRU waste to the WIPP facility. 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 Cs.

The NRC approved the packagings for transporting CH-TRU waste, which are the TRUPACT-II (C of C No. 9218, issued November 21, 2022) (NRC, 2022a), the TRUPACT-III (C of C No. 9305, issued June 24, 2020) (NRC, 2020), and the HalfPACT (C of C No. 9279, issued November 21,2022) (NRC, 2022b). The NRC also approved packagings for transporting RH-TRU waste, which is the RH-TRU 72-B cask (C of C No. 9212, issued December 2, 2019) (NRC, 2019). For purposes of this section, the term “packaging” implies the TRUPACT-II, the HalfPACT, the TRUPACT-III, and the RH-TRU 72-B cask. The NRC’s issuance of the C of C means it has reviewed and approved the applicable SAR for each of the Type B Packages as well. Each SAR for the Type B Packages contains Chapter 9, Quality Assurance, and/or is controlled in accordance with the DOE/CBFO QAPP for Type B Packages.

Table 14-1 provides compliance information for the regulatory requirements.

Table 14-1 – Status of Compliance with the Regulatory Requirements of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance Table 14-1
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 facility.
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 RH-TRU 72-B cask specifies that the contents are optionally controlled to limit the amount of fissile material that may be shipped to exempted quantities, or as identified in the applicable C of C for the package. The NRC reissuance of the C of C confirms that the packaging continues to meet the applicable requirements of 10 CFR § 71.15.
3. Application for Package Approval, 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.
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.*

Regulatory Requirement	WIPP Compliance Table 14-1
	The applications discuss 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 and the RH-TRU 72-B 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, and HalfPACTare limited to less than 10^5A_2.
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, and the RH-TRU 72-B 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.

Regulatory Requirement	WIPP Compliance Table 14-1
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. Department of Energy personnel have the responsibility for training personnel at the generator sites in accordance with the application and implementing operations and maintenance manual. Department of Energy personnel perform assessments and audits of the generator sites to ensure that methods for using transportation packagings 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.* 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 2022 and identified no areas of concern (AOCs) in the program. The following 10 CFR 71.95(c) notifications were made to the NRC:

Regulatory Requirement	WIPP Compliance Table 14-1
	(1) T. E. Sellmer to S. Helton, dated May 9, 2022; TS:22:03021. Concerned a shipment to the WIPP originating from the Los Alamos National Laboratory on February 24, 2022, that did not follow the conditions in Section 5(b)(1) of C of C No. 9218 in their entirety. (2) T. E. Sellmer to S. Helton, dated April 19, 2023; TS:23:03016. Concerned 28 shipments to the WIPP originating from the Los Alamos National Laboratory from June 28, 2006, to October 13, 2022, that did not follow the conditions in Section 7 of C of C No. 9218 in their entirety. (3) T. E. Sellmer to S. Helton, dated May 23, 2023; TS:23:03019. Concerned 8 shipments to the WIPP originating from the Oak Ridge National Laboratory from September 14, 2022, to March 30, 2023, that did not follow the conditions in Section 7 of C of C No. 9218 in their entirety.
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 DOE with regard to shipments 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 6-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 Requirements, 10 CFR §§ 71.101 through 71.137	*Subpart H of 10 CFR Part 71 (§§ 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

Regulatory Requirement	WIPP Compliance Table 14-1
	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) (SIMCO, 2023h), which is equivalent to the NRC-required plan in 10 CFR Part 71, Subpart H, addresses the 18 criteria specified in Annex 2 of NRC Regulatory Guide 7.10, promulgated by the Office of Nuclear Regulatory Research. 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 the DOE is a registered user for the TRUPACT-III packaging by the NRC. Packages are designed, fabricated, assembled, tested, procured, used, maintained, and repaired in accordance with the C of Cs. Table 14-2 provides compliance information for the regulatory requirements.

Table 14-2 – Status of Compliance with the Certificate of Compliance of the *Atomic Energy Act* and the U.S. Nuclear Regulatory Commission

Regulatory Requirement	WIPP Compliance Table 14-2
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, and the RH-TRU 72-B Cask SAR.* 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. 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 an 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 C of Cs identify the TRUPACT-II, the HalfPACT, the TRUPACT-III, and the RH-TRU 72-B cask as fissile material packagings (reference condition 5(b)(2) of the applicable C of C of the respective 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 Transuranic Waste Authorized Methods for Payload Control (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, 2020e). The TRUPACT-III TRAMPAC, section 2.4, describes the filter vent requirements for the authorized container for the TRUPACT-III (DOE, 2010). The RH-TRAMPAC, section 2.4, describes filter vents for the authorized containers for the RH-TRU 72-B (DOE, 2015b). 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. 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, and section 3 of the RH-TRAMPAC for the RH-TRU 72-B. 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, and section 5 of the RH-TRAMPAC for the RH-TRU 72-B. 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 August 26, 1994. This Public Law, which amends the HMTA, requires the DOT to set standards for designating routes for the transportation of hazardous materials that are required to be placarded, and establishes regulations for training standards for hazardous materials transportation workers, for issuing safety permits to motor carriers for certain hazardous materials, and for performing 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 basic DOT requirements applicable to the transportation of hazardous materials, incident notification requirements, and authorizes the use of international regulations with certain conditions and limitations.

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 15-1 provides WIPP compliance with regulatory requirements under the HMTA.

Table 15-1 – Status of Compliance with the Regulatory Requirements of the *Hazardous Materials Transportation Act*

Regulatory Requirement	WIPP Compliance Table 15-1
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 MOC programs and implementing procedures, which identify the organizations and positions responsible for ensuring compliance with the HMTA. The MOC general programmatic transportation document is WP 08-NT.12, *WIPP Transportation Program* (SIMCO, 2024c). 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*

Regulatory Requirement	WIPP Compliance Table 15-1
	transporters. Manifesting, marking, labeling, placarding, and other requirements are addressed in the MOC 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 (NWP, 2020b).
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 MOC transportation program (SIMCO, 2024c). This program and MOC procedures address reportable incident and reporting requirements, including the identification of organizations and other entities that receive reports. The transportation program specifies that the MOC 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 MOC 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 MOC procedures (SIMCO, 2024c).
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 MOC procedures (SIMCO, 2024c). Each required record is identified and defined by forms attached to these procedures. Shipping papers are managed in accordance with MOC 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 MOC procedures for shipments originating at the WIPP (SIMCO, 2024c), the TE marks the packages of hazardous materials 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 MOC procedure, the TE labels the packages of hazardous material in accordance with Subpart E of 49 CFR Part 172 (SIMCO, 2024c).
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 MOC procedures, the TE ensures that the vehicle that will transport

Regulatory Requirement	WIPP Compliance Table 15-1
	hazardous materials or waste from the WIPP is properly placarded (SIMCO, 2024c).
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 MOC 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 WIPP Central Monitoring Room (CMR) with copies of transportation documentation. The CMR is the 24-hour emergency contact for shipments of hazardous waste or materials (SIMCO, 2024c; SIMCO, 2023i). The MOC addresses on-site emergency response in its procedures and waste management plans (DOE, 2021c).
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.* Waste Isolation Pilot Plant 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. Transportation Engineers receive initial and refresher training from recognized training companies in accordance with established schedules. New or transferred transportation employees are required to attend the training within 90 days of employment or transfer. Until completion of training, they may work under the direct supervision of another certified hazardous materials employee. The MOC maintains records of current training, inclusive of the preceding three years. Training records are maintained in accordance with existing requirements. The TE task cards must be satisfactorily completed prior to the performance of work without supervision. Requalification is required every two years (SIMCO, 2024c).
11. Safety and Security Plans Subpart I, 49 CFR §§ 172.800 through 172.804	*This subpart prescribes requirements for development and implementation of plans to address security risks related to the 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, based on historical records, are unlikely to require a security plan because the nature and quantity of such shipments do not meet the requirements (SIMCO, 2024c). 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), or for other hazardous materials, the *NWP Hazardous Material Transportation Security Plan* (NWP, 2019a).
12. Shippers – General Requirements for Shipments and Packages, Subpart	*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.* The MOC procedures encompass the requirements of these sections. Outbound DOE

Regulatory Requirement	WIPP Compliance Table 15-1
A 49 CFR Part 173, §§ 173.1 through 173.13	shipments are evaluated and prepared by an MOC TE to ensure requirements are met (SIMCO, 2024c).
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 MOC procedures, MOC Transportation Operations is responsible for ensuring that hazardous 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 (SIMCO, 2024c).
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 MOC procedures (NWP, 2012; NWP, 2020a).
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 MOC procedures include worksheets for ground (NWP, 2020b) and air (NWP, 2014a) 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; 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.]* MOC procedures direct the TE to classify each shipment using the information provided in the shipping request or request for disposal by completing a shipment worksheet (NWP, 2014a; NWP, 2020b). 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 §§	*This subpart describes permissible packagings for hazardous materials larger than 119 gallons in size depending on physical state and type of hazard.* The MOC procedures direct the TE to classify each shipment using the information provided in the shipping request or request for disposal by completing a shipment worksheet (NWP, 2020b). If required, the requester and/or the TE obtain additional

Regulatory Requirement	WIPP Compliance Table 15-1
173.240 through 173.249	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. MOC TEs receive and ship radioactive materials in accordance with DOT regulations, using MOC procedures (NWP, 2014a; NWP, 2014b; NWP, 2020b).
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 MOC procedure provides guidance for shipping hazardous materials by air (NWP, 2014a). 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 DOE or the MOC. The transportation of hazardous waste by air transport is prohibited.
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 facility by contract carriers. 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 if the shipment requires placarding. The MOC has a motor carrier program plan for the local transport of empty packaging and miscellaneous hazardous materials (SIMCO, 2024c).
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 facility receives a QA review beginning with the purchase order and completed with acceptance of packaging for use. The MOC TEs use an MOC procedure worksheet to specify the performance-oriented packaging necessary to satisfy packaging requirements for each shipment of hazardous materials from the WIPP facility (NWP, 2020b).

Regulatory Requirement	WIPP Compliance Table 15-1
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 facility 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 (DOE, 2022f; SIMCO, 2024c).

16.0 MATERIALS ACT OF 1947

16.1 Summary of the Law

The Materials Act of 1947 (61 Stat. 681) is a commonly used title referring to the act of July 31, 1947, and subsequent amendments thereto (codified in 30 U.S.C. 601–604). The Act provides for the disposal of materials on the public lands of the United States. Accordingly, the act authorizes the U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) to dispose of minerals (including, but not limited to, sand, stone, gravel, pumice, pumicite, 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 Interior determines that the aggregate damage to public lands and resources under BLM jurisdiction would exceed the benefits to be derived from the proposed sale or free use of the material.

As promulgated in the WIPP LWA, the Secretary of Energy was granted authority and responsibility for managing the WIPP land withdrawal area. The LWA stipulates that the Secretary of Energy shall consult with the Secretary of the Interior in discharging such responsibility. The Materials Act of 1947 is applicable to WIPP because the LWA established a management responsibility to dispose of extracted salt tailings that are not needed for backfilling the repository, with disposition consistent with sections 2 and 3 of the Act of July 31, 1947 (*Materials Act of 1947*). The LWA directs the Secretary of Energy to develop a management plan. Accordingly, the WIPP Land Management Plan (LMP) was developed to meet the LWA requirement. The LMP stipulates that disposal of salt tailings will be in accordance with sections 2 and 3 of the *Materials Act of 1947*.

16.2 Status of Compliance with the Regulatory Requirements

Table 16-1 provides the compliance status of requirements established in the WIPP LWA relative to the *Materials Act of 1947*.

Table 16-1 – Status of Compliance with the WIPP LWA and *Materials Act of 1947*

Regulatory Requirement	WIPP Compliance Table 16-1
1. Section 4 (b)(4) of the WIPP LWA Pub.L. 102–579, as amended by Pub.L. 104–201	*The Secretary* [of Energy] *shall dispose of salt tailings extracted from the Withdrawal that the Secretary* [of Energy] *determines are not needed for backfill at WIPP. Disposition of such tailings shall be made under sections 2 and 3 of the Act of July 31, 1947, (30 U.S.C. 602, 603; commonly referred to as the "Materials Act of 1947").* Section 2 of the Materials Act of 1947 states: *The Secretary* [of the Interior] *shall dispose of materials under this Act to the highest responsible qualified bidder after formal advertising and such other public notice as he deems appropriate: Provided, however, That the Secretary* [of the Interior] *may authorize negotiation of a contract for the disposal of materials if —* (first provision omitted since not applicable) *(2) the contract is for the disposal of materials to be used in connection with a public works improvement program on behalf of a Federal, State, or local governmental agency and the public exigency will not permit the delay incident to advertising; or if* *(3) the contract is for the disposal of property for which it is impracticable to obtain competition.* Section 3 of the Materials Act of 1947 states (in part): *All moneys received from the disposal of materials under this Act shall be disposed of in the same manner as moneys received from the sale of public lands.* No disposal of salt tailings occurred during the reporting period.

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 LMP (DOE/WIPP-93-004) (DOE, 2023g) to include concurrent memorandums 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 LMP (DOE, 2023g) 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 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 and beyond.

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 facility (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.

17.2 Status of Compliance with Regulatory Requirements

Table 17-1 provides details on the compliance status of rights-of-way awarded to the DOE by the BLM.

Table 17-1 – Status of Compliance with the Permit Conditions of the *Federal Land Policy and Management Act of 1976*

Regulatory Requirement	WIPP Compliance Table 17-1
1. Rights-of-Way Under the Federal Land Policy and Management Act, 43 CFR Part 2800	Several conditions are common to a right of way (grant) awarded to the DOE by the BLM. These common conditions include: (1) That the right of way is granted and reserved for full use by the DOE, subject to reasonable rules and regulations of the Secretary of the Interior; (2) That BLM retains the right to occupy and use right-of-way and may grant rights and privileges to other compatible users under certain conditions; (3) That any resources on lands within the right of way shall remain under the jurisdiction of the BLM; (4) That applicable regulations under 43 CFR Part 2800 and terms and conditions of the right of way be followed; and (5) That a right-of-way no longer needed will be rehabilitated, to include reseeding of disturbed areas in accordance with BLM specifications. The DOE maintains rights-of way in accordance with stipulations associated with each right-of-way grant. 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 performed as needed at the WIPP site and is performed as described in the LMP, DOE/WIPP-93-004 (DOE, 2023g). Reseeding of disturbed areas 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, revised, or canceled as necessary. Appendix B1, Other Environmental Permits, in the HWFP lists active rights-of-way.

18.0 PUBLIC RANGELANDS IMPROVEMENT ACT OF 1978

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 (in part):

- 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 Title IV, Range Management, of FLPMA (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:

> *(a) 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.*
>
> *(b) These objectives will be realized in a manner 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 Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701) 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 18-1 provides the compliance status of the *Public Rangelands Improvement Act* requirements.

Table 18-1 – Status of Compliance with the Regulatory Requirements of the *Public Rangelands Improvement Act*

Regulatory Requirement	WIPP Compliance Table 18-1
1. Land Use Plans, 43 CFR § 4100.0-8	*The authorized officer shall manage livestock grazing on public lands under the principle of multiple use and sustained yield and in accordance with applicable land -use plans.* 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, 2023g), the BLM will administer range management activities in accordance with the LMP, Appendix C, which is an MOU between the DOE and the BLM (DOE, 2023g).

19.0 TAYLOR GRAZING ACT

19.1 Summary of the Law

The *Taylor Grazing Act of 1934* (43 U.S.C. § 315, et seq.), hereafter, *Taylor Grazing Act*, was enacted by Congress 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 livestock grazing to continue on allotments 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 portions of two grazing allotments (i.e., Livingston Ridge and Antelope Ridge).

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 19-1 provides the compliance status of requirements under the *Taylor Grazing Act*.

Table 19-1 – Status of Compliance with the Regulatory Requirements of the *Taylor Grazing Act*

Regulatory Requirement	WIPP Compliance Table 19-1
1. Land Use Plans, 43 CFR § 4100.0-8	*The authorized officer shall manage livestock grazing on public lands under the principles of multiple use and sustained yield, and 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) (DOE, 2023g).
2. Allotment Management Plans and Resource Activity Plans, 43 CFR § 4120.2	*An allotment management plan or other activity plans intended to serve as the functional equivalent of allotment management plans shall be prepared in careful and considered consultation, cooperation, and coordination with affected permittees or lessees, landowners involved, the resource advisory council, any State having lands or responsible for managing resources within the area to be covered by such a plan, and the interested public.* The WIPP land withdrawal area includes portions of two grazing allotments administered by the BLM. The 293-acre DOE exclusive use area and approximately 50 additional acres set aside for reclamation sites, storage yards, etc., are the only portions withdrawn by DOE and only impacts the Antelope Ridge allotment. 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 withdrawal area." (LMP, Appendix C, section VI, Grazing Management) (DOE, 2023g).

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, et seq.) 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 20-1 provides the compliance status of requirements under the *Bald and Golden Eagle Protection Act*.

Table 20-1 – Status of Compliance with the Regulatory Requirements of the *Bald and Golden Eagle Protection Act*

Regulatory Requirement	WIPP Compliance Table 20-1
1. Status of Compliance with the Regulatory Requirements	During this reporting period, no bald or golden eagles nests were observed within the WIPP land withdrawal area; however, individual eagles may migrate through or overwinter on WIPP lands. Migrant and 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 identified. For any affecting construction activities, the National Bald Eagle Management Guidelines (USFWS, 2007) will be incorporated into a typical NEPA Mitigation Plan which 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.* Note that the above plan constraints may be subject to more restrictive guidance for open habitats which may specify larger buffer zones. 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 of 1918* (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 (50 CFR Part 20, “Migratory Bird Hunting”).

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.

In a notice published in 78 FR 219, the DOE informed the public of the availability of its MOU with the FWS regarding implementation of Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. The Executive order was published in 66 FR 3853. This MOU expired in 2018, but the DOE signed an addendum to extend the MOU past this date. The MOU and the Executive order commit DOE to take certain actions to implement the Migratory Bird Treaty Act.

21.2 Status of Compliance with the Regulatory Requirements

Table 21-1 provides the compliance status of requirements under the *Migratory Bird Treaty Act of 1918*.

Table 21-1 – Status of Compliance with the Regulatory Requirements of the *Migratory Bird Treaty Act of 1918*

Regulatory Requirement	WIPP Compliance Table 21-1
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. Hunts for migratory bird species within the area open to recreation (outside the Off-Limits Area) is per federal and state laws. The DOE has implemented management objectives for protection of birds and their habitats in the WIPP LMP. Exemplary protective measures completed during this reporting period include the installation of netting over open containers of brine water near the Exhaust Shaft ductwork. This netting eliminates a potentially hazardous condition for birds. Groundwater well (Water Quality Sampling Program) WQSP-3 is located within 45 yards of an artificial nesting platform. Best management practices were implemented to ensure nesting birds would not be impacted due to groundwater-monitoring activities. Routine inspections of equipment at the WIPP are performed during the bird-nesting season to monitor for early signs of nest building in critical areas. When established nests are discovered in critical areas, subsequent mitigative actions depend on specific species, situation, state and federal regulations, and authorizations and conditions of the MOC relocation permit. Granting a request for use of WIPP lands outside the WIPP Property Protection Area is contingent on environmental walkdowns and confirming no nesting birds, including ground-nesting species. When nests are found, measures are implemented to minimize impact. The MOC, under the purview of the DOE, maintains a U.S. Fish and Wildlife Service (USFWS) migratory bird special purpose relocation permit (USFWS, 2020 and USFWS, 2023), which allows for relocation of nests, eggs, and or fledglings of migratory birds (as permitted) if located in a critical area that will impact their safety. The permit granted in CY 2023 requires relocation in the same general area. Subsequent permit authorizations are then permitted only after this relocation is unsuccessful. Required annual reports summarizing relocation activities for CY 2022 and CY 2023 were submitted to FWS on January 17, 2023, and January 2, 2024, respectively. The annual report for CY 2024 will be due on January 31, 2025.

22.0 ENDANGERED SPECIES ACT

22.1 Summary of the Law

The *Endangered Species Act of 1973* (ESA), as amended, (16 U.S.C. § 1531, et seq.) was enacted to prevent the extinction of imperiled species. 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 species 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 FWS. Under section 1536 of the act and implementing regulations in 50 CFR Part 402, *Interagency Cooperation- Endangered Species Act of 1973,* 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 FWS, may be required for a species that is determined to be in potential jeopardy. Threatened and endangered species are protected by the take prohibitions of section 9 of the ESA. Under section 7(a)(4) of the ESA, federal agencies must confer with the FWS if their action will jeopardize the continued existence of a proposed species. Candidate species are not protected by the take prohibitions of section 9 of the ESA.

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 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 22-1 provides the compliance status of requirements under the ESA.

Table 22-1 – Status of Compliance with the Regulatory Requirements of the *Endangered Species Act*

Regulatory Requirement	WIPP Compliance Table 22-1
1. Endangered Species Act, 16 U.S.C. § 1531, et seq.	To ensure that DOE 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. A more recent survey encompassing the main areas of WIPP operations was performed in 2022. The results for both surveys are summarized in the LMP. Based on these survey results, no current DOE activities are expected to impact endangered species. Therefore, no permits, biological assessments, or formal consultations are required. The Waste Isolation Pilot Plant Land Management Plan was updated in 2023 to include a review and tabulation of threatened and endangered species listed in the State of New Mexico counties of Eddy and Lea where WIPP and WIPP assets (e.g., groundwater wells) are located. Considerations pertaining to protected or proposed species are implemented in accordance with the plan, during the deliberation and administration of projects conducted on WIPP lands and lands under the purview of DOE. On November 25, 2022, the USFWS published a final rule listing two Distinct Population Segments of the lesser prairie-chicken (Tympanuchus pallidicinctus) under the ESA. A correction to the prohibitions prescribed in the rule document was published on December 2, 2022. The final rule listed the Southern Distinct Population Segment of the lesser prairie-chicken as endangered and the Northern Distinct Population Segment as threatened. The original effective date of January 24, 2023, was extended to March 27, 2023, to allow the USFWS to finalize conservation tools and guidance documents to avoid confusion and disruption for landowners, federal partners, and industry within the lesser prairie-chicken's five-state range. The WIPP site is within the 10-mile buffer of the estimated occupied range of the Southern Distinct Population Segment. Biologists with BLM have also identified areas suitable to the species (i.e., suitable habitat) and included the WIPP site in the agency's habitat evaluation area. The DOE adheres to established BLM timing restrictions when performing off-site field activities that may generate excessive noise (e.g., drilling of groundwater wells).

23.0 NATIONAL HISTORIC PRESERVATION ACT

23.1 Summary of the Law

The *National Historic Preservation Act* (NHPA), as amended, (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 the State of New Mexico participation in implementing the NHPA.

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 many archaeological sites and isolated occurrences within the 16-square-mile (10,240 acres) WIPP land withdrawal area. The SHPO maintains information on these sites.

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 timelines. 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 23-1 summarizes the regulatory requirements and compliance status under the NHPA.

Table 23-1 – Status of Compliance with the Regulatory Requirements of the *National Historic Preservation Act*

Regulatory Requirement	WIPP Compliance Table 23-1
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 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.
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 (DOE, 2023g).
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.* On August 17 and August 18, 2022, a Class III archaeological investigation (NMCRIS number 150820) was conducted for a proposed south expansion of current WIPP facilities and a modular small arms training facility on a total land area of approximately 78 acres. The survey results were negative, as only two non-significant isolates were found on the surveyed acreage. A Class III archaeological investigation (NMCRIS Number 151228) on 640 acres was conducted between October 2, 2022, and October 8, 2022. This investigation supports the WIPP SEIS for analyzing impacts of excavation for additional disposal panels. The survey results were negative, as no cultural resources were found on the surveyed acreage. This investigation was held in conjunction with a Class I inventory (NMCRIS Number 151291) for the same purpose stated but covering a much larger area of 3,862 acres. This inventory was performed to collect up-to-date information on previously located sites and provide findings for Section 106 consultation for determining National Register eligibility. Avoidance of known archaeological sites is the primary mitigation measure used by the DOE. 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 the health and safety of New Mexicans 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 *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

The DOE continued to comply with applicable New Mexico environmental regulations, standards, and orders as demonstrated in the following sections.

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 authorized New Mexico 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 74-4-4E 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 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 facility in three different areas. First, WIPP personnel generate hazardous waste, universal waste, and used oil. They 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 facility personnel generate mixed waste containing both hazardous and radioactive components, and are subject to the requirements of 40 CFR Part 262.

Second, the WIPP facility 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).

Third, USTs used for petroleum storage at the WIPP facility 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, 40 CFR Part 262 (20.4.1.300 NMAC)

Table 25-1 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. In October 2018, the State of New Mexico revised its Hazardous Waste Management regulations, 20.4.1 NMAC. These regulations, which became effective on December 1, 2018, adopt by reference changes in the federal RCRA hazardous waste regulations beginning July 1, 2009, through the present.

Table 25-1 – Status of Compliance with Standards Applicable to Generators of Hazardous Waste, 40 CFR Part 262 (20.4.1.300 NMAC)

Regulatory Requirement	WIPP Compliance Table 25-1
1. Hazardous Waste Determination and Recordkeeping, 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. Records of the determination must be kept for at least three years.* 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. The DOE maintains compliance with hazardous waste recordkeeping requirements through proper records generation, completeness of required information, and retention for a minimum of three years.
2. Generator Category Determination, 40 CFR § 262.13 (20.4.1.300 NMAC)	*A hazardous waste generator must determine its generator category based on the amount of hazardous waste it generates, as defined in 40 CFR § 262.10.* The WIPP facility is classified as a large quantity generator.
3. Satellite Accumulation Area (SAA) Regulations, 40 CFR § 262.15(a)) (20.4.1.300 NMAC)	*There are a number of requirements for SAAs. These include the limit of 55 gallons of hazardous waste, and/or 1 quart of acutely hazardous liquid waste or 1 kg of acutely hazardous solid waste (listed in 40 CFR § 261) 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

Regulatory Requirement	WIPP Compliance Table 25-1
	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. The DOE generates in excess of 1,000 kg (kilograms [2,200 lbs]) of non-acute hazardous waste in a calendar month, qualifying it as a large -quantity generator at the WIPP facility under 40 CFR § 260.10.
4. Satellite Accumulation Area (SAA) Regulations, 40 CFR § 262.15(a) (1) through (5) (20.4.1.300 NMAC)	*Additional requirements apply to the condition of containers holding hazardous waste that are not in good condition; compatibility of the container with its contents; separation of incompatible wastes; keeping containers closed at all times; conditions when a container may be opened; and marking and labeling containers with an indication of the hazards of its contents.* Standard operating procedures (SOPs) for SAA and hazardous waste management define the requirements for managing containers. The DOE was in compliance with the SAA container requirements throughout the reporting period.
5. Satellite Accumulation Area (SAA) Regulations, 40 CFR § 262.15(a) (6) (20.4.1.300 NMAC)	*If a generator accumulates waste in excess of the 55-gallon or 1-quart/1 kg 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.* Use of SOPs and weekly inspections ensure that waste in an SAA is moved to the 90-day accumulation area before excess amounts are accumulated (SIMCO, 2023j). There were no excess accumulations in the SAAs during this reporting period, as verified by the weekly inspections.
6. Satellite Accumulation Area (SAA) Regulations, 40 CFR § 262.15(a) (8) (20.4.1.300 NMAC)	*A large quantity generator who operates an SAA must comply with the requirements for preparedness, prevention, and emergency procedures found in 40 CFR § 262 Subpart M.* The WIPP facility personnel implement procedures and plans for preparedness, prevention, and emergency procedures in compliance with this regulation and also to fulfil requirements under the Permit.
7. Conditions for Large Quantity Generators of Hazardous Waste, 40 CFR § 262.17(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 as long as certain conditions are met.* 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 an SAA as described in 40 CFR § 262.15. The WIPP facility personnel follow hazardous waste management, storage area inspection, and waste disposal plans and procedures to ensure that accumulation time is not exceeded.
8. Accumulation Time, 40 CFR § 262.17(a)(1) (20.4.1.300 NMAC)	*Except as provided in paragraphs (b) through (e) 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

Regulatory Requirement	WIPP Compliance Table 25-1
	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 facility personnel implement hazardous waste management procedures 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. 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.
9. Labeling and Marking of Containers and Tanks, 40 CFR § 262.17(a)(5) (20.4.1.300 NMAC)	*Each container of hazardous waste must be clearly marked with the words "Hazardous Waste," an indication of the hazards of the contents, hazard communication consistent with the Department of Transportation requirements; hazard statement or pictogram or chemical hazard label, and the date of the initial accumulation of the waste.* Each hazardous waste container in the 90-day storage area and SAA is clearly marked with the words "hazardous waste," and an indication of the hazards of the contents as described in WIPP procedures 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. Container markings are inspected weekly. The WIPP facility does not manage hazardous waste in tanks.

Regulatory Requirement	WIPP Compliance Table 25-1
10. Accumulation Time, 40 CFR § 262.17(b) (20.4.1.300 NMAC)	*A large quantity generator 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),40 CFR 124, 40 CFR 270, Section 3010 of RCRA Subtitle C, 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 the 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 facility 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 procedures. Corrective actions are accomplished through spill management procedures and action requests. The following communication and alarm systems are in place at the WIPP facility: building fire alarms, underground fire alarms, site notification system, underground evacuation alarm system, public address system, mine pager phones, portable radios, plant-based radios and mobile phones. 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. 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 to an emergency. Copies of the plan and amendments are provided to the NMED and outside agencies listed in the Permit. The DOE maintains the distribution list for the plan and is responsible for providing up-to-date copies. The RCRA Contingency Plan is reviewed and amended whenever the Permit for the WIPP facility is revised in any way that would affect the RCRA Contingency Plan; the plan fails in an emergency; the WIPP facility design, construction, operation, maintenance, or other circumstances change in a way that materially increases the potential for fires, explosions or releases of hazardous waste or hazardous

Regulatory Requirement	WIPP Compliance Table 25-1
	constituents or change the response necessary in an emergency; the list of RCRA Emergency Coordinators changes; or the list of WIPP facility emergency equipment changes. A RCRA Emergency Coordinator is onsite 24 hours a day, seven days a week. This individual is responsible for coordinating emergency response measures at the WIPP facility. 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, treatment, and disposal facilities, 40 CFR § 268.7(a)(5): TRU mixed waste designated by the Secretary of Energy for disposal at the WIPP facility 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. Should an accumulation time limit be exceeded or it is anticipated that an exceedance will occur, an extension of time will be requested as identified in 40 CFR 262.17(b). Should the NMED not approve the request, a RCRA Permit for a hazardous waste management unit will be initiated in accordance with Subpart B-Specific Procedures Applicable to RCRA Permits of 40 CFR 124 and 40 CFR 270. WIPP facility personnel conduct weekly inspections of hazardous waste accumulation areas (SIMCO, 2023j) and applicable WIPP procedures provide instruction for the shipment of hazardous waste off site prior to expiration of the waste accumulation time limit. Should a hazardous waste management unit need to be permitted at the WIPP facility due to a hazardous waste accumulation time exceedance, then the applicable regulatory requirements of Section 3010 of Subtitle C of RCRA will be implemented. As a Large Quantity Generator and in accordance with Permit Section 2.14.2. Biennial Report, WIPP personnel submit a biennial hazardous waste report every two years to the EPA describing the types and quantities of hazardous waste generated and its subsequent disposition.
11. Accumulation Time, 40 CFR § 262.17(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 expiration of the 90-day deadline and if a request for an extension is needed. There were no extensions requested during this reporting period.
12. EPA Identification Number, 40 CFR § 262.18 (20.4.1.300 NMAC)	*An EPA identification number is required for each generator of hazardous waste. In addition, a generator must not treat, store, dispose of, or offer for transportation, hazardous waste without having an EPA identification number. 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 facility: NM4890139088. The DOE uses only transporters or TSDFs that have an EPA identification number.
13. Manifest Requirements:	*Compliance with the manifest requirements is mandatory for shipping hazardous*

Regulatory Requirement	WIPP Compliance Table 25-1
General Requirements, 40 CFR § 262.20 (20.4.1.300 NMAC)	*waste off-site.* Veolia Environmental Services (Veolia) prints manifests used to ship WIPP site-generated hazardous waste. Veolia has gained approval from EPA to print their own manifests. These manifests comply with the EPA-specified Uniform Hazardous Waste Manifest for off-site hazardous waste shipments. The EPA required the use of a uniform manifest, issuing the most recent format version in December, 2017. The DOE did not use e-manifests for shipping hazardous waste during the reporting period.
14. 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.
15. 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 by the DOE contain sufficient copies to fulfill this requirement.
16. 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 by facility personnel 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.
17. Electronic Manifests and Electronic Manifest Signatures, 40 CFR § 262.24 and § 262.25 (20.4.1.300 NMAC)	*In lieu of the paper manifest described in 262.20(a), an electronic manifest (e-Manifest) that meets the requirements of 262.24 may be used. Electronic signatures on the e-Manifest shall be a legally valid and enforceable signature.* The DOE did not use an e-Manifest during the reporting period.
18. Waste Minimization Certification, 40 CFR § 262.27 (20.4.1.300 NMAC)	*A large quantity generator who initiates a shipment of hazardous waste must certify that there is a waste minimization program in place.* The DOE has a waste minimization program in place. Annual certifications of the waste minimization program are kept at the facility in the operating record.
19. 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 facility personnel are responsible for proper packaging of hazardous and mixed waste shipped from the site.
20. Labeling Requirements, 40 CFR § 262.31 (20.4.1.300 NMAC)	*DOT labeling requirements must be met before shipping hazardous waste off-site.* The WIPP facility personnel use transportation procedures to address these requirements and to ensure that each package of hazardous or mixed waste is properly labeled before being shipped off-site.
21. Marking Requirements, 40 CFR § 262.32 (20.4.1.300 NMAC)	*DOT marking requirements must be met before shipping hazardous waste off-site. Additional EPA marking requirements apply for containers of 119 gallons or less.* The WIPP facility personnel use transportation procedures to address these requirements and to ensure that each package of hazardous or mixed waste is properly marked before being shipped off-site.

Regulatory Requirement	WIPP Compliance Table 25-1
22. Placarding, 40 CFR § 262.33 (20.4.1.300 NMAC)	*DOT placarding requirements must be met before shipping hazardous waste off-site.* The WIPP facility personnel use transportation procedures to address these requirements and to ensure that each shipment of hazardous or mixed waste is placarded in accordance with regulations.
23. 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) [through November 30, 2018, then as of December 1, 2018:] Subpart A, 40 CFR §§ 262.15(a)(1), 262.15(a)(2), and 265.173(a), 40 CFR § 262.17(a)(iv)(B) (20.4.1.300 NMAC)	*For SAAs, requirements for hazardous waste generators from 40 CFR Part 262, Subpart A, pertain to the condition of the containers (§ 262.15(a)(1), compatibility of the waste with the container (§ 262.15(a)(2), 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 § 262.17(a)(iv)(B).* 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. The WIPP facility personnel use procedures to address waste/container compatibility and the requirement that containers are closed except when waste is being added or removed. Procedures are also used by facility personnel to 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.
24. 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 DOE on-site for a minimum of three years. Waste analyses and reports supporting LDRs are kept on file for a minimum of three years.
25. 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 2024 (SIMCO, 2024a).
26. 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.* No exception reports were required during this reporting period.
27. 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.
28. 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.* This regulation is not applicable.

Regulatory Requirement	WIPP Compliance Table 25-1
29. 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, MOC 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, MOC 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 facility.
30. Required Aisle Space 40 CFR § 264.255 and 265.35 (20.4.1.300 NMAC)	*A large quantity generator must maintain aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in an emergency.* The WIPP Permit, Part 2, *General Facility Conditions*, Permittee procedures, and Part 3, *Container Storage*, require the Permittee to maintain appropriate aisle space for stored waste in the WHB Unit and Parking Area Unit. No aisle space is required to be maintained between containers emplaced in the HWDUs as designated in WIPP Permit, Attachment A2, *Geologic Repository*. During inspections of the Central Accumulation Area, the inspector inspects aisle space to ensure sufficient space allows for response personnel and equipment. Aisle space requirements were maintained for this reporting period.

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 25-2.

Table 25-2 – Status of Compliance with Standards Applicable to Transporters of Hazardous Waste, 40 CFR Part 263 (20.4.1.400 NMAC)

Regulatory Requirement	WIPP Compliance Table 25-2
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. was contracted by DOE to transport TRU waste to the WIPP from the generator sites during this reporting period. The 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 facility, 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.* The transporter hired to ship TRU and TRU mixed waste to the WIPP facility has an EPA identification number (COR000206722). The transporters used to transport site -generated hazardous and mixed waste from the WIPP facility to off-site TSDFs must have EPA identification numbers.
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 facility must comply with these requirements. When shipments of TRU mixed waste are received at the WIPP facility, the manifest is signed and a copy is immediately given to the transporter. Applicable records are maintained by the DOE. Transporters of site -generated hazardous and mixed waste are given copies of manifests that include both transporter and generator signatures before leaving the WIPP facility. Transporters ensure that the manifests accompany the hazardous waste shipments and are signed and delivered to the designated TSDF.
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 facility 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.

Regulatory Requirement	WIPP Compliance Table 25-2
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 non-hazardous 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 facility 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, 2010), with an effective date of December 30, 2010, and a duration of 10 years. The Permittees submitted the *Resource Conservation and Recovery Act Ten -Year Renewal Application for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit* on March 31, 2020 (DOE, 2020a). On October 6, 2020, the NMED determined the Renewal Application was administratively complete (NMED, 2020). On December 17, 2021, NMED notified the Permittees of the decision to consolidate the Class 3 Permit Modification Request (PMR) for Panels 11 and 12, received July 31, 2021, with the Renewal Application (NMED, 2021). The Renewal Application again was acknowledged as administratively complete in the December 17, 2021, letter to the Permittees which stated, *"Formally, NMED continues to consider the Renewal Application administratively complete, the inclusion of the Class 3 PMR for Panels 11 and 12 being a supplement to previously submitted material.*" Furthermore, on its own, the Class 3 PMR had already been deemed administratively complete after an NMED review in October 2021. On March 17, 2022, the Permittees submitted the updated redline strikeout for the Renewal Application requested by NMED (DOE, 2022g). Following this submittal, the NMED issued a technical incompleteness determination on May 13, 2022 (NMED, 2022a). The Permittees responded to this determination on June 27, 2022 (DOE, 2022h), and July 12, 2022 (DOE, 2022i). On December 8, 2022, the NMED issued a fact sheet and notice requesting public comment on the proposed final Permit and the opportunity to request a public hearing on the application. On December 20, 2022, the NMED deemed the Renewal Application technically complete (NMED, 2022b). The NMED subsequently extended the public comment period on February 13, 2023 (NMED, 2023b). During the public comment period, several commenters requested a public hearing. This resulted in the Permittees entering pre-hearing negotiations, with the interested parties that

requested a hearing, in an effort to resolve the concerns raised by those parties. On June 23, 2023, NMED negotiated a settlement agreement, in conjunction with the Permittees and interested parties (NMED, 2023c). On September 22, 2023, the NMED held a public meeting to discuss the proposed final Permit. On October 4, 2023, the NMED issued a final order granting the Permittees a 10-year Permit (NMED, 2023a). The renewed Permit became effective for ten years on November 3, 2023.

Table 25-3 – Status of Compliance with the Regulatory Requirements for TSDFs, 40 CFR Part 264 (20.4.1.500 NMAC)

Regulatory Requirement	WIPP Compliance Table 25-3
1. General Facility Standards, 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 facility 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.* At the onset of the contract with a hazardous waste disposal facility or a mixed Low-level waste disposal facility, the facilities notify the DOE of their appropriate permits for receiving the waste being sent to them. Notice requirements are described in WIPP Permit Part 2, Section 2.2.2, *Required Notification to Off-Site Sources*. The DOE has notified the generator sites of TRU waste of the permit to receive hazardous waste at the WIPP facility.
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 requirements are described in WIPP Permit Part 2, Section 2.3, *General Waste Analysis*. WIPP Permit Attachment C, *Waste Analysis Plan*, contains a description of the test methods and details of planned waste analysis for complying with the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13), a description of the waste shipment screening and verification process, and a description of the quality assurance/quality control program. The Permittees maintained compliance with these requirements during this reporting period.
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 described in the WIPP Permit, Part 2, Section 2.6, *Security*. The WIPP Property Protection Area is enclosed within a 7-foot high chain-link fence consisting of a minimum of No. 11 American Wire Gauge or

Regulatory Requirement	WIPP Compliance Table 25-3
	heavier galvanized steel wire. This fencing is topped by three or more strands of barbed wire single or double outriggers, and 24-hour surveillance is conducted by guards trained to prevent unauthorized entry onto the facility. Signs are posted with “No Trespassing” and “Danger — Authorized Personnel Only” in both English and Spanish at approximately 50-foot intervals. The perimeter fence, gates, and signs are inspected daily for evidence of tampering or structural damage and signage in accordance with Permittee -approved procedures, in accordance with WIPP Security requirements (NWP, 2018b).
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.* General inspection requirements are described in WIPP Permit Part 2, Section 2.7, *General Inspection Requirements*. WIPP Permit Attachment E, Inspection Schedule, Process and Forms, contains a description of the facility inspections (including container inspections), inspection schedule, and record requirements. In accordance with WIPP Permit Part 1, Section 1.7.14, the Permittees are required to report all other instances of noncompliance not otherwise required to be reported pursuant to Permit Part 1, Sections 1.7.10 through 1.7.13, at the time monitoring reports are submitted annually in October. During this reporting period, the Permittees reported various instances of noncompliance related to WIPP Permit inspections in the Semi-Annual Volatile Organic Compound Data Summary Report, dated October 2022 (DOE, 2022j) and the Annual Noncompliance Report, dated October 2023 (SIMCO, 2023k). The Permittees implemented corrective actions for these noncompliances. The corrective actions are described in the Semi-Annual VOC Data Summary Report and the Annual Noncompliance Report.
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.*

Regulatory Requirement	WIPP Compliance Table 25-3
	Personnel training requirements are described in WIPP Permit Part 2, Section 2.8, *Personnel Training*. WIPP Permit Attachment F, *Facility Personnel Permit Training Program*, contains a description of the WIPP facility personnel training program (SIMCO, 2023l) including a program outline and design, job titles and job descriptions, training content, frequency, techniques, implementation and records requirements. A list of personnel assigned to TRU mixed waste management and emergency response positions is maintained in WIPP facility files. In accordance with WIPP Permit Part 1, Section 1.7.14, the Permittees are required to report all other instances of noncompliance not otherwise required to be reported pursuant to Permit Part 1, Sections 1.7.10 through 1.7.13, at the time annual monitoring reports are submitted in October. During this reporting period, the Permittees reported various instances of noncompliance related to WIPP Permit inspections in the Semi-Annual Volatile Organic Compound Data Summary Report, dated October 2022 (DOE, 2022j) and the Annual Noncompliance Report, dated October 2023 (DOE 2023k). The Permittees implemented corrective actions for these noncompliances. The corrective actions are described in the Semi-Annual VOC Data Summary Report and the Annual Noncompliance Report.
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.* General requirements for ignitable, reactive, or incompatible wastes are defined in WIPP Permit Part 2, Section 2.9, *General Requirements for Handling Ignitable, Corrosive, Reactive, or Incompatible Wastes*. The Permittees maintained compliance with these requirements during this reporting period.
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 governmental 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. Preparedness and Prevention, Applicability, 40 CFR § 264.30 (20.4.1.500 NMAC)	*The regulations in this subpart apply to owners and operators of hazardous waste facilities, except as 40 CFR § 264.1 provides otherwise.* The portions of Subpart C applicable to the WIPP facility are identified in 40 CFR §§ 264.30 through 264.37, and this table.

Regulatory Requirement	WIPP Compliance Table 25-3
11. 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.* The WIPP facility is designed, constructed, maintained and operated in a manner to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of TRU mixed waste or mixed waste constituents to air, soil, groundwater, or surface water which could threaten human health or the environment. This requirement is specified in WIPP Permit Part 2, Section 2.1, *Design and Operation of Facility.* The Permittees maintained compliance with these requirements during this reporting period.
12. 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.* Emergency equipment requirements are defined in WIPP Permit Part 2, Section 2.10.1, *Required Equipment*. Emergency equipment is described in WIPP Permit Attachment D, Section D-6, *Emergency Equipment*. The Permittees maintained compliance with these requirements during this reporting period.
13. 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.* Testing and maintenance of equipment is required in WIPP Permit Part 2, Section 2.10.2, *Testing and Maintenance of Equipment*. WIPP Permit Attachment E, Inspection Schedule, Process and Forms, contains a description of the facility inspections (including container inspections), inspection schedule, and record requirements. In accordance with WIPP Permit Part 1, Section 1.7.14, the Permittees are required to report all other instances of noncompliance not otherwise required to be reported pursuant to Permit Part 1, Sections 1.7.10 through 1.7.13, at the time annual monitoring reports are submitted in October. During this reporting period, the Permittees reported various instances of noncompliance related to WIPP Permit inspections in the Semi-Annual Volatile Organic Compound Data Summary Report, dated October 2022 (DOE, 2022i) and the Annual Noncompliance Report, dated October 2023 (DOE 2023k). The Permittees implemented corrective actions for these noncompliances. The corrective actions are described in the Semi-Annual VOC Data Summary Report and the Annual Noncompliance Report.

Regulatory Requirement	WIPP Compliance Table 25-3
14. 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 facility: the PA system and its intercom phones and paging channels, an intraplant telephone system, mine phones, local and facility-wide alarm systems, pagers, 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.
15. 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*, Permittee procedures, and Permit Part 3, *Container Storage*, call for maintaining appropriate aisle space for stored waste in the WHB. No aisle space is required to be maintained between containers emplaced in the HWDUs as designated in WIPP Permit, Attachment A2, *Geologic Repository*. Aisle space requirements were maintained for this reporting period.
16. Arrangements with Local Authorities, 40 CFR § 264.37 (20.4.1.500 NMAC)	*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, 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.
17. Contingency Plan and Emergency Procedures, Applicability, 40 CFR § 264.50 (20.4.1.500 NMAC)	*The regulations in this subpart apply to owners and operators of all hazardous waste facilities, except as 40 CFR § 264.1 provides otherwise.* The portions of Subpart D applicable to the WIPP facility are identified in 40 CFR §§ 264.50 through 264.56, and this table.
18. 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 Permittees have a contingency plan for their facility. This contingency plan is designed to minimize hazards to human health or the environment from fires, explosions, or unplanned releases of hazardous waste or hazardous waste constituents. Pursuant to the criteria in the Permit, the RCRA Contingency Plan was implemented on April 9, 2022, August 23, 2022, and August 30, 2023, as a precautionary measure. On April 9, 2022, the RCRA Contingency Plan was

Regulatory Requirement	WIPP Compliance Table 25-3
	implemented due to the observation of a small quantity of liquid identified in the inside bottom of the TRUPACT-II shipping package and on some payload containers. Some drops of liquid were also observed on the floor near the TRUPACT-II. On August 23, 2022, the RCRA Contingency Plan was implemented due to the observation of a small quantity of an oily substance identified on top of the reinforcement plate, on top of the payload inside of TRUPACT-II #186 and the observation of a missing filter vent on an SWB in TRUPACT-II #206. On August 30, 2023, the RCRA Contingency Plan was implemented due to a container being breached after waste emplacement. The push pull attachment on a forklift made contact with an emplaced drum. This resulted in a puncture of the outer steel drum; however, the inner liner and plastic bag were not damaged. Following each implementation, the Permittees submitted the required 15-day report of implementation. These reports were submitted on April 22, 2022 (DOE, 2022k), September 6, 2022 (DOE, 2022l), and September 14, 2023 (DOE, 2023h).
19. 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.* Permit Attachment D, 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. The Permittees maintained compliance with these requirements during this reporting period.
20. 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.* The requirements for maintaining copies of the contingency plan are described in WIPP Permit Part 2, Section 2.12.2, *Copies of Plan*. WIPP Permit Attachment D, Section D-9, *Location of the RCRA Contingency Plan and Plan Revision*, contains a description of how the Permittees maintain and distribute copies of the RCRA Contingency Plan. The Permittees maintained compliance with these requirements during this reporting period.
21. Amendment of Contingency Plan, 40 CFR § 264.54 (20.4.1.500 NMAC)	*The contingency plan must be reviewed and immediately revised, if necessary, whenever applicable regulations are revised; the 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 requirement for amendments to the RCRA Contingency Plan are described in WIPP Permit Part 2, Section 2.12.3, *Amendments to Plan* and Attachment D, Section D-9, Location of the RCRA Contingency Plan and Plan Revision. The RCRA Contingency Plan was modified by several Permit modifications (See Table 25-5). The Permittees maintained compliance with this requirement during this reporting

Regulatory Requirement	WIPP Compliance Table 25-3
	period.
22. 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 facility 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.
23. 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, 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.* Emergency procedure requirements are described in WIPP Permit Part 2, Section 2.12, *Contingency Plan*, and WIPP Permit Attachment D, *RCRA Contingency Plan*. The RCRA Contingency Plan was implemented on April 9, 2022 (DOE, 2022k), August 23, 2022 (DOE, 2022l), and August 30, 2023 (DOE, 2023h). The 15-day report of implementation was submitted to the NMED on April 22, 2022 (DOE, 2022k), September 6, 2022 (DOE, 2022l), and September 14, 2023 (DOE, 2023h). The Permittees maintained compliance with these requirements during this reporting period.
24. Manifest System, Recordkeeping, and Reporting, Applicability, 40 CFR § 264.70 (20.4.1.500 NMAC)	*(a) The regulations in this subpart apply to owners and operators of both on-site and off-site facilities, except as § 264.1 provides otherwise.* The portions of Subpart E applicable to the WIPP facility are identified in 40 CFR §§ 264.70 through 264.77, and this table.
25. 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, submit a copy of the manifest to the EPA's e-Manifest system within 30 days, and retain a copy of the manifest for at least three years.* Manifest system requirements are described in WIPP Permit Part 2, Section 2.13,

Regulatory Requirement	WIPP Compliance Table 25-3
	Manifest System. 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 (NWP, 2022c). Significant manifest discrepancies are noted as required and a copy of the manifest is returned to the generator within 30 days. A scanned copy of the manifest is uploaded to the EPA's e-Manifest system within 30 days. Copies of hazardous waste manifests were returned to the generator within 30 days. Copies of manifests were submitted to the e-Manifest system within 30 days.
26. 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.* Manifest discrepancy requirements are described in Permit Part 2, Section 2.13, *Manifest System*, and Attachment A1, *Container Storage*. Permittee waste handling and transportation procedures provide instruction and guidance for handling manifest discrepancies (NWP, 2022c). 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. There were no manifest discrepancies that occurred during this reporting period.
27. 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 Permittees. The NMED modified 20.4.1.500 NMAC, effective December 1, 2018, to require most records to be maintained until closure. Annual certifications of the waste minimization program are kept in the operating record.
28. 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. 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.
29. Biennial Report, 40 CFR § 264.75 (20.4.1.500	*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.*

Regulatory Requirement	WIPP Compliance Table 25-3
NMAC)	The biennial report requirements are described in WIPP Permit Part 2, Section 2.14.2, *Biennial Report*. The Permittees submit TRU mixed waste data for the TSDF biennial report to the NMED. The last biennial report was submitted in February 2024 (SIMCO, 2024a).
30. 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.
31. 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.* Additional reporting was required for the discharge permit 831 (DP-831) for an abatement investigation, sulfate evaluation, and radium evaluation.
32. Releases From Solid Waste Management Units, Applicability, 40 CFR § 264.90 (20.4.1.500 NMAC)	*Except as provided in paragraph (b) of this section, the regulations in this subpart apply to owners or operators of facilities that treat, store or dispose of hazardous waste.* The portions of Subpart F applicable to the WIPP facility are identified in 40 CFR §§ 264.90 through 264.101, and this table.
33. Releases From Solid Waste Management Units, Applicability, 40 CFR § 264.90(b)(4) (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.
34. 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.* Permit Attachment L meets this requirement. The WIPP Groundwater Monitoring Program Plan (WP 02-1) implements the Attachment L performance statements. (NWP, 2021b). During this reporting period, water level monitoring and annual sampling and analysis were performed, and results were submitted to the NMED in accordance with the WIPP Permit Part 5, Section 5.10.2, *Submittal of Results*. Results were in compliance and were lower than the action levels.
35. 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 related to the disposal of TRU mixed waste 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*. Results were in compliance and were lower than the

Regulatory Requirement	WIPP Compliance Table 25-3
	action levels.
36. 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 Table 5.4.b, *Hazardous Constituents*. Results were in compliance and were lower than the action levels.
37. 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 5.6, *Background Groundwater Quality*, Table 5.6, *WQSP Well Background Values.* Results were in compliance and were lower than the action levels.
38. 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.
39. 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 for each detection monitoring well (DMW) during each sampling activity, 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 was submitted to the NMED prior to receipt of TRU mixed waste at the WIPP facility (WIPP Permit Part 5, Table 5.6, *WQSP Well Background Values*). Through the 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*.
40. Detection Monitoring Program, 40 CFR §	*The Secretary will specify the parameters or constituents to be monitored in the*

Regulatory Requirement	WIPP Compliance Table 25-3
264.98 (20.4.1.500 NMAC)	*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 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.
41. 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 (SWMUs) and AOCs that require no further action. No new SWMUs were identified during this reporting period. However, an SWMU was indicated as closed in accordance with the Permit Attachment G. This was disposal panel 7.
42. 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 portions of Subpart G applicable to the WIPP facility are identified in 40 CFR §§ 264.110 through 264.120, and this table. The Permittees have prepared a closure plan and a post-closure plan for the

Regulatory Requirement	WIPP Compliance Table 25-3
	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 unit 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. During this reporting period, the Permittees closed an HWDU, known as Panel 7 in accordance with Permit Attachment G, and Attachment G1 in February 2023. On April 7, 2023, the Permittees requested a 45-day extension to submit the certification of closure to the NMED. This extension was granted on April 11, 2023. The Permittees submitted the certification of closure to the NMED on April 27, 2023 (DOE, 2023i). This HWDU is also designated as a Solid Waste Management Unit (SWMU) SWMU 013i in Permit Attachment K, Table K-4.
43. 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.* Closure performance standard requirements are described in WIPP Permit Part 6, Section 6.2, *Performance Standard*, and Attachment G, *Closure Plan*. The Permittees continued to maintain compliance with this requirement.
44. 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.* Closure requirements are described in WIPP Permit Part 6, *Closure Requirements*, and Attachment G, *Closure Plan*. The Permittees continued to maintain compliance with this requirement.
45. 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 WIPP Permit Part 6, Section 6.5, *Time Allowed for Closure*, and Attachment G, *Closure Plan*. The Permittees continued to maintain compliance with this requirement.
46. Disposal or Decontamination of Equipment, Structures, and Soils, 40 CFR § 264.114 (20.4.1.500	*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.*

Regulatory Requirement	WIPP Compliance Table 25-3
NMAC)	This requirement is described in WIPP Permit Part 6, Section 6.6, *Disposal or Decontamination of Equipment, Structures, and Soils*, and Attachment G, *Closure Plan*. 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. The Permittees continued to maintain compliance with this requirement.
47. 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.* This requirement is described in WIPP Permit Part 6, Section 6.7, *Certification of Closure*, and Attachment G, *Closure Plan*. During this reporting period, the Permittees closed an HWDU, known as Panel 7 in accordance with Permit Attachment G, and Attachment G1 in February 2023. On April 7, 2023, the Permittees requested a 45-day extension to submit the certification of closure to the NMED. This extension was granted on April 11, 2023. The Permittees submitted the certification of closure to the NMED on April 27, 2023 (DOE, 2023i). The Permittees continued to maintain compliance with this requirement.
48. 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.* This requirement is described in Permit Part 6, Section 6.8, *Survey Plat*, and Attachment G, *Closure Plan*. During this reporting period, the Permittees closed an HWDU, known as Panel 7 in accordance with Permit Attachment G, and Attachment G1 in February 2023. The Permittees filed the survey plat with the Eddy County Clerk's Office in Carlsbad, NM, on March 9, 2023, and submitted the survey plat and evidence of filing to the NMED on March 27, 2023 (DOE, 2023j). The Permittees continued to maintain compliance with this requirement.
49. 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*.
50. 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.
51. 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*

Regulatory Requirement	WIPP Compliance Table 25-3
	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. This requirement is described WIPP Permit Part 7, Section 7.4.1, *Disposal Unit Records*, and Attachment H, *Post-Closure Plan*. During this reporting period, the Permittees closed a HWDU, known as Panel 7 in accordance with Permit Attachment G, and Attachment G1 in February 2023. On April 7, 2023, the Permittees requested a 45-day extension to submit the certification of closure to the NMED. This extension was granted on April 11, 2023. The Permittees submitted the certification of closure to the NMED on April 27, 2023 (DOE, 2023i). The Permittees submitted the disposal unit record on May 15, 2023 (DOE, 2023k). The Permittees continued to maintain compliance with this requirement.
52. Certification of Completion of Post-Closure Care, 40 CFR § 264.120 (20.4.1.500 NMAC)	*Within 60 days of the completion of post-closure of each landfill 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*.
53. Use and Management of Containers, Applicability, 40 CFR § 264.170 (20.4.1.500 NMAC)	*The regulations in this subpart apply to owners and operators of all hazardous waste facilities that store hazardous waste in containers, except as § 264.1 provides otherwise.* The portions of Subpart I applicable to the WIPP facility are identified in 40 CFR §§ 264.170 through 264.179, and this table.
54. 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.* The WIPP Permit Part 3, *Container Storage*, and Permit 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 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 the WIPP facility 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 received from off-site waste generators are not opened at the WIPP facility, 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

Regulatory Requirement	WIPP Compliance Table 25-3
	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.
55. Use and Management of Miscellaneous Units, Applicability, 40 CFR § 264.600 (20.4.1.500 NMAC)	*The requirements in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units, except as § 264.1 provide otherwise.* The portions of Subpart X applicable to the WIPP facility are identified in 40 CFR §§ 264.601 through 264.603, and this table.
56. 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 Permit Attachment A2, *Geologic Repository*, describe the location, design, operation, and 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. The status of Permit-related monitoring activities is detailed below. **Volatile Organic Compound (VOC) Monitoring** Repository VOC monitoring activities were performed during the reporting period as required by Permit Part 4, Section 4.6.2., and associated requirements in Permit Attachment N. Room-based VOC monitoring activities were performed during the reporting period in Panel 7, Rooms 1, 2, 3, 4, 5, and 6 and Panel 8, Rooms 6 and 7, as required by Permit Part 4, Section 4.6.3., and associated requirements in Permit Attachment N. Panel 7 VOC monitoring was terminated in February 2023 as a result of closure of the HWDU. **Geomechanical Monitoring** Remote geomechanical monitoring data continued to be transmitted electronically during the reporting period on a weekly basis via remote instruments located in Panel 7 and in Panel 8, as required by Permit Part 4, Section 4.6.1., associated requirements in Permit Attachment A2, Section A2-5b(2), and Permit Attachment E, Table E-2. **Mine Ventilation Rate Monitoring** Mine ventilation rate monitoring activities were performed during the reporting period as required by Permit Part 4, Section 4.6.4., and associated requirements in Permit Attachment O.

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 25-4.

Table 25-4 – 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 Table 25-4
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 the Permittees requested permit modifications. The Permit modifications are listed in Table 25-5. 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 the MOC 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. The Permittees continue to comply by submitting required reports.

Regulatory Requirement	WIPP Compliance Table 25-4
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.* A summary of Permit modifications submitted by the Permittees is outlined in Table 25-5.

Table 25-5 – Hazardous Waste Facility Permit Modifications Submitted During this Reporting Period (April 1, 2020, through March 31, 2022)

Class	Subject [Table 25-5]	Date
2022 Class 1 Permit Modification Notifications		
1	Correction to Table D-2 in Permit Attachment D Changes to the Property Protection Area Fence, Removal of Human Resources Trailer, and the Addition of the Access Control Point Shelter to Figures in Permit Attachment A4 and Attachment D	04/12/2022
1	Update Permit Attachment D, Table D-1, RCRA Emergency Coordinators Clarification to Permit Attachment E, Section E-1, Inspection Schedule	06/15/2022
1	Correction to Table E-1 in Permit Attachment E Correction to Permit Attachment H1	07/26/2022
1	Completion of Panel 8 Mining	10/05/2022
1	Update Permit Attachment D, Table D-1, Resource Conservation and Recovery Act Emergency Coordinators	11/07/2022
1*	Change in Operational Control	11/22/2022
2023 Class 1 Permit Modification Notifications		
1	Revise Permit Part 4, Table 4.1.1, Underground Hazardous Waste Disposal Units Update to Permit Attachment E, Section E-1, Inspection Schedule	01/12/2023

Class	Subject [Table 25-5]	Date
1*	Addition of four new Shielded Containers	01/12/2023
1	Update Carlsbad Field Office (CBFO) Manager and Management and Operating Contractor (MOC) Start Date in Permit Attachments A and B Update Permit Attachment D, Table D-1, Resource Conservation and Recovery Act Emergency Coordinators	02/06/2023
1	Update Department of Energy (DOE) Carlsbad Field Office (CBFO) Manager Title and phone number in Permit Attachments A, B, and G	05/15/2023
1	Update Attachments A2, B, D, G, and K to Address Panel 7 Closure; Update Permit Attachment B, Appendix B1, Other Environmental Permits; and Update Permit Attachment D, Resource Conservation and Recovery Act Contingency Plan	08/02/2023
2024 Class 1 Permit Modification Notification		
1	Revise text in Permit Part 1, Section 1.15.1 through 1.15.5, regarding Tribal Community notice and involvement. Revise text in Permit Attachment A1, concerning the flood zone designation for the Waste Isolation Pilot Plant (WIPP) facility.	03/19/2024
2022 Class 2 Permit Modification Requests		
	None	
2023 Class 2 Permit Modification Requests		
	Update Panel 8 Volatile Organic Compound Room-Based Limits	10/15/2023
2024 Class 2 Permit Modification Requests		
	Addition of Four New Shielded Containers Revise Site Recertification Audit Scheduling from Annual to Graded Approach	03/29/2024
2022 Class 3 Permit Modification Requests		
	None	
2023 Class 3 Permit Modification Requests		
	None	
2024 Class 3 Permit Modification Requests		
	None	
2022 Determination of Class Permit Modification Requests		
	None	
2023 Determination of Class Permit Modification Requests		
	None	
2024 Determination of Class Permit Modification Requests		
	None	

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

Nickel-cadmium, nickel-metal hydride, and lithium batteries, and used lamps at the WIPP are managed as universal waste under these regulations. Also, in accordance with 20.4.1.1001 NMAC, hazardous waste aerosol cans have also been managed as a universal waste at the WIPP. On December 9, 2019, the EPA finalized a rule adding hazardous waste aerosol cans to the federal universal waste regulations at 40 CFR § 273.6. The final rule became effective on February 7, 2020. The WIPP facility operating staff 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 Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities, Spent Lead-Acid Batteries Being Reclaimed, 40 CFR § 266.80 (20.4.1.700 NMAC) rather than 40 CFR Part 273. Compliance with the requirement is shown in Table 25-6.

Table 25-6 – Status of Compliance with the Universal Waste Management Regulations Under 40 CFR Part 273 (20.4.1.1000 NMAC)

Regulatory Requirement	WIPP Compliance Table 25-6
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 DOE is a small-quantity handler of universal waste, as defined in 40 CFR § 273.9. The DOE manages nickel-cadmium batteries, nickel-metal hydride batteries, lithium batteries, mercury-containing thermostats, used lamps, and non-punctured aerosol cans at the WIPP facility under the universal waste regulations.
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 facility. Universal waste is handled in accordance with the requirements of 40 CFR Part 273 and 20.4.1.1001 NMAC, 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 DOE 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 DOE hazardous and universal waste management plans and procedures. In one instance, two fluorescent lamps were not labeled, but were in a container. This was corrected upon discovery during an NMED inspection.
5. Accumulation Time Limits, 40 CFR § 273.15	*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*

Regulatory Requirement	WIPP Compliance Table 25-6
(20.4.1.1000 NMAC)	*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 DOE hazardous waste management plans and procedures, the DOE logs the date universal waste is generated at the WIPP facility 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 1-year storage limit is not exceeded. The DOE is 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.
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 the WIPP facility. The WIPP compliance status is summarized in Table 25-7.

Table 25-7 – Status of Compliance with the UST Regulatory Requirements Under 20.5 NMAC

Regulatory Requirement	WIPP Compliance Table 25-7
1. Applicability, 20.5.1.102 NMAC (40 CFR § 280.10)	*Any owner or operator of any 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 petroleum product USTs at the WIPP facility; one contains unleaded gasoline, and the other contains diesel fuel.
2. Existing Tanks, 20.5.102.200 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.*

Regulatory Requirement	WIPP Compliance Table 25-7
	Both USTs at the WIPP facility are registered with the NMED Petroleum Storage Tank Bureau.
3. Transfer of Ownership, 20.5.102.201 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 USTs has not been transferred.
4. New Storage Tank Systems, 20.5.102.202 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.
5. Substantially Modified Storage Tank Systems, 20.5.102.203 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 30 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, 20.5.102.204 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.* There were no known or suspected releases during the reporting period.
7. Emergency Repairs and Tank Replacement, 20.5.102.205 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.* There were no known or suspected releases during the reporting period.
8. Registration, 20.5.102.206 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 that are operated at the WIPP facility.
9. Registration Certificate, 20.5.102.207 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 facility.
10. Payment of Fee, 20.5.103.300 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

Regulatory Requirement	WIPP Compliance Table 25-7
	Tank Fund. The annual per-tank fees were paid by July 1, 2022, and July 1, 2023.
11. Amount of Fee, 20.5.103.301 NMAC	*The annual fee for each UST is $100.00 per tank.* The annual UST fee paid by the DOE is $200 for the two storage tanks.
12. Timeliness and Late Fees, 20.5.103.302 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, 20.5.106.600 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 20.5.107.708 NMAC.* The USTs are designed and constructed of fiberglass-reinforced plastic in accordance with the appropriate standards. The USTs are double-walled and are compatible with their contents.
14. Performance Standards for Fiberglass-Reinforced Plastic USTs, 20.5.106.601 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 UST system piping and the tank is constructed of fiberglass-reinforced plastic in accordance with the appropriate standards.
15. Spill and Overfill Prevention 20.5.106.313 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 (spill bucket) at the fill port of each UST.
16. Spill and Overfill Prevention, 20.5.106.613. A&B 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 UST at the WIPP facility when the UST reaches the 95 percent full point. This valve is a permanent part of the system.
17. Installation of UST Systems, Subsection A of 20.5.106.608 NMAC (40 CFR § 280.20[d])	*All piping must be properly designed and 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 USTs and piping at the WIPP facility comply with the requirements. Cline Pump Company has supplied the DOE with copies of qualified

Regulatory Requirement	WIPP Compliance Table 25-7
	certifications.
18. Required Certifications, Subsection B of 20.5.105.500 & Hydrocarbon Storage Facilities, 20.2.38 NMAC (40 CFR § 280.20[e])	*No person may install, replace, repair or modify UST systems in this state unless the person is, or employs, an individual who has been certified by the department to perform that work on UST systems. This provision requires certification of the individual who exercises supervisory control over the installation, replacement, repair or modification work, whether as an officer or employee of the UST system owner or operator performing its own installation, replacement, repair or modification, or as an officer or employee of the person agreeing to perform the installation, replacement, repair or modification for the owner or operator.* A certified UST installer was used to install the USTs at the WIPP facility. The installation of the new systems was inspected and approved by an NMED representative who was present during the installation. No new installations were made during the reporting period.
19. Required Certifications, 20.5.106.616.A 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 20.5.102 NMAC with the following requirements:* *Installation of tanks and piping in 20.5.106.605 NMAC for UST systems, cathodic protection of steel tanks and piping in 20.5.106.602 NMAC and 20.5.106.610 NMAC for UST systems, or 20.5.106.604 NMAC for UST systems; financial responsibility under 20.5.117 NMAC; and release detection in 20.5.108 NMAC.* As identified in the registration form, the certification requirements were met. Cathodic protection requirements are not applicable since neither the USTs nor the piping at the WIPP facility 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 do not apply to the DOE.
20. Operations and Maintenance Plan, 20.5.107.701 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.* The DOE operates the USTs in accordance with an approved operations and maintenance plan. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
21. Operation and Maintenance of Spill and Overfill Prevention, Subsection A of 20.5.107.704 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 USTs 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 USTs and that specify requirements for reporting, cleaning up, and investigating spills or overfills are in place.
22. Compatibility, 20.5.107.708 NMAC (40 CFR § 280.32)	*Owners and operators must use a UST system made of or lined with materials that are compatible with the substance stored in the UST system.* Fiberglass-reinforced plastic USTs at the WIPP facility are compatible with unleaded gasoline and diesel fuel.
23. Repairs, Replacements and Modifications, Subsection B of 20.5.107.709 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 facility USTs during this reporting period.

Regulatory Requirement	WIPP Compliance Table 25-7
24. Repairs, Replacements and Modifications, 20.5.107.709 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 facility USTs during this reporting period.
25. Repairs, Replacements and Modifications, 20.5.107.709 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 facility USTs during this reporting period.
26. Repairs, Replacements and Modifications, Subsection C of 20.5.107.709 NMAC (40 CFR § 280.33[d])	*Repaired tanks and piping must be tightness tested in accordance with 20.5.108.804 NMAC, and Subparagraph (a) of Paragraph (2) of Subsection A 20.5.108.810 NMAC, prior to returning system to service.* No repairs were made to the WIPP facility USTs during this reporting period.
27. Repairs, Replacements and Modifications, Subsection F of 20.5.107.709 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 repairs were made to the WIPP facility USTs during this reporting period.
28. Reporting, 20.5.107.715 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 20.5.107.714 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 20.5.107.714 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 by the DOE at the WIPP facility and are readily available to NMED inspectors.
31. Inspections, Monitoring, and Testing, Subsection A of 20.5.107.710 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*

Regulatory Requirement	WIPP Compliance Table 25-7
	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 contents; and* *(3) To conduct monitoring or testing of the tanks, associated equipment, contents, or surrounding soils, air, surface water, or groundwater.* *NMED personnel may inspect and sample the contents of the WIPP UST 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.* The last inspection by NMED occurred on December 23, 2019. No violations were noted.
32. Required Notification Prior to Replacement, Repair and Modification, Subsections B, C, and D of 20.5.107.711 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.* Notice will be given 30 days prior to the NMED and at least 24 hours in advance of the commencement of a modification or repair procedure to installed USTs.
33. Requirements and Deadlines for Release Detection for UST Systems, Subsection A of 20.5.108.800 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.
34. General Release Detection Requirements for UST Systems, Subsection D of 20.5.108.800 NMAC	*When a release detection method indicates that a release may have occurred, owners and operators must notify the NMED in accordance with 20.5.102.204 NMAC and 20.5.118 NMAC.* No releases or suspected releases occurred from the UST system at the WIPP facility during this reporting period.

Regulatory Requirement	WIPP Compliance Table 25-7
(40 CFR § 280.40[b])	
35. General Release Detection Requirements for UST Systems, Subsection A of 20.5.6.9 NMAC (40 CFR § 280.40[c])	*Owners and operators of UST systems shall provide a method or combination of methods of release detection that can detect a release from any portion of the tank, connected piping and ancillary equipment that routinely contains a regulated substance.* The UST system at the WIPP facility was installed on February 10, 1992. The system meets the release-detection requirements of this part.
36. Requirements for UST Systems, Subsection A of 20.5.108.800 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 the WIPP UST system meets the release-detection requirement. Should the interstitial system become inoperable, monthly inventory controls will be used. In this contingency situation, UST tightness testing will be performed every five years.
37. Requirements for UST Suction Piping Installed Prior to April 4, 2008, 20.5.108.812 NMAC (40 CFR § 280.41[b])	*Owners and operators of underground storage tank systems with piping installed prior to April 4, 2008, that conveys regulated substances under suction where the piping system does not meet the requirements in Subsection B of 20.5.108.812 NMAC shall use one of the following methods. These methods shall be designed to detect a release from any portion of underground piping.* The WIPP UST system meets the requirements for suction piping.
38. Requirements for UST Underground Pressurized Piping Installed on or After April 4, 2008, 20.5.108.811 NMAC (40 CFR § 280.41[b][1])	*Owners and operators of underground storage tank systems with piping installed on or after April 4, 2008, shall use interstitial monitoring as release detection for underground pressurized piping that routinely contains regulated substances by 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.* This requirement is not applicable since the UST system at the WIPP facility operates under suction piping.
39. Requirements for UST Underground Pressurized Piping Installed on or After April 4, 2008, Paragraph 2 of Subsection B of 20.5.108.812 NMAC (40 CFR § 280.41[b][1][i])	*Release detection is not required for suction piping that is designed and constructed to meet all of the following standards:* *(1) The below-grade piping operates at less than atmospheric pressure.* *(2) 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.* *(3) Only one check valve is included in each suction line.* *(4) The check valve is located directly below and as close as practical to the suction pump.* *(5) Compliance with Paragraphs (2) through (4) of Subsection B of this section is*

Regulatory Requirement	WIPP Compliance Table 25-7
	demonstrated. The below-grade piping will drain back into a foot valve within the UST and is compliant with suction piping requirements.
40. Requirements for Hazardous Substance UST Systems, 20.5.108.801 NMAC (40 CFR § 280.42)	*A number of release-detection requirements are specified for UST systems that contain hazardous substances.* The USTs 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, 20.5.108.802 through 20.5.108.809 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 facility USTs use interstitial monitoring to meet this requirement.
42. Inventory Control With Tank Tightness Testing Requirements For USTs, Subsection A Through Subsection G of 20.5.108.802 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 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. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
43. Interstitial Monitoring Requirements for USTs, 20.5.108.808 NMAC (40 CFR § 280.43[g])	*Interstitial monitoring between the UST system and a secondary 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*

Regulatory Requirement	WIPP Compliance Table 25-7
	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 facility. 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. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
44. Methods of Release Detection of Piping, 20.5.108.812 NMAC (40 CFR § 280.44)	*Owners and operators of underground storage tank systems with piping installed prior to April 4, 2008 that conveys regulated substances under suction where the piping system does not meet the requirements in Subsection B of 20.5.108.812 NMAC shall use one of the following methods. These methods shall be designed to detect a release from any portion of underground piping.(1) A line tightness test shall be conducted every three years and the tightness test shall be capable of detecting a one-tenth gallon per hour leak rate.* *(2) Interstitial monitoring shall be used in accordance with all of the requirements in 20.5.108.808 NMAC and 20.5.108.813 NMAC.* *(3) Statistical inventory reconciliation shall be used in accordance with 20.5.108.809 NMAC for monthly monitoring of underground suction piping in conjunction with line tightness testing in accordance with Paragraph (1) of Subsection A of this section.* *(4) Vapor monitoring shall be used in accordance with 20.5.108.806 NMAC.* *(5) Groundwater monitoring* shall be used in accordance with 20.5.108.807 NMAC. 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, UST-tightness testing will be performed every five years. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
45. Alternative Methods, 20.5.108.814 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. The UST procedure WP 04-GC1605*, Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
46. Release Detection Recordkeeping, 20.5.108.815 NMAC (40 CFR § 280.45)	***A.** All storage tank system owners and operators shall maintain records in accordance with 20.5.107 NMAC demonstrating compliance with all applicable requirements of 20.5.108 NMAC. If the owner and operator of a storage tank are separate persons, only one person is required to maintain the records required by this section; however, both parties are liable in the event of noncompliance.* ***B.** Records to be maintained shall include, but not be limited to:* ***(1)** all 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;* ***(2)** the results of any sampling, testing, or monitoring;*

Regulatory Requirement	WIPP Compliance Table 25-7
	(3) *written documentation of all calibration, maintenance, and repair of release detection equipment permanently located on-site and any schedules of calibration and maintenance required by the release detection equipment manufacturer;* ***(4)*** *no later than three years after the effective date of these rule, records of site assessments required under 20.5.108.806 NMAC and 20.5.108.807 NMAC. Records of site assessments developed after the effective date of these rules must be signed by a professional engineer, professional geologist, or equivalent licensed professional with experience in environmental engineering, hydrogeology, or other relevant technical discipline acceptable to the department; and* ***(5)*** *the results of annual operational tests of release detection equipment. At a minimum, the results must list each component tested, indicate whether each component tested meets criteria for the specified equipment or needs to have action taken, and describe any action taken to correct an issue.* The MOC purchasing group maintains manufacturer equipment and performance claim records. The DOE records management program discusses the maintenance of records. The MOC purchasing group Records Inventory and Disposition Schedule adequately addresses the record retention requirements of this section. According to the manufacturer of the UST system, no calibration or maintenance of the release-detection equipment by the manufacturer is required for the current configuration. If modifications are made, these functions will be performed. The UST procedure WP 04-GC1605*, Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
47. Suspected Releases, 20.5.118.1801 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 20.5.108.1808 NMAC and 20.5.111 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. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
48. Confirmed Releases, 20.5.118.1802 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. A release report was submitted to the NMED indicating the information required by 20.5.108.113 NMAC. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
49. Suspected Releases,	*Owners and operators shall immediately investigate suspected releases of*

Regulatory Requirement	WIPP Compliance Table 25-7
Subsection B, 20.5.118.1801 NMAC (40 CFR § 280.52)	*regulated substances within 7 days of discovery of the suspected release. Owners and operators shall conduct appropriate storage tanks system testing, site check or another procedure, with prior approval by the department of the procedure.* 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. The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections.
50. Spills and Overfills, Subsection A of 20.5.118.1803 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 20.5.118.1800 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 20.5.119 NMAC and 20.5.120 NMAC.* The DOE fuel station operation procedure addresses requirements with respect to petroleum UST systems (i.e., as specified in 20.5.12 NMAC). The UST procedure WP 04-GC1605, *Operation of Surface Fuel Station Storage Tanks* (NWP, 2020c), guides the operators in performing daily, monthly, and annual inspections. There were no spills or overfills exceeding 25 gallons from the WIPP facility USTs during this reporting period. WIPP facility USTs contain only petroleum products.
51. Spills and Overfills, Subsection B of 20.5.108.1803 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 facility USTs during this reporting period. No UST system is used to contain hazardous substances at the WIPP facility.
52. Temporary Closure and Return to Service, 20.5.115.1501 NMAC (40 CFR § 280.70)	*When a storage tank system is temporarily closed, and the tank contains greater than one inch or 0.3 percent by weight of the total capacity of the tank system, 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 contains less than one inch or 0.3 percent by weight of the total capacity of the system. When a storage tank system is temporarily closed for three months or more, the vent lines must be 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.
53. Assessing the Site at Closure or Change-in- Service, Subsection B of 20.5.115.504 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 20.5.19 NMAC or 20.5.120 NMAC.* There were no releases from the UST system at the WIPP facility during this reporting period.
54. Financial Responsibility,	*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*

Regulatory Requirement	WIPP Compliance Table 25-7
Applicability, 20.5.117.1700 NMAC (40 CFR § 280.90)	*20.5.117 NMAC, Financial Responsibility.* As the owner of the WIPP, the DOE, a federal government entity, is exempt from the financial responsibility requirements of this part.
55. Corrective Actions for Storage Tank Systems Containing Petroleum Products, General, Subsection A of 20.5.119.1900 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.* All releases will be cleaned up in a manner protective of health, public welfare, and the environment.

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 (SWMR) contained within 20.9 NMAC. These regulations are applicable because infectious wastes are generated by the WIPP Project participants, soil(s) may become contaminated from unintentional releases of petroleum products, and the DOE receives TRU mixed waste containing asbestos wastes for disposal at the WIPP facility. A construction debris landfill is operational at the site but is exempt under 20.9.2.11C NMAC of the SWMR.

26.2 Status of Compliance with the Regulatory Requirements

Table 26-1 summarizes the applicable requirements and compliance status under the New Mexico *Solid Waste Act*.

Table 26-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Solid Waste Act*

Regulatory Requirement	WIPP Compliance Table 26-1
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 non-hazardous material generated from DOE 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 (NWP, 2018c). Infectious wastes are generated by the WIPP Project participants and are managed in accordance with the applicable requirements of 20.9.8.13 NMAC. 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 20.9.8.15 NMAC. Petroleum-contaminated soil is shipped off-site for disposal or remediation (NWP, 2012). Procedures WP 02-RC.02 and WP 02-RC3108 give instructions on managing these wastes (NWP, 2022d; NWP, 2022e). The DOE provides containers for solid waste in accordance with the applicable

Regulatory Requirement	WIPP Compliance Table 26-1
	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 non-hazardous 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.
4. 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 construction landfill during normal business hours to conduct an inspection.
5. 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 receives only construction debris and because it is located at the same site where the construction debris is generated.
6. 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 by the WIPP Project participants is accomplished by a registered off-site contractor that meets the requirements. Medical waste and petroleum spill clean-up debris are shipped from the facility regularly.

Regulatory Requirement	WIPP Compliance Table 26-1
7. 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.
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. 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.
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 mixed waste containing asbestos at the WIPP facility. No evidence of asbestos has been found at the WIPP facility except in the friction linings of the braking system for the Air Intake Shaft hoist. Compliance with the DOE 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.

Regulatory Requirement	WIPP Compliance Table 26-1
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 (29 CFR 1910). • 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. The infectious waste storage area was inspected by the NMED during their annual routine environmental compliance inspections January 2022 and April 2023. There were no violations found.
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 Veolia ES Technical Solutions. The disposal facilities used for the infectious waste were Stericycle, and Medical Systems of Denver.
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.

Regulatory Requirement	WIPP Compliance Table 26-1
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 as needed and analyzed for total petroleum hydrocarbons and other constituents as required by 20.9.8 NMAC and the DOE to determine the contaminants in the soil. 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 bill of lading or 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.

At the WIPP facility, the DOE operates 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 27-1 provides compliance status with the New Mexico GWPA.

Table 27-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Ground Water Protection Act*

Regulatory Requirement	WIPP Compliance Table 27-1
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 spills or releases from the facility USTs during the reporting period.

28.0 NEW MEXICO AIR QUALITY CONTROL ACT

28.1 Summary of the Law

The New Mexico *Air Quality Control Act* (§§ 74-2-1 through 74-2-17 NMSA 1978) was enacted in 1978. 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 describe the fee and structure for the operating permit program.

28.2 Status of Compliance with the Regulatory Requirements

Table 28-1 summarizes DOE compliance with the applicable requirements of 20.2 NMAC. Although no longer 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 verifying that the standby generator is operated less than 500 hours per year.

On July 12, 2019, Nuclear Waste Partnership obtained a New Source Review Permit for five diesel generators that supply power to the SSCVS and the new shaft projects (NSR Permit Number 0310-M3) (NMED, 2019). These generators are restricted to 2,520 hours of operation per year per generator. No initial compliance testing is required.

Table 28-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Air Quality Control Act*

Regulatory Requirement	WIPP Compliance Table 28-1
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. For NSR Permit 0310-M3, no sampling is required by the permit.

Regulatory Requirement	WIPP Compliance Table 28-1
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. For NSR Permit 0310-M3, 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 unit (Btu) per hour.* No oil-burning equipment at the WIPP exceeds this rated heat capacity. The rated heat capacity of each backup generator is 139.6 million Btu per hour. The NSR Permit generators are much smaller than the backup generators at less than 60 million Btu 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 Btu 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.
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 except for the NSR Permit generators. 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. The NSR Permit generators have consistently obtained a zero percent opacity since their startup.

Regulatory Requirement	WIPP Compliance Table 28-1
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.* 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. The NSR Permit generators are permitted for the criteria pollutant emissions and not HAPs emissions.
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 did not request an air emissions inventory during the reporting period. The NSR Permit requires only reporting of initial startup of generators.
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.* Although no longer required, the DOE 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 AQB 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. On July 12, 2019, Nuclear Waste Partnership obtained a New Source Review Permit for five diesel generators that supply power to the SSCVS and the new shaft projects (NSR Permit Number 0310-M3). These generators are restricted to 2,520 hours of operation per year per generator. No initial compliance testing is required. On June 9, 2023, a request that the NSR permit be closed was submitted to NMED, as the permitted equipment was no longer needed.
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. The permit fee for the NSR Permit was submitted with the permit application.
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). The NSR Permit 310-M3 has no stack height requirements.

28.3 Status of Compliance with the Permit Conditions

The permit for the backup diesel generators (Permit No. 310-M-2) and an NSR Permit for five diesel generators (NSR Permit No. 310-M3) are the only permits issued under

the authority of 20.2 NMAC. The permit conditions and compliance status of each regulatory requirement are provided in Table 28-2 for Permit 310-M-2, and in Table 28-3 for NSR Permit No 310-M3.

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 28-2.

Table 28-2 – Status of Compliance with the Permit Conditions for the Permit for Backup Diesel Generators, Permit No. 310-M-2

Regulatory Requirement	WIPP Compliance Table 28-2
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 facility operated less than 20 hours per year during this reporting period. The diesel generators were operated incident to electrical maintenance and testing.
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 was operated less than 20 hours per year during this reporting period.

Regulatory Requirement	WIPP Compliance Table 28-2
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. No other testing has been required.
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 facility 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.

Regulatory Requirement	WIPP Compliance Table 28-2
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.* The DOE has posted a copy of the permit at the WIPP facility.
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 WIPP facility procedures. The 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 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 an 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. No annual emission inventory was requested for the standby diesel generators by NMED during this reporting period.

28.3.2 Air Permit for Five Diesel Generators, NSR Permit No. 0310-M3

The conditions specified by New Source Review (NSR) Permit No. 0310-M3 (NMED, 2019c) for five diesel generators at the WIPP are described in Table 28-3.

On June 9, 2023, New Source Review Permit Number 0310-M3 was cancelled since all diesel generators were removed from the project areas and returned to the rental companies (LATA, 2023).

Table 28-3 – Status of Compliance with the Permit Conditions for the New Source Review Permit for Five Diesel Generators, NSR Permit No. 0310-M3

Regulatory Requirement	WIPP Compliance Table 28-3
Condition A106: Allowable Emissions	*Emission units and their allowable emission limits are stated in the permit.* Emissions from Emission Units are calculated using the hours run per month. No emission unit has exceeded the permitted values.
Condition A201.A: Hour of Operation	*Units Gen1, Gen2, Gen3, Gen4, and Gen5 shall not exceed 2,520 hours of operation per year per engine* Emission Units have not exceeded the 2,520 hours per year per engine.
Condition A201 A: Monitoring	*The permittee shall monitor the dates and hours of operation for each of the units.* Logs for each engine are kept, recording daily run-time hours. The hour reading are taken every morning at the start of shift.
Condition A201. A: Recordkeeping	*The permittee shall record the hours of operation daily, shall calculate and record the monthly rolling 12-month total hours of operation.* Logs for each engine are kept, recording daily run-time hours. The hour readings are taken every morning at start of shift. Hours are transferred to an Excel spreadsheet to calculate the monthly rolling 12-month total hours of operation.
Condition B100 A: Fuel Requirements	*Liquid fuel shall be first run refinery grade diesel or No. 2 fuel oil that is not a blend containing waste oils or solvents and contains less than 0.3% sulfur by weight.* WIPP procurement and contracts specify low sulfur diesel of 0.025% by weight sulfur.
Condition B100 B: Opacity	*Combustion units shall not equal or exceed 20% opacity averaged over a 10-minute period regardless of the type of fuel used.* The opacity of each engine is taken every quarter. No exceedance of 20% opacity averaged over a 10-minute period has been recorded.
Condition B100 C: Catalytic Converters	*For engines required by this permit to be equipped with catalytic converters, the engine shall not be operated without the catalytic converter, specifically including catalyst maintenance periods. During periods of catalyst maintenance, the permittee shall either (1) shut down the engine(s); or (2) replace the catalyst with a functionally equivalent spare to allow the engine to remain in operation.* All engines are equipped with catalytic converters.

Regulatory Requirement	WIPP Compliance Table 28-3
Condition B100 D: Air Fuel Ratio Controlling Device	*Any engine required by this permit to be equipped with a catalytic converter shall also have an air fuel ratio (AFR) controlling device, or similar device that performs the same function of maintaining an appropriate air-fuel ratio. Engines equipped with oxidation catalysts are not required to operate with an AFR.* All engines have an air fuel ratio controlling device.
Condition B100 E: Co-location of Portable Engines	*The permittee shall not co-locate portable engine(s) or turbine(s) at the same site, or at a site that has existing stationary or portable source emissions not regulated by this permit.* There are no other stationary or portable emission sources co-located in the permitted area.
Condition B100 F: Relocation of Portable Engines	*The permittee may relocate portable engine(s) or turbine(s) to a new location after completing a relocation notice form and determining that the compressor engine will comply with restrictions listed in the form; the permittee shall retain the completed form in company files and provide it to the Department upon request. The permittee shall retain the completed relocation form for two (2) years after the unit moves from the location to which the form applies.* No engine has been relocated to any other location other than the original location of that engine.
Condition B100 G: Use of Other Permitted Equipment	*If an owner/operator of a site chooses to use portable equipment that is regulated under another permit as well as this permit, the owner/operator will identify, at the time of installation, which permit governs operation at the site and shall record each determination and corresponding date. Records shall be available to the Department upon request. The owner/operator shall ensure that all requirements of the governing permit are fulfilled at the site. Initial emissions tests do not need to be repeated, except as required by the Department.* No other permitted equipment is used in the permitted area.

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 DOE does not discharge to surface water in the vicinity of the WIPP facility, but does have a discharge permit (DP-831) for the Facultative Lagoon System,Stormwater ponds 1, 2, and 3, Evaporation Pond H-19, Salt Storage Ponds 1, 2, 3, and 5, Salt Cells 1, 2, 3, and Brine Salt Storage Pond 4 to prevent impacts to groundwater.

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 (gal/d) of non-hazardous wastewater to the synthetically lined H-19 evaporation pond. The 1997 discharge permit renewal also authorized the discharge of up to 2,000 gal/d of non-hazardous wastewater to Effluent Lagoon B in the sewage treatment system. The latest discharge permit renewal was on January 28, 2022 (NMED, 2022c).

A 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 above-ground facility 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. The shallow water lens in the northern and eastern portions of the WIPP contain total dissolved solids (TDS) above 100,000 milligrams per liter (mg/L), which is a result of leachate from the unlined salt cell SC1 and Brine Salt Storage Pond 1 (Formerly Pond 1). The shallow water lens also exists around the SPDV. It has not been concluded this is the same shallow water lens identified in the western portion of the site. Based on the potentiometric surface, it appears these are two different bodies of water and that the shallow water around the SPDV was a result of infiltration through an unlined SPDV. Additional freshwater contributions to this lens is from a depression to the east of the SPDV pile that collected rain and surface water. 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 runoff 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 1 was graded with a 2 percent slope from the center, capped with a high--density polyethylene liner, 2 feet of soil, and seeded with a BLM -approved seed mix to establish native vegetation. Salt Cell 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 salt storage area, Salt Cell 2 and Salt Cell 3, was constructed north of Salt Cell 1. This area was constructed with a prepared subgrade and a 2 percent slope to the center, which contains a perforated pipe that conveys storm water 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 gal/d 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.

For the bulk of the reporting period, the discharge permit authorized the following activities:

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

- The Effluent Lagoons B, C, and H-19 are permitted for the discharge of up to 50,000 gal/d into each pond of miscellaneous non-hazardous 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 DOE on July 29, 2014 (NMED, 2014b). That Discharge Permit authorized 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 nomenclature in the July 29, 2014, renewal for the existing impoundments and storage cells.

On January 28, 2022, a renewal DP-831 permit went into effect, modifying monitoring methods and recognizing additional water control impoundments and conditions. Procedures were modified during the reporting period to reflect the new permit requirements.

The new Discharge Permit requires installation of new monitoring locations and a characterization report. Authorization from the NMED allowed for the installation and reporting ahead of the issuance of the final Discharge Permit due to schedule constraints in the permit. During calendar year 2020, five additional wells were installed and a characterization report was developed and submitted to the NMED (DOE, 2021l).

29.2 Status of Compliance with the Regulatory Requirements

Table 29-1 provides the regulatory requirements and the compliance status under the New Mexico *Water Quality Act.*

Table 29-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Water Quality Act*

Regulatory Requirement	WIPP Compliance Table 29-1
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 facility 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 above-ground WIPP facility. Another NOI and modified discharge plan was submitted in 2020 to include four new ponds and one salt storage cell.
2. Filing of Plans and Specifications - Sewera ge 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 DOE submitted a permit modification/renewal to the NMED -Ground Water Quality Bureau on December 3, 2018. This modification/renewal added ponds and salt cells for the SSCVS and the new shaft projects. As of January 28, 2022, the permit renewal was made effective by the NMED -Ground Water Quality Bureau.
3. Notification of	*Requirements for reporting, notifications, and corrective action with respect to*

Regulatory Requirement	WIPP Compliance Table 29-1
Discharge - Removal, 20.6.2.1203 NMAC	*any discharge from any facility of oil or other water 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 DOE environmental incident reporting procedure. No unauthorized discharge requiring notification occurred during this 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.* The DOE does not discharge WIPP facility wastewater and storm water to a watercourse; therefore, this regulation is not applicable to the WIPP facility.
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 became aware that the most likely source of perched anthropogenic water containing elevated total dissolved solids, chloride, and sulfate was most likely from the salt stockpile and infiltration from other storm water discharges. Additional controls were implemented in the 2022 DP-831 renewal and modification. The DOE continues to comply with this requirement.
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 August 1, and February 1, of each year. The pre-January 2022 discharge permit required 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 are monitored for depth to groundwater to the nearest hundredth of a foot quarterly. Thirteen wells are sampled semi-annually for TDS, chlorides, sulfate, and field parameters (temperature, conductivity, and pH). One well, PZ-17b, is also sampled for 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 July 29, 2014, discharge permit remained in effect until the renewal permit was made effective by the NMED -Ground Water Quality Bureau on January 28, 2022 (NMED, 2022c).

Regulatory Requirement	WIPP Compliance Table 29-1
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 for the permit modification/renewal sent to the NMED -Ground Water Quality Bureau. Notices were placed in local libraries and newspapers to give the public access to the notices.
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 facility 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 facility wastewater treatment facility is considered a Class 1 facility because of the population served and because the treatment process 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 facility.

29.3 Status of Compliance with the Permit Requirements

Table 29-2 summarizes the requirements in discharge permit DP-831 of January 28, 2022, and compliance status.

Table 29-2 – Status of Compliance with the January 28, 2022, Discharge Permit Requirements

Regulatory Requirement	WIPP Compliance Table 29-2
1. Section III – Authorization to Discharge (January 28, 2022, Discharge Permit Renewal)	*The permittee is authorized to discharge up to 23,000 gal/d of domestic wastewater to a synthetically*-lined facultative impoundment system for disposal by evaporation. The design capacity of 23,000 gal/d, authorized in the discharge permit, has not been exceeded.
2. Section III – Authorization to Discharge (January 28, 2022, Discharge Permit Renewal)	*Up to 50,000 gal/d 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.* The 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 gal/d have occurred. No exceedances of the one foot of freeboard have occurred.
3. Section III – Authorization to Discharge (January 28, 2022, Discharge Permit Renewal)	*Up to 27,000 gal/d 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 water to Effluent Lagoons B and C occurred during this reporting period. No exceedances have occurred.
4. Operational Plan – Condition 3 (January 28, 2022, 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. In the event that one-foot freeboard cannot be maintained in a storm water pond, water is pumped to other ponds if possible to reduce the water level in the storm water pond. If pumping between ponds is not possible, the NMED Ground Water Quality Bureau is notified by telephone in order to pump the storm water pond to ground to lower the water level to the one-foot freeboard. A report to the Ground Water Quality Bureau follows the initial telephone contact. Corrective measures to restore freeboard are controlled by utilizing evaporation in the storm water ponds.

Regulatory Requirement	WIPP Compliance Table 29-2
5. Operational Plan – Condition 4 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall preserve a minimum of one foot of freeboard between the liquid level in all the impoundments and the elevation of the top of the impoundment liner, except Brine Salt Storage Pond 4, Salt Storage Pond 5, and Brine Retention Ponds East and West shall maintain two feet of freeboard. 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.* No freeboard conditions occurred during this period requiring enactment of the contingency plan.
6. Facultative Lagoon System – Condition 5 (January 28, 2022, Discharge Permit Renewal)	*Within three years following the effective date of this Discharge Permit (**by January 28, 2025**), the Permittee shall measure the thickness of the settled solids in two impoundments (Settling Lagoon 1 and Settling Lagoon 2) that are part of the Facultative Lagoon System. The Permittee shall report the results of the solids thickness measurements to NMED in the subsequent required periodic monitoring report.* Settled solids measurements occurred on September 16, 2023, and reporting was appropriately scheduled and documented.
7. Facultative Lagoon System – Condition 6 (January 28, 2022, 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 7 (January 28, 2022, 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 8 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall utilize operators of the domestic wastewater collection, treatment and disposal systems that are certified by the State of New Mexico at the appropriate level pursuant to 20.7.4 NMAC. A certified operator or a direct supervisee of a certified operator shall perform the operations and maintenance of all or any part of the wastewater system.* At least two Facility Operations operators maintained full qualification and certification by NMED in wastewater systems operations during the reporting period.
10. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 9 (January 28, 2022, Discharge Permit Renewal)	*Within 180 days following the effective date of this Discharge Permit (**by July 27, 2022**), the Permittee shall install fences around Storm Water Ponds 1, 2 and 3 to limit access by wildlife, livestock, or unauthorized persons. The fences shall consist of a minimum of six-foot chain link or field fencing and locking gates. The Permittee shall maintain the fences to serve the stated purpose throughout the term of this Discharge Permit.* Fence installation is complete and access integrity maintained.
11. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 10	*Within two years following the effective date of this Discharge Permit (**by January 28, 2024**), the Permittee shall measure the thickness of the settled solids in Evaporation Pond H-19. The Permittee shall report the results of the solids thickness measurements to NMED in the subsequent required periodic monitoring report.*

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(January 28, 2022, Discharge Permit Renewal)	Settled solids measurements occurred on December 20, 2023, and reporting was appropriately scheduled and documented.
12. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 11 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Brine Retention Pond East, Brine Retention Pond West, or Brine Salt Storage Pond 4, the Permittee shall complete construction of the Ponds in accordance with the final construction plans and specifications the Permittee submitted to NMED as part of the Discharge Permit application received on December 3, 2018. The Permittee shall notify NMED prior to the commencement of construction to allow NMED personnel to be onsite for inspection during construction.* The NMED was notified of the construction beginning on Brine Retention Pond East, Brine Retention Pond West, and Brine Salt Storage Pond 4. These ponds have not been completed during this reporting period.
13 Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 - Condition 12 (January 28, 2022, Discharge Permit Renewal)	*Within 30 days of construction completion of Brine Retention Pond East, Brine Retention Pond West, and Brine Salt Storage Pond 4, the Permittee shall submit record drawings to NMED that bear the seal and signature of a licensed New Mexico professional engineer (pursuant to the New Mexico Engineering and Surveying Practice Act and the rules promulgated under that authority)..* Documentation and notifications were performed per the Permit conditions. Construction of Brine Retention Pond East, Brine Retention Pond West, and Brine Salt Storage Pond 4 were not completed during this reporting period.
14. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 13 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Brine Salt Storage Pond 4, the Permittee shall install fences around said impoundment to limit access by wildlife, livestock, or unauthorized persons. The fences shall consist of a minimum of six-foot chain link or field fencing and locking gates. The Permittee shall maintain the fences to serve the stated purpose throughout the term of this Discharge Permit.* Fencing of Brine Salt Storage Pond 4 did not commence during this reporting period. Fence installation is scheduled for 2024.
15. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 14 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Brine Salt Storage Pond 4, the Permittee shall post signs indicating that the wastewater in the impoundment is not potable. The Permittee shall post signs at the Facility entrance and other areas where there is potential for public contact with wastewater. Posted signs shall be in English and Spanish and shall remain visible and legible during the term of this Discharge Permit.* Signage on the fence around Brine Salt Storage Pond 4 will be completed after the fence is erected in 2024.
16. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 15 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to the proposed Brine Retention Pond East, the Brine Retention Pond West, or the Brine Salt Storage Pond 4, the Permittee shall submit written notification to NMED stating the date the discharge(s) is to commence.* Written notification to NMED will be made after the construction of Brine Retention Pond East, Brine Retention Pond West, and Brine Salt Storage Pond 4 is complete and prior to commencement of discharge.

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17. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 16 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall construct, maintain and operate the leak detection, collection, and recovery systems (LDCRS) for Brine Salt Storage Pond 4 and Brine Retention Ponds East and West in a manner that will result in less than one foot of hydraulic head on the secondary liners in the impoundments.* The LDCRS for these ponds were not completed during this reporting period.
18. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 17 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall maintain fences around Evaporation Pond H-19 to limit access by wildlife, livestock, or unauthorized persons. The fences shall consist of a minimum of six-foot chain link or field fencing and locking gates. The Permittee shall maintain the fences to serve the stated purpose throughout the term of this Discharge Permit.* Fence installation is complete and access integrity maintained. Signage was posted as required.
19. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 18 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall maintain signs indicating that the wastewater in Evaporation Pond H-19 is not potable. The Permittee shall post signs at the impoundment entrance and other areas where there is potential for public contact with wastewater. The signs shall be printed in English and Spanish and shall remain visible and legible for the term of this Discharge Permit.* Fence installation is complete and access integrity maintained. Signage was posted as required.
20. Evaporation Pond H-19, Brine Ponds, Brine Salt Storage Pond 4, and Storm Water Ponds 1, 2, and 3 – Condition 19 (January 28, 2022, Discharge Permit Renewal)	*Within 90 days following the effective date of this Discharge Permit (**by April 28, 2022**), the Permittee shall install fences around Salt Storage Ponds 1, 2 and 3 to limit access by wildlife, livestock, or unauthorized persons. The fences shall consist of a minimum of six-foot chain link or field fencing and locking gates. The Permittee shall maintain the fences to serve the stated purpose throughout the term of this Discharge Permit.* Fence installation is complete and access integrity maintained.
21. Salt Storage Ponds and Salt Stockpiles – Condition 20 (January 28, 2022, Discharge Permit Renewal)	*Within 120 days following the effective date of this Discharge Permit (**by May 28, 2022**), the Permittee shall post signs indicating that the wastewater in Salt Storage Ponds 1, 2 and 3 is not potable. The Permittee shall post signs at the Facility entrance and other areas where there is potential for public contact with wastewater. Posted signs shall be in English and Spanish and shall remain visible and legible during the term of this Discharge Permit.* Fence installation is complete and access integrity maintained. Signage was posted as required.
22. Salt Storage Ponds and Salt Stockpiles – Condition 21 (January 28, 2022, Discharge Permit Renewal)	*Within two years following the effective date of this Discharge Permit (**by January 28, 2024**), the Permittee shall measure the thickness of the settled solids in Salt Storage Pond 1, 2, and 3. The Permittee shall report the results of the solids thickness measurements to NMED in the subsequent required periodic monitoring report.* Settled solids measurements occurred on July 7, 2023, and reporting was appropriately scheduled and documented.
23. Salt Storage Ponds and Salt Stockpiles – Condition 22 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Salt Storage Pond 5 and prior to utilizing Salt Cell 5, the Permittee shall complete construction in accordance with the final construction plans and specifications the Permittee submitted to NMED as part of the Discharge Permit application received on December 3, 2018. The Permittee shall notify NMED prior to construction to allow NMED personnel to be onsite for*

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	inspection during construction. Construction and notifications were performed per the Permit conditions.
24. Salt Storage Ponds and Salt Stockpiles – Condition 23 (January 28, 2022, Discharge Permit Renewal)	*Within 30 days of completing construction of Salt Storage Pond 5 and Salt Cell 5, the Permittee shall submit record final drawings to NMED that bear the seal and signature of a licensed New Mexico professional engineer (pursuant to the New Mexico Engineering and Surveying Practice Act and the rules promulgated under that authority).* Documentation and notifications were performed per the Permit conditions. An updated status for Salt Storage Pond 5 was submitted to the Groundwater Protection Bureau on November 22, 2022 to provide drawings of the pond and Salt Cell 5.
25. Salt Storage Ponds and Salt Stockpiles – Condition 24 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Salt Storage Pond 5, the Permittee shall submit written notification to NMED stating the date the discharge is to commence.* Notifications were performed per the Permit conditions. An updated status for Salt Storage Pond 5 was submitted to the Groundwater Protection Bureau on November 22, 2022, to provide a start date of discharge of water into the pond on December 1, 2022.
26. Salt Storage Ponds and Salt Stockpiles – Condition 25 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall maintain and operate the leak detection, collection, and removal systems (LDCRS) for Salt Storage Ponds 2, 3 and 5 in a manner that will result in less than one foot of hydraulic head on the secondary liners in the ponds.* Salt Storage Ponds do not have mechanical LCDRS installed. The method of leak detection and removal from Salt Storage Ponds 2 and 3 are with a pump in the sump between the primary and secondary liners. Volumes between events are evaluated to determine leakage. The LDCRS for Salt Storage Pond 5 was constructed and installed in December 2023. The totalizer function is not yet operational per specifications, however, corrective wiring is still in process.
27. Salt Storage Ponds and Salt Stockpiles – Condition 26 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall conduct regular inspection of the earthen cover on Salt Cell 1 and the SPDV material pile. The Permittee shall conduct inspections monthly and after storm events of 2 inches or greater in a 24-hour period to evaluate the integrity of the covers, including erosional impact and vegetation success. The Permittee shall report general observations and minor cover repairs to NMED in the subsequent semi-annual report.* Inspections and reports are being performed per the Permit conditions.
28. Monitoring and Reporting Conditions – Condition 29 (January 28, 2022, Discharge Permit Renewal)	*Semi-annual monitoring: The Permittee shall perform semi-annual monitoring during the following periods and shall submit reports to NMED by the following due dates:* • *January 1st through June 30th –* ***due by August 1st; and*** • *July 1st through December 31st –* ***due by February 1st.*** Monitoring and reporting are being performed per the Permit conditions.
29. Monitoring and Reporting Conditions – Condition 30 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall submit its "Waste Isolation Pilot Plant Annual Site Environmental Report" to NMED with the next semi-annual monitoring report following its publication* The reports are being submitted per the Permit conditions.
30. Monitoring and Reporting Conditions – Condition 31 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall estimate the monthly volume of domestic wastewater discharged to the Facultative Lagoon System by obtaining readings on a monthly basis from a totalizing flow meter that measures total domestic water usage. The Permittee shall submit the monthly meter readings and calculated monthly and average daily water usage volumes to NMED in the semi-annual monitoring*

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	reports. The reports are being submitted per the Permit conditions.
31. Monitoring and Reporting Conditions – Condition 32 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the total monthly volume and record the origin of all industrial wastewater discharged to Effluent Lagoons B and C. The Permittee shall calculate discharge volumes to Effluent Lagoons B and C by a time/volume method or volumetric measurement of the transport container(s). The Permittee shall submit the monthly discharge volumes or other volumetric calculations and waste origins from each month to NMED in the semi-annual monitoring reports.* No discharge into Effluent Lagoons B and C occurred during this reporting period. The reports are being submitted per the Permit conditions.
32. Monitoring and Reporting Conditions – Condition 33 (January 28, 2022, Discharge Permit Renewal)	*All flow meters shall be capable of having their accuracy verified under working (i.e., realtime, in-the-field) conditions. The Permittee shall develop a field verification method for each flow meter and shall utilize that method to check the accuracy of each respective meter. The Permittee shall perform field calibrations upon the repair or replacement of a flow measurement device and, at a minimum, once within 90 days of the effective date of this Discharge Permit (**by April 28, 2022**).* Equipment has been tested and routine performance verified per the Permit conditions.
33. Monitoring and Reporting Conditions – Condition 34 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall collect a composite wastewater sample on a semi-annual basis (once every six months) from Effluent Lagoon A. The composite sample shall consist of a minimum of six equal aliquots collected at equal distances around the entire perimeter of the evaporative impoundment and thoroughly mixed. The Permittee shall analyze the composite sample for:* *• TKN;* *• NO3-N;* *• TDS;* *• Cl; and* *• SO_4.* Samples are collected from Effluent Lagoon A and analyzed in the spring and the fall. The required analytes are reported to the Groundwater Quality Bureau in the semiannual report for that period.
34. Monitoring and Reporting Conditions – Condition 35 (January 28, 2022, Discharge Permit Renewal)	*In the event that the Permittee discharges any industrial wastewater to Effluent Lagoon B or C within a monitoring reporting period, the Permittee shall collect a composite wastewater sample from the impoundment(s) that received the industrial wastewater discharge. The composite sample(s) shall consist of a minimum of six equal aliquots collected at equal distances around the entire perimeter of the evaporative impoundment(s) and thoroughly mixed. The Permittee shall analyze the composite sample(s) for:* *• TDS;* *• Cl; and* *• SO_4.* No reportable events happened during this latest reporting period. If the condition occurs, samples will be collected and analyzed per the Permit conditions.
35. Monitoring and Reporting Conditions – Condition 36 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the total monthly volume and record the origin of all wastewater discharged to Evaporation Pond H-19. The Permittee shall calculate discharge volumes to Evaporation Pond H-19 by a time/volume method or volumetric measurement of the transport container(s). The Permittee shall submit the monthly discharge volumes or other volumetric calculations and waste origins each month to NMED in the semi-annual monitoring reports.* Disposal logs are maintained to record the origin and volume of wastewater discharged into Evaporation Pond H-19. The volume of wastewater discharged into Evaporation Pond

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	H-19 is totaled for each month. The monthly totals and origins of the waste waters are reported in the semiannual report for that period.
36. Monitoring and Reporting Conditions – Condition 37 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the total monthly volume of brine received by Brine Retention Ponds East and West. The Permittee shall calculate discharge volumes to Brine Retention Ponds East and West by a time/volume method or volumetric measurement of the transport container(s). NMED may require comprehensive laboratory analyses of such wastewater prior to discharge when NMED determines that additional information is needed. The Permittee shall submit the monthly discharge volumes and other volumetric calculations each month to NMED in the semi-annual monitoring reports.* Construction of Brine Retention Ponds East and West has not been completed during this reporting period.
37. Monitoring and Reporting Conditions – Condition 38 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the total weekly volume of liquid pumped from the leak detection sumps for Brine Salt Storage Pond 4 and Brine Retention Ponds East and West. The Permittee shall calculate the total volume of liquid pumped by a totalizing flow meter. The Permittee shall submit the weekly volumes to NMED in the semi-annual monitoring reports.* Construction of Brine Retention Ponds East and West and Brine Salt Storage Pond 4 has not been completed during this reporting period.
38. Monitoring and Reporting Conditions – Condition 39 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall collect a composite wastewater sample annually after a storm event of two inches or greater in a 24-hour period from Storm Water Ponds 1, 2, and 3. The composite sample shall consist of a minimum of six equal aliquots collected at equal distances around the perimeter of the evaporative impoundments and thoroughly mixed. The Permittee shall analyze the composite sample for:* • *SO_4;* • *TDS; and* • *Cl.* Samples from Storm Water Ponds 1, 2, and 3 are taken after a storm event of two inches or greater in a 24-hour period. These samples are analyzed for sulfate, total dissolved solids, and chloride. The results are included in the semiannual report for that period.
39. Monitoring and Reporting Conditions – Condition 40 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall collect a composite wastewater sample on a semi-annual basis (once every six months) from Evaporation Pond H-19 and from Brine Salt Storage Pond 4, once it becomes operational. The composite sample shall consist of a minimum of six equal aliquots collected at equal distances around the perimeter of the evaporative impoundment and thoroughly mixed. The Permittee shall analyze the composite sample for:* • *SO_4;* • *TDS; and* • *Cl.* Samples from Evaporation Pond H-19 every six months. These samples are analyzed for sulfate, total dissolved solids, and chloride. The results are included in the semiannual report for that period. Brine Salt Storage Pond 4 has not been completed and commissioned for operation during this reporting period.
40. Monitoring and Reporting Conditions – Condition 41 (January 28, 2022, Discharge Permit Renewal)	*During the first year following the effective date of the Discharge Permit (by January 28, 2023), the Permittee shall collect a grab sample (except as noted for pH) of wastewater from Evaporation Pond H-19 and analyze the sample for the inorganic contaminants (dissolved fraction, except as noted) listed in 20.6.2.3103 NMAC:* Data were collected and analyzed per the Permit conditions.

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41. Monitoring and Reporting Conditions – Condition 42 (January 28, 2022, Discharge Permit Renewal)	*During the first year following the effective date of the Discharge Permit (by January 28, 2023), the Permittee shall collect a grab sample of wastewater from Evaporation Pond H-19 and analyze the non-filtered sample for the organic contaminants listed in 20.6.2.3103 NMAC:* Data were collected and analyzed per the Permit conditions.
42. Monitoring and Reporting Conditions – Condition 43 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the water depth in Storm Water Ponds 1, 2, and 3 and Brine Salt Storage Pond 4 monthly to the nearest tenth of a foot (0.1 ft). The Permittee shall calculate and submit the approximate monthly volume of water to NMED in the semiannual monitoring reports.* Data are being collected and analyzed per the Permit conditions for Storm Water Ponds 1, 2, and 3. Construction of Brine Salt Storage Pond 4 has not been completed during this reporting period.
43. Monitoring and Reporting Conditions – Condition 44 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall collect at least one sample quarterly rotating between Brine Retention Pond East and Brine Retention Pond West of the liquid present and analyze the sample for every constituent listed in Subsection A of 20.6.2.3103 NMAC. The Permittee shall submit the laboratory analytical results, including the QA/QC summary and Chain of Custody, to NMED in the semi-annual monitoring reports.* Construction of Brine Retention Ponds East and West has not been completed during the reporting period.
44. Monitoring and Reporting Conditions – Condition 45 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall submit all analytical laboratory data from Brine Retention Ponds East and West submitted to the NMED Hazardous Waste Bureau to the Ground Water Quality Bureau.* Construction of Brine Retention Ponds East and West has not been completed during the reporting period.
45. Monitoring and Reporting Conditions – Condition 46 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall submit a copy of all records of solids (salt) removal from the Brine Retention Basins East and West and the associated disposal documentation to NMED in the subsequent semi-annual monitoring report.* Construction of Brine Retention Ponds East and West has not been completed during the reporting period.
46. Monitoring and Reporting Conditions – Condition 47 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall collect a composite wastewater sample annually after a storm event of 2 inches or greater in a 24-hour period from Salt Storage Ponds 1, 2, 3, and 5. The composite sample shall consist of a minimum of six equal aliquots collected at equal distances around the perimeter of the evaporative impoundments and thoroughly mixed. The Permittee shall analyze the composite sample for:* • *SO_4;* • *TDS; and* • *Cl.* Samples from Salt Storage Ponds 1, 2, 3, and 5 are taken after a storm event of two inches or greater in a 24-hour period. These samples are analyzed for sulfate, total dissolved solids, and chloride. The results are included in the semiannual report for that period.
47. Monitoring and Reporting Conditions – Condition 48 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the water depth monthly to the nearest tenth of a foot (0.1 ft) in the Salt Storage Ponds 1, 2, 3, and 5. The Permittee shall calculate and submit the approximate volume of water to NMED in the semi-annual monitoring reports.* Water depths from Salt Storage Ponds 1, 2, and 3 are measured to the nearest tenth of a foot every month. Approximate volumes of water are calculated and included in the semiannual report for that period.

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48. Monitoring and Reporting Conditions – Condition 49 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the total volume of liquid pumped from the leak detection sumps for Salt Storage Ponds 2 and 3 during every pumping event. The Permittee shall calculate the total volume of liquid pumped by a volumetric measurement of the container(s) filled. The Permittee shall submit the volumetric calculations for each pumping event to NMED in the semi-annual monitoring reports.* Water from the leak detection system of Salt Storage Ponds 2 and 3 is pumped out and the number gallons pumped is measured. These measurements are included in the semiannual report for that period.
49. Monitoring and Reporting Conditions – Condition 50 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the weekly volume of liquid pumped from the leak detection sump for Salt Storage Pond 5. The Permittee shall calculate the total volume of liquid pumped by a totalizing flow meter. The Permittee shall submit the weekly volumes to NMED in the semi-annual monitoring reports.* The pump in the leak detection of Salt Storage Pond 5 was not installed during this reporting period. On March 15, 2023, the NMED approved a pumping procedure using the method for Salt Storage Ponds 2 and 3 to pump the sump of Salt Storage Pond 5 until the pumping system for the Leak Detection System is installed. These volumes have been reported to NMED according to Permit conditions.
50. Groundwater Monitoring Actions with Implementation Deadlines – Condition 51 (January 28, 2022, Discharge Permit Renewal)	*Within 60 days following the effective date of this Discharge Permit (by March 29, 2022), the Permittee shall install the following new monitoring wells in accordance with the Monitoring Well Proposal submitted to NMED on February 18, 2020 and approved by NMED on February 20, 2020.* *• One monitoring well (PZ-17) located 20 to 50 feet hydrologically downgradient of the Facultative Lagoon System in the natural groundwater of the Dewey Lake Formation and intended to monitor the Facultative Lagoon System.* *• One monitoring well (PZ-19) located 20 to 50 feet hydrologically downgradient of Evaporation Pond H-19 in the natural groundwater of the Dewey Lake Formation and intended to monitor Evaporation Pond H-19.* *The Permittee shall complete the wells in accordance with the attachment titled Ground Water Discharge Permit Monitoring Well Construction and Abandonment Guidelines, Revision 1.1, March 2011 or alternative methods submitted for approval. The Permittee shall submit construction and lithologic logs to NMED within 120 days of well completion in a cumulative well report.* Well construction was completed, documentation was submitted per the Permit conditions.
51. Groundwater Monitoring Actions with Implementation Deadlines – Condition 52 (January 28, 2022, Discharge Permit Renewal)	*Prior to discharging to Brine Salt Storage Pond 4, Salt Storage Pond 5, and Brine Retentions Ponds East and West, the Permittee shall install the following new monitoring wells in accordance to the Monitoring Well Proposal submitted to NMED on February 18, 2020 and approved by NMED on February 20, 2020.* *• One monitoring well (PZ-16) located 20 to 50 feet hydrologically downgradient of Brine Salt Storage Pond 4 in the shallow groundwater and intended to monitor Brine Salt Storage Pond 4.* *• One monitoring well (PZ-18) located 20 to 50 feet hydrologically downgradient of Salt Storage Pond 5 in the shallow groundwater and intended to monitor Salt Storage Pond 5.* *The Permittee shall complete the wells in accordance with the attachment titled Ground Water Discharge Permit Monitoring Well Construction and Abandonment Guidelines, Revision 1.1, March 2011 or alternative methods submitted for approval. The Permittee shall submit construction and lithologic logs to NMED within 120 days of well completion in a cumulative well report.* Well construction was completed, documentation was submitted per the Permit conditions.

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52. Groundwater Monitoring Actions with Implementation Deadlines – Condition 53 (January 28, 2022, Discharge Permit Renewal)	*Following the installation of the monitoring wells required by this Discharge Permit, the permittee shall sample groundwater in the wells and analyze the samples for temperature, pH, specific conductance (field measured); and for SO_4, TDS, and Cl.* *The Permittee shall submit a well completion report to NMED within 120 days of well completion in a cumulative well report. A well completion report shall include; the Office of the State Engineer permit, depth-to-most-shallow groundwater measurements, groundwater laboratory analytical results, including the QA/QC summary report and Chain of Custody, and a Facility layout map showing the location and number of each well.* Well construction was completed, documentation was submitted per the Permit conditions.
53. Groundwater Monitoring Actions with Implementation Deadlines – Condition 54 (January 28, 2022, Discharge Permit Renewal)	*Within 120 days following the effective date of this Discharge Permit (by May 28, 2022), the Permittee shall perform a geographical survey of all newly constructed groundwater monitoring wells approved by NMED for Discharge Permit monitoring purposes in the natural groundwater of the Dewey Lake Formation and in the shallow groundwater. The survey shall be tied or referenced to a U.S. Geological Survey (USGS) or other permanent benchmark.* *Depth-to-most-shallow groundwater shall be measured to the nearest hundredth of a foot in all surveyed wells and referenced to mean sea level, and the data shall be used to develop a groundwater elevation contour map showing the location of all monitoring wells and the direction and gradient of groundwater flow at the Facility. The Permittee shall submit the data and groundwater elevation contour map to NMED within 120 days of the installation of the monitoring wells in a cumulative well report.* Well construction was completed, documentation was submitted per the Permit conditions.
54. Groundwater Monitoring Actions with Implementation Deadlines – Condition 55 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall perform aquifer testing to determine the local hydraulic properties of the aquifer near the monitoring wells required by this Discharge Permit and that contain groundwater within 60 days of the complete installation of each new monitoring well. The purpose of the aquifer testing shall be to quantify the movement of groundwaters in the vicinity of each well or piezometer. The Permittee shall perform aquifer testing in wells in both the shallow groundwater and in the natural groundwater in the Dewey Lake Formation where groundwater is present. Aquifer testing shall estimate hydraulic conductivity, transmissivity, and storage coefficient and shall be performed utilizing procedures previously utilized at the Facility so as to produce comparable results.* *The Permittee shall submit the measured hydraulic properties for each monitoring well to NMED within 120 days of the installation of the monitoring wells in a cumulative well report.* Well construction was completed, documentation was submitted per the Permit conditions.
55. Groundwater Monitoring Conditions – Condition 56 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall measure the depth to groundwater to the nearest hundredth of a foot (0.01 ft) quarterly in the following piezometers/monitoring wells:* *• PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, PZ-6, PZ-7, PZ-9, PZ-10, PZ-11, PZ-12, PZ-13, PZ-14, PZ-15, PZ-16, PZ-17a, PZ-17b,, PZ-18, and PZ-19a* *• C-2505, C-2506, C-2507, C-2811, and WQSP-6A* Data were collected and reported.
56. Groundwater Monitoring Conditions – Condition 57 (January 28, 2022, Discharge Permit	*Within the first year of the permit term, the Permittee shall perform sampling in the following groundwater piezometers/monitoring wells and analyze the samples for temperature, pH, specific conductance (field measured); Uranium and combined Radium-226 and Radium-228:*

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Renewal)	*• PZ-1, PZ-5, PZ-6, PZ-7, PZ-9, PZ-10, PZ-11, PZ-12, PZ-13, PZ-14, PZ-15, PZ-16, PZ-17, PZ-18, and PZ-19* *• C-2507, C-2811, and WQSP-6A* Data were collected and reported.
57. Groundwater Monitoring Conditions – Condition 58 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall perform semi-annual groundwater sampling in the following groundwater piezometers/monitoring wells and analyze the samples for temperature, pH, specific conductance (field measured); and for SO_4, TDS, and Cl:* *• PZ-1, PZ-5, PZ-6, PZ-7, PZ-9, PZ-10, PZ-11, PZ-12, PZ-13, PZ-14, PZ-15, PZ-16, PZ-17, PZ-18, and PZ-19* *• C-2507, C-2811, and WQSP-6A* Data were collected and reported.
58. Groundwater Monitoring Conditions – Condition 59 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall perform semi-annual groundwater sampling in the following monitoring wells and analyze the samples for TKN and NO3-N.* *• PZ-17, located south of the Facultative Lagoon System and intended to be located hydrologically downgradient of the Facultative Lagoon System in the natural groundwater of the Dewey Lake Formation.* Data were collected and reported.
59. Groundwater Monitoring Conditions – Condition 60 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall develop a groundwater elevation, i.e., potentiometric surface, contour map for the shallow groundwater and for the natural groundwater in the Dewey Lake Formation on a semi-annual basis. The Permittee shall use the top of casing elevation data from the monitoring well surveys and quarterly depth-to-groundwater measurements, referenced to mean sea level, obtained during the groundwater sampling required by this Discharge Permit.* Data were collected and reported.
60. Groundwater Monitoring Conditions – Condition 61 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall submit a single table in a paper and electronic format (i.e., EXCEL spreadsheet) of water level measurements and water quality data with only those constituents analyzed and water levels measured during a single event shown in columns to NMED in the semi-annual monitoring reports. The table shall include the following tabulated field measurements: temperature, pH, and electrical conductivity corrected to 25 degrees Celsius. The monitoring sites shall be shown in rows on the table, and the second column shall contain the date of the sampling event. Values exceeding standards shall be bolded. Any constituent not analyzed for at a particular site shall be shown as "NA", any site not sampled shall be shown as "NS" with an associated reason, and any site not measured for water levels shall be shown as "NM" with an associated reason.* Data were collected and reported.
61. Groundwater Monitoring Conditions – Condition 62 (January 28, 2022, Discharge Permit Renewal)	*The Permittee shall submit a single table that includes all available groundwater data to date annually to NMED in the semi-annual monitoring reports due February 1st. For each monitoring well, the name of the well shall be entered in the far-left column in a row by itself. Sampling events, beginning with the earliest event first, shall be entered in subsequent rows with the sampling date in the second column and the corresponding analytical data in columns further to the right. Each new sampling event shall be added as an additional row to the existing spreadsheet with the corresponding date of the sampling event noted in the second column next to the monitoring well name.* Data were collected and reported.
62. Terms and Conditions – Condition 63 (January 28, 2022, Discharge Permit Renewal)	*Within six months following the effective date of this Discharge Permit (by July 28, 2022), the Permittee shall submit for NMED approval a site investigation workplan and implementation schedule. The purpose of the site investigation shall be to evaluate the efficacy of existing source controls, to determine the current lateral and vertical extent of the shallow contaminated groundwater, and to identify any*

Regulatory Requirement	WIPP Compliance Table 29-2
	potential impacts to the downgradient and naturally occurring groundwater in the Dewey Lake Formation. Documentation was submitted per the Permit conditions.
63. Contingency Plan – Condition 64 (January 28, 2022, Discharge Permit Renewal)	*In the event that groundwater monitoring indicates that a groundwater quality standard identified in Section 20.6.2.3103 NMAC is newly exceeded in a monitoring well with no previous exceedances at the date of issuance of this Discharge Permit, the Permittee shall collect a confirmatory sample from the monitoring well within 15 days of receipt of the initial sampling results to confirm the initial sampling results. Within 90 days of confirmation of groundwater contamination, the Permittee shall submit to NMED a Corrective Action Plan (CAP) that proposes, at a minimum, source control measures and an implementation schedule. The Permittee shall implement the CAP as approved by NMED.* Exceedances occurred for sulfate and Radium 226/228 and investigation plans were submitted per the Permit conditions.
64. Contingency Plan – Condition 65 (January 28, 2022, Discharge Permit Renewal)	*In the event that information available to NMED indicates that a groundwater monitoring well or piezometer is not constructed in a manner consistent with the attachment titled Ground Water Discharge Permit Monitoring Well Construction and Abandonment Guidelines, Revision 1.1, March 2011; contains insufficient water to effectively monitor groundwater quality; or is not completed in a manner that is protective of groundwater quality, the Permittee shall install a replacement well(s) within 120 days following notification from NMED.* Replacement monitoring wells will be installed per the Permit conditions if condition occurs.
65. Contingency Plan – Condition 66 (January 28, 2022, Discharge Permit Renewal)	*In the event that groundwater flow information obtained pursuant to this Discharge Permit indicates that a monitoring well/piezometer is not appropriately located, e.g., hydrologically downgradient of the discharge location it is intended to monitor, the Permittee shall install a replacement well within 180 days following notification from NMED. The Permittee shall survey the replacement monitoring well within 30 days following well installation.* Replacement monitoring wells will be installed per the Permit conditions if condition occurs.
66. Contingency Plan – Condition 67 (January 28, 2022, Discharge Permit Renewal)	*In the event that the site investigation required by this Discharge Permit or an inspection reveals significant damage has occurred or is likely to affect the structural integrity of an impoundment liner or its ability to contain contaminants, the Permittee shall propose to repair or the replacement of the impoundment liner by submitting a Corrective Action Plan (CAP) to NMED for approval. The Permittee shall ensure the CAP to NMED within 30 days after discovery of the damage or following notification from NMED that significant liner damage is evident. The Permittee shall ensure the CAP includes a schedule for completion of corrective actions and the Permittee shall initiate implementation of the CAP following approval by NMED.* A CAP will be submitted per the Permit conditions if needed.
67. Contingency Plan – Condition 68 (January 28, 2022, Discharge Permit Renewal)	*In the event that the required freeboard cannot be preserved in an impoundment, the Permittee shall take actions authorized by this Discharge Permit and all applicable local, state, and federal regulations to restore the required freeboard.* Contingent actions will be applied per the Permit conditions if needed.
68. Contingency Plan – Condition 69 (January 28, 2022, Discharge Permit Renewal)	*In the event the average solids accumulation exceeds one-third of the maximum liquid depth in an impoundment, the Permittee shall submit a plan for NMED's approval for the removal and disposal of the solids. The Permittee shall ensure*

Regulatory Requirement	WIPP Compliance Table 29-2
	that the solids removal and disposal plan is submitted to NMED within 120 days of the determination of excess solids. A plan will be submitted per the Permit conditions if needed.
69. Contingency Plan – Condition 70 (January 28, 2022, 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.* Contingent actions will be applied per the Permit conditions if needed.
70. Contingency Plan – Condition 71 (January 28, 2022, Discharge Permit Renewal)	*In the event that NMED or the Permittee identifies any failures of the discharge plan, i.e., the application, 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.* Contingent actions will be applied per the Permit conditions if needed.

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 the 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 facility water-supply system is considered a public water supply and classified the system as a non-transient, non-community 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 facility 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 facility 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. In April 2016, the WIPP water system drinking water coliform sampling procedure was revised to comply with the Revised Total Coliform Rule which went into effect on April 1, 2016 (NWP, 2022f).

The specific requirements under 20.7.10 NMAC that are applicable to the WIPP and the compliance status of each are provided in Table 30-1. Federal regulatory references are listed first, along with the title of the requirements.

Table 30-1 – Status of Compliance with the Regulatory Requirements of the New Mexico Drinking Water Regulations

Regulatory Requirement	WIPP Compliance Table 30-1
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.* The DOE collects coliform samples monthly and has them analyzed by a State of New Mexico certified laboratory.
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 facility 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 (TTHM) and haloacetic acid (HAA5) samples required, with State approval in accordance with criteria developed under 40 CFR § 142.16(h)(5) of this chapter.* The DOE collects trihalomethane and haloacetic acid samples from the WIPP drinking water system in September annually.
4. Lead Service Line Replacement Requirements. 40 CFR § 141.84	*All water systems must develop an inventory to identify the materials of service lines connected to the public water distribution system.* The WIPP facility is currently developing a lead service line inventory along with a replacement plan to replace all lead piping and fittings within five years.
5. 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 facility 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 2023, with results at or below action levels for eight of ten locations. For two locations with elevated results the Drinking Water Bureau was notified of the exceedances along with a plan to remediate. Two valves containing lead were replaced. The next lead and copper sampling event will occur in August 2026.

Regulatory Requirement	WIPP Compliance Table 30-1
6. 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 American National Standards Institute (ANSI)/National Sanitation Foundation certified or compliant with the most recent applicable safety standards.* • *Cross-connections must have backflow prevention.* • *Personnel must comply with utility operator certification requirements in the Utility Operator Certification Act, NMSA 1978, 61-33-1 et seq as amended.* The DOE documents compliance with these requirements as part of the work package process for performing maintenance and modifications to the WIPP facility water infrastructure.
7. 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 Homeland Security and Emergency Management 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 31-1 provides more detail for each applicable requirement and its compliance status under the HCIA.

Table 31-1 – Status of Compliance with the New Mexico *Hazardous Chemicals Information Act*

Regulatory Requirement	WIPP Compliance Table 31-1
1. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, § 74-4E-5(A)(1)	*Facility owners or operators who are required by any section of Title III to file a written notice or report to the commission shall file that notice or report on or before the required deadline with the department…Facility owners or operators shall file with the department:* *(1) Notice that an extremely hazardous substance, at or above a specified quantity, is present at a facility;* The DOE provides a copy of the annual Tier II Emergency & Hazardous Chemical Inventory Report with corresponding SDS's to the SERC, LEPC, and local/volunteer fire departments with which the DOE maintains an MOU. If additional hazardous chemical substances are stored above the TPQ, or 500 pounds, or if significant new safety information is identified about an item, a revised list of hazardous chemicals is re-submitted to these organizations.
2. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, § 74-4E-5(A)(2)	*Facility owners or operators who are required by any section of Title III to file a written notice or report to the commission shall file that notice or report on or before the required deadline with the department…Facility owners or operators shall file with the department:* *(1) Notice that a release of any chemical substance has occurred at or above reportable quantities determined by the commission. The contents of the notice shall be determined by the commission. The notice shall be filed as soon as practicable following a release;* There were no releases of chemical substances in excess of an RQ during this reporting period.
3. Hazardous Chemical Information Act, Notices and Reports Required;	*Facility owners or operators who are required by any section of Title III to file a written notice or report to the commission shall file that notice or report on or before the required deadline with the department…Facility owners or operators*

Regulatory Requirement	WIPP Compliance Table 31-1
Deadlines Set, § 74-4E-5(A)(3)	*shall file with the department:* *(2) An inventory form covering each hazardous material. This form shall be filed annually on or before March 1;* On behalf of the DOE, the current MOC submitted the annual Tier II Emergency and Hazardous Chemical Inventory Report in February 2023 for the reporting year 2022 (SIMCO, 2023b) and February 19, 2024 for the reporting year 2023 (SIMCO, 2024b) to the SERC, the LEPC, and local/volunteer fire departments.
4. Hazardous Chemical Information Act, Notices and Reports Required; Deadlines Set, § 74-4E-5(A)(4)	*Facility owners or operators who are required by any section of Title III to file a written notice or report to the commission shall file that notice or report on or before the required deadline with the department…Facility owners or operators shall file with the department:* *(3) A toxic chemical release inventory form…The form shall be filed annually on or before July 1.* The DOE and the MOC submitted the annual Toxic Chemical Release Inventory Form R report prior to July 1, 2023 for reporting year 2022 (DOE, 2023c) and prior to July 1, 2022 for reporting year 2021 (DOE, 2022d).

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 32-1 provides a summary of the compliance status of each requirement under the New Mexico *Emergency Management Act*.

Table 32-1 – Status of Compliance with the Regulatory Requirements of the New Mexico Emergency Management Act

Regulatory Requirement	WIPP Compliance Table 32-1
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 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 facility occur within New Mexico, the New Mexico State Police Division of the Public Safety Department will be notified by the CMR operator, as outlined in a DOE 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 by lack of an expected communication from in-transit shipment personnel. The CMR operator will then contact the state police and other appropriate agencies. Carriers of hazardous material shipments from the WIPP receive written instructions to call the CMR operator in the event of an accident involving the transport of WIPP hazardous materials. The CMR operator will then contact the state police, if the carrier has not done so, and other appropriate agencies. There were no traffic accidents involving shipments of TRU mixed waste or WIPP hazardous materials in New Mexico during this reporting period. The 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.*

Regulatory Requirement	WIPP Compliance Table 32-1
	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. An additional objective of 4.10.12 NMAC is to establish 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 33-1 provides more detail on compliance status under the New Mexico *Prehistoric and Historic Sites Preservation Act*.

Table 33-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Prehistoric and Historic Sites Preservation Act*

Regulatory Requirement	WIPP Compliance Table 33-1
1. Prehistoric and Historic Site Preservation, §§ 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 site 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 site. During this reporting period, several surveys were performed for various reasons. Refer to table 23.1 for more details on these surveys.

34.0 EASEMENTS AND RIGHTS OF WAY ON NEW MEXICO STATE TRUST LANDS

34.1 Summary of the Law

In 1912, the New Mexico Legislature created the State Land Office and directed that the Office executive officer, the Commissioner of Public Lands (Commissioner), execute jurisdiction over, and provide for the management, care, control, and disposition of, trust 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 New Mexico State Trust Lands 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 34-1 provides the compliance status of DOE right-of-ways granted by the New Mexico State Land office. A tabulation of rights-of-way and other environmental permits is also found in Appendix B1 of the WIPP Permit.

Table 34-1 – Status of Compliance with the Regulatory Requirements of New Mexico State Trust Lands

Regulatory Requirement	WIPP Compliance Table 34-1
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, revision, reclamation, and restoration when required. During the reporting period, right-of-way RW-22789 which was granted in 1985 for construction and operation of an aerosol sampling station (i.e., Angel Ranch station) was relinquished. Structures, improvements, and debris associated with the aerosol sampling station were removed from the location and the site reseeded with approved native vegetation. Based on an inspection occurring on March 14, 2023, the State Land Office determined that remediation was completed and the land was left in an appropriate condition. Also during the reporting period, the DOE submitted an easement application requesting approval for personnel to travel existing roads occurring on State Land Office lands. Some activities of the WIPP Environmental Monitoring Program entail travel on these roads and alternative options are limited. This grant was approved on January 24, 2024, under ROW Easement No. R-40726. The grant expires on January 24, 2044. This grant replaces RW-25430 that was allowed to expire on October 31, 2018.

35.0 STATE OF NEW MEXICO 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 (NMDGF) 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 New Mexico State Game Commission regulations. In addition, § 17-2-41 of the *Wildlife Conservation Act (*§§ 17-2-37 through 17-2-46 NMSA 1978) furthers the purpose of the *Bald and Golden Eagle Protection Act* with respect to the bald eagle as a threatened species (New Mexico listing).

35.2 Status of Compliance with the Regulatory Requirements

Table 35-1 provides more detail on compliance status under the State of New Mexico implementation of the *Bald and Golden Eagle Protection Act*.

Table 35-1 – Status of Compliance with the Regulatory Requirements of the State of New Mexico Implementation of the *Bald and Golden Eagle Protection Act*

Regulatory Requirement	WIPP Compliance Table 35-1
1. Status of Compliance with the Regulatory Requirements Chapter 17 NMSA 1978	For the reporting period, no bald or golden eagles were observed nesting within the WIPP land withdrawal area; however, transient eagles may, at times, migrate through or 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, the National Bald Eagle Management Guidelines (USFWS, 2007) will be incorporated into a typical NEPA Mitigation Plan which 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*

Regulatory Requirement	WIPP Compliance Table 35-1
	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 imperiled species. 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 species 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 in 1978 to protect the state's threatened and endangered wildlife. 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 threatened and 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. Sections 17-1-14 and 17-1-26 NMSA 1978 provide that the New Mexico State Game Commission (the commission) has the authority to establish rules and regulations that it may deem necessary to carry out the purpose of Chapter 17, *Game and Fish and Outdoor Recreation*, NMSA 1978, and other acts pertaining to protected species. Sections 17-2-41 and 17-2-40 NMSA 1978 provide that the commission will develop and biennially review a list of threatened and endangered wildlife within the State. The 2022 biennial review was approved on October 14, 2022.

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

Section 17-2-41 NMSA 1978, *Endangered Species*, states (in part) that “except as otherwise provided in the Wildlife Conservation Act [17-2-37 NMSA 1978], it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale, or ship” any species of wildlife appearing on any of the following lists: (1) the list of wildlife indigenous to the state determined to be endangered within the state as set forth by regulations of the commission ; and (2) United States lists of endangered native and foreign fish and wildlife as set forth in Section 4 of the Endangered Species Act of 1973 as endangered or threatened species, but only to the extent that those lists are adopted by regulations of the commission. Defined in subsection L of section 17-2-38 NMSA 1978, “take” or “taking” means to harass, hunt, capture or kill any wildlife, or to attempt to do so.

In section 17-2-42 NMSA 1978, *Management Programs*, the Director of the NMDGF 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, exportation 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 bird families protected as game animals under state law. 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.

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, including when these species are removed, captured, or destroyed in emergency situations involving immediate threat to human life or private property, must report any such incident to the NMDGF.

19.33.6 NMAC, *List of Threatened and Endangered Species*, lists threatened and endangered wildlife in New Mexico. 19.21.2 NMAC, *Endangered Plant Species Lists and Collection Permits*, lists endangered plants in New Mexico. The Energy, Minerals, and Natural Resources Department State Forestry Division is authorized under section 75-6-1 NMSA 1978 to conduct investigations and establish programs, within the limits of its authority, relating to conservation and management of endangered species of plants in New Mexico. Section 17-3-29 NMSA and regulation 19.35.6 NMAC, *Authorized Uses of Wildlife for Education, Law Enforcement, Research and Scientific Purposes*, 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. Biotic collection of wild fauna, as prescribed in the WIPP Environmental Monitoring Plan, is performed as authorized by a permit granted by NMDGF (authorization number 3293). Even though this permit allows salvage of any dead vertebrate which includes endangered or threatened species, the primary objective of the monitoring plan is to evaluate potential radiation doses received by way of human consumption of wild game that would be legally harvested during hunting and

fishing seasons.

36.2 Status of Compliance with the Regulatory Requirements

Table 36-1 provides more detail on compliance status under the New Mexico *Wildlife Conservation Act*, supplementing the ESA.

Table 36-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Wildlife Conservation Act*, Supplementing the *Endangered Species Act*

Regulatory Requirement	WIPP Compliance Table 36-1
1. New Mexico Wildlife Conservation Act, §§ 17-2-37 through 17-2-46 NMSA 1978	In 1989, the DOE consulted with the NMDGF regarding the state-listed endangered species in the vicinity of the WIPP site. 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 NMDGF subsequently concurred that proposed WIPP activities would probably have no significant impacts on state-listed species in the area. To ensure that DOE 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 for amphibians, birds, reptiles, and vegetation. Although the report for this large-scale survey indicated that no threatened or endangered species for these taxa were found within the WIPP land withdrawal area boundaries, there was one recorded observation of a Baird's Sparrow which has been listed as threatened by the State since 1975. Per the 2022 biennial review by NMDGF, the Baird's Sparrow is primarily a migrant species in New Mexico. The Waste Isolation Pilot Plant LMP was updated in 2023 to include a review and tabulation of threatened and endangered species listed in the State of New Mexico counties of Eddy and Lea where WIPP and WIPP assets (e.g., groundwater wells) are located. Several special-status taxa on the tabulated list were not surveyed in 1996. In May 2022, a small-scale biological survey was performed on undisturbed land focusing on an 800-acre area near the main WIPP facility. Although results indicate that no threatened or endangered species were found within the surveyed area, some special-status species were encountered. It was also reported that WIPP has suitable habitat for some special-status species. Additional details can be found in the Waste Isolation Pilot Plant LMP. Considerations pertaining to protected species are implemented in accordance with the plan during the deliberation and administration of projects conducted on WIPP lands. No current WIPP activities impacting threatened or endangered species are conducted. No permits, biological assessments, or formal consultations are required. There have been no known habitat changes within the WIPP LWA that would indicate a need for a separate updated large-scale review for threatened or endangered species on WIPP lands, however, an updated review may be warranted because the 1996 survey did not include some taxa that are currently listed as threatened and endangered in the area of the WIPP facility. The lesser prairie chicken is currently not listed under the New Mexico Wildlife Conservation Act, although the lesser prairie chicken has favorable habitat within the WIPP LWA and other surrounding areas affected by WIPP operational activities. Nevertheless, the species is federally protected and thus the DOE adheres to established BLM timing restrictions for protection of the lesser prairie chicken when performing off-site field activities that may generate excessive noise (e.g., drilling of groundwater wells). There were no reports of any endangered or threatened species occurring at the WIPP site. Biotic collection of wild fauna did not include any salvage of endangered or threatened species. Biotic collection only included the specific species authorized by NMDGF in permit 3293. Reports on collection activities are required by the permit and are submitted annually by January 31 to NMDGF. For CY 2022 and CY 2023, required reports were provided to NMDGF on January 3, 2023, and

	January 2, 2024, respectively.

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 37-1 provides more detail on compliance status under the New Mexico *Pesticide Control Act.*

Table 37-1 – Status of Compliance with the Regulatory Requirements of the New Mexico *Pesticide Control Act*

Regulatory Requirement	WIPP Compliance Table 37-1
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 DOE is not a commercial, noncommercial, or public applicator, or a pest-management consultant. Licensed, certified applicators are contracted to apply pesticides at the WIPP facilities 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 Agriculture and Environmental Services Division of the New Mexico Department of

	Agriculture has the authority to sample for illegal pesticide residues at the WIPP site during investigations of certified applicators for noncompliance with this Act. There were no investigations that required testing/sampling at the WIPP site during the reporting period.

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APPENDIX A – CALENDAR YEAR (CY) 2023 AND CY 2024 WIPP CONFIRMATORY MEASUREMENT COMPLIANCE REPORTS (TITLE 40 CFR PART 191, SUBPART A, ENVIRONMENTAL STANDARDS FOR MANAGEMENT AND STORAGE)

Appendix A-1

CY 2022 WIPP Confirmatory Measurement Compliance Report

CY 2022 Report Summary

CY 2022 CAP88-PC Output Data for the Maximum Exposed Non-Resident Individual at the U.S. Department of Energy Waste Isolation Pilot Plant Facility Utility Shaft Construction Office (0.5 mile [812 meters] WNW)

CY 2022 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (652 meters WNW)

CY 2022 CAP88-PC Output Data for the Maximum Exposed Off-Site Individual at the DOE WIPP Maximum Residential Location (8,850 meters WNW)

Appendix A-2

CY 2023 WIPP Confirmatory Measurement Compliance Report

CY 2023 Report Summary

CY 2023 CAP88-PC Output Data for the Maximum Exposed Individual at the DOE WIPP Exclusive Use Area Fence Line (822 meters NW)

CY 2023 CAP88-PC Output Data for the Maximum Exposed Non-Resident Individual at the DOE WIPP Maximum Office Location (330 meters ESE)

CY 2023 CAP88-PC Output Data for the Maximum Exposed Off-Site Resident Individual at the DOE WIPP Maximum Residential Location (8,850 meters WNW)

Periodic Confirmatory Measurement Compliance Report for Calendar Year 2022

DOE/WIPP-23-3638
Revision 0

U.S. Department of Energy
Carlsbad Field Office

June 2023

Periodic Confirmatory Measurement Compliance Report for Calendar Year 2022

U.S. Department of Energy
Carlsbad Field Office

DOE/WIPP-23-3638
Revision 0
June 2023

Approved by: /Signature on file/ 6/21/2023
Michael Gerle Date
Director, Environmental Regulatory
Compliance Division

Change History Summary

Revision Number	Description of Changes
0	Initial issue.

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Summary

The United States (U.S.) Department of Energy (DOE) Carlsbad Field Office (CBFO) has oversight and stewardship duties associated with the Waste Isolation Pilot Plant (WIPP). Facility operations include radiological operations with the potential to emit low levels of radioactive materials.

This report documents compliance with the *Memorandum of Understanding Between the U.S. Environmental Protection Agency and the U.S. Department of Energy concerning the Clean Air Act Emission Standards for Radionuclides 40 CFR Part 61 Including Subparts H, I, Q & T,* dated May 16, 1995 (DOE, 1995) and Title 40, Protection of the Environment, of the 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". Compliance is determined by comparing the calculated effective dose equivalent (EDE) for the maximally exposed individual (MEI) member of the public to the regulatory limit of 0.1 millirem per year (mrem/yr) U.S. Environmental Protection Agency (EPA) standard for periodic confirmatory monitoring.

The EDE to the WIPP MEI due to routine operations in 2022 was 7.20E-05 mrem. This MEI is a temporary workspace at the Utility Shaft project. For continuity, since the aforementioned workspace is temporary, the DOE has provided the EDE to the historical maximally exposed off-site individual (MEOSI). The EDE to the MEOSI due to routine operations in 2022 was 2.49E-06 mrem. No non-routine emissions occurred in 2022.

For further information concerning this report, you may contact Dr. Anderson Ward, U.S. Department of Energy, Carlsbad Field Office, by telephone at (575) 988-5414 or by e-mail at Anderson.Ward@cbfo.doe.gov.

Certification of DOE/WIPP-23-3638

DOE-CBFO
Waste Isolation Pilot Plant
Carlsbad Field Office
Periodic Confirmatory Measurement Compliance Report
Calendar Year 2022

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. [verbatim from 40 CFR 61, Subpart H, 61.94(b)(9)].

/Signature on file/	6/29/2023
Mark Bollinger, Manager U.S. Department of Energy Carlsbad Field Office	Date

Acronyms and Abbreviations

AIRDOS-PC	Atmospheric Dispersion of Radionuclides – Personal Computer
CAP88-PC	Clean Air Act Assessment Package – 1988
CBFO	Carlsbad Field Office
CFR	Code of Federal Regulations
cm/yr	centimeters per year
CY	Calendar Year
DOE	Department of Energy
EDE	effective dose equivalent
EPA	Environmental Protection Agency
FAS	Fixed Air Samplers
g/m^3	grams per cubic meter
HEPA	high-efficiency particulate air
ICRP	International Commission on Radiological Protection
km	kilometers
m	meters
MEI	maximally exposed individual
MEOSI	maximally exposed off-site individual
mrem/yr	millirem per year
PASs	Portable Air Samplers
PIC	Potential Impact Category
SDD	System Design Description
SHS	Salt Handling Shaft
SSCVS	Safety Significant Confinement Ventilation System
SVS	Supplemental Ventilation System
TRU	transuranic
U.S.	United States
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

This report satisfies the reporting requirements established by the Memorandum of Understanding between the EPA and the DOE dated May 16, 1995 (DOE, 1995). The Memorandum of Understanding is applicable to the provisions of CFR Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities" for radionuclides at the WIPP. In addition, this report is used to demonstrate DOE compliance with the standards provided in 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage." Emission monitoring and compliance procedures for DOE facilities (40 CFR §61.93[a]) require the use of Clean Air Act Assessment Package - 1988 Personal Computer (CAP88-PC), Atmospheric Dispersion of Radionuclides – Personal Computer (AIRDOS-PC) computer models, or other approved procedures, to calculate effective dose equivalent values to members of the public. The CAP88-PC computer model is a set of computer programs, databases, and associated utility programs for estimating dose and risk from radionuclide emissions to the air (Trinity, 2019). The CAP88-PC, Version 4.1.1.0, dose assessment computer model was used to calculate the doses reported in this document. Output data from CAP88-PC are provided in Addendum A.

2.0 COMPLIANCE

Calculations made using the above-referenced code indicate that the EDE to the MEI resulting from normal operations at this facility is 7.20E-05 mrem/yr. For calendar year (CY) 2022, the MEI is a non-resident, non-WIPP worker, at the Utility Shaft construction site. This location is the Utility Shaft construction office trailer, which is the nearest occupied point on this construction site. This point is 0.5 miles (812 meters [m]) west-northwest of the stack. The EDE is in compliance with the 10 mrem/yr emission standard stated in 40 CFR §61.92. The maximum dose to the critical organ (bone surface) of this individual is calculated to be 1.20E-03 mrem/yr. Both the EDE and maximum dose to the critical organ for this individual are below the 25 mrem/yr and 75 mrem/yr limit for whole body and critical organ, respectively, as stated in 40 CFR §191.03(b).

To provide reference point continuity, since the above-mentioned workspace is temporary, the DOE is providing the EDE to the historical MEOSI (i.e., prior to 2019). This individual is a resident living 5.5 miles (8.85 kilometers [km]) west-northwest. The EDE to this resident, resulting from normal operations at this facility, is calculated to be 2.49E-06 mrem/yr. The maximum dose to the critical organ (bone surface) of this resident individual is calculated to be 3.88E-05 mrem/yr. In addition, both the EDE and maximum dose to the critical organ are below the 25 mrem/yr and 75 mrem/yr limit for whole body and critical organ, respectively, as stated in 40 CFR §191.03(b). The dose to this resident, however, is not the maximum exposure to a member of the public.

The EDE to a hypothetical member of the public resulting from normal operations conducted at this facility at the maximum point of exposure, 0.41 miles (652 m) west-northwest at the Exclusive Use Area fence line, is calculated to be 9.35E-05 mrem/yr. The maximum dose to the critical organ (bone surface) of this hypothetical individual is calculated to be 1.56E-03 mrem/yr. Both the EDE and maximum dose to the critical organ are below the 25 mrem/yr and 75 mrem/yr limit for whole body and critical organ, respectively, as stated in 40 CFR §191.03(b). Since this is a

hypothetical individual, referencing compliance with 40 CFR §191.03(b), this dose estimate does not meet the specified directive to calculate a realistic dose to an actual member of the public, as required by 40 CFR Part 61, Subpart H.

3.0 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

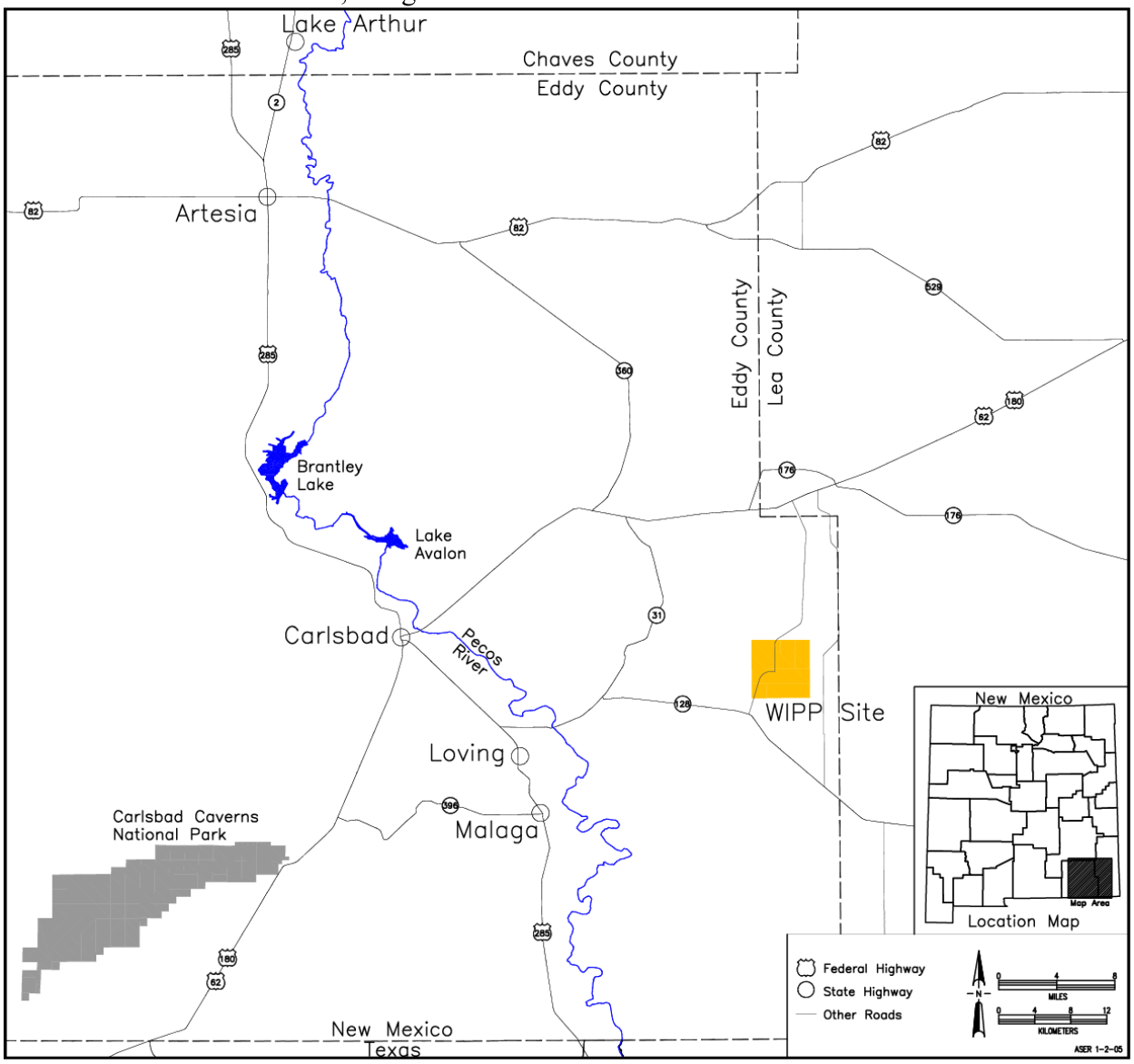

Figure 1. Waste Isolation Pilot Plant in Southeast New Mexico

4.0 RADIOACTIVE MATERIALS USED

The WIPP is a facility for the management, storage, and disposal of transuranic (TRU) mixed waste. The 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 do not involve handling loose radioactive material. Waste containers are sealed, including installed filtered gas relief vents, 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, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (DOE, 2022), 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 waste managed at the WIPP.

Since the February 2014 radiological event at the WIPP, there is a potential limited source term, comprised primarily of ^{241}Am and a lesser amount of $^{239/240}$Pu, that remains underground. Engineered barriers and administrative controls are in place to mitigate resuspension of contaminants.

Small quantities (i.e., activities) of radioactive materials (mostly sealed sources) are used at the WIPP 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.

A summary of CY 2022 radiological air emission source term quantities by radionuclide and emission point is shown in Tables 1 through 3 for the underground repository and the Waste Handling Building (WHB), respectively.

5.0 SUMMARY OF THE SOURCE TERM FROM WIPP OPERATIONS

Table 1. CY 2022 Summary of Radionuclide Effluents from Underground Storage Areas During Unfiltered Ventilation

Station	Radionuclide	Activity Release (Ci/yr)[1]	Particle Size (µm)[2]	Class (F, M, S)[3]
H	^{238}Pu	3.42E-08	1	M
H	$^{239/240}$Pu	2.20E-08	1	M
H	^{241}Am	2.22E-07	1	M
H	^{90}Sr	3.32E-07	1	M
H	^{137}Cs	2.97E-06	1	F
H	$^{233/234}$U	3.27E-08	1	M
H	^{238}U	2.45E-08	1	M

1 Transmission factors have been applied in accordance with the System Design Description (SDD) for Station H (Blunt Consulting, 2022). The factors are applied to the data to account for depositional losses based on the design of the system.

2 The default particle size in micrometers for inhaled particles.

3 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 International Commission on Radiological Protection (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 2. CY 2022 Summary of Radionuclide Effluents from Underground Storage Areas During Filtered Ventilation

Station	Radionuclide	Activity Release (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
B	^{238}Pu	6.18E-09	1	M
B	$^{239/240}$Pu	2.38E-08	1	M
B	^{241}Am	1.80E-07	1	M
B	^{90}Sr	3.87E-07	1	M
B	^{137}Cs	2.43E-06	1	F
B	$^{233/234}$U	3.06E-08	1	M
B	^{238}U	2.27E-08	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 3. CY 2022 Summary of Radionuclide Effluents from the Waste Handling Building

Station	Radionuclide	Activity Release (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
C	^{238}Pu	2.37E-09	1	M
C	$^{239/240}$Pu	4.44E-09	1	M
C	^{241}Am	4.03E-09	1	M
C	^{90}Sr	2.28E-07	1	M
C	^{137}Cs	1.07E-06	1	F
C	$^{233/234}$U	1.03E-08	1	M
C	^{238}U	1.05E-08	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.

6.0 DESCRIPTION OF OPERATIONS

The WIPP is a TRU and TRU mixed waste disposal facility owned by the DOE and operated by Salado Isolation Mining Contractors LLC. The principal operation of the WIPP involves the receipt and permanent disposal of TRU mixed waste. Only waste that conforms to DOE/WIPP-02-3122 is accepted for placement in the WIPP (DOE, 2022). Administrative controls prohibit the waste containers from being opened once they are shipped to the WIPP.

7.0 EMISSION POINTS

In CY 2022, the WIPP had three emission points: unfiltered and filtered air released from the exhaust shaft and filtered air from the WHB. Station A sampled the unfiltered air at the surface from the underground exhaust shaft. Station H, constructed in CY 2020 for 700-C fan operation and testing, sampled the unfiltered air released from the exhaust shaft and the ductwork between Station A and the 700-C fan exit. Data from Station A and Station H are compared and the more conservative value is used. For this reporting period, Station H data was used in calculating the dose to the MEI. Station B sampled filtered air from the exhaust shaft that has passed through a bank of high-efficiency particulate air (HEPA) filters. Station C sampled filtered air from the

WHB that has passed through a bank of HEPA filters. Stations H, B, and C monitor emission points that are categorized as Potential Impact Category (PIC) 3 sources, requiring periodic confirmatory sampling and off-line analysis to confirm air emissions to be at or less than a 0.01 potential fraction of the allowable dose limit, in accordance with American National Standards Institute/Health Physics Society (ANSI/HPS N13.1-1999) with respect to radiological air emissions sampling and monitoring. These sampling locations are depicted in Figure 2.

During this reporting period, the WIPP operated the Supplemental Ventilation System (SVS). The SVS consists of an auxiliary fan installed in the S-90 drift in the underground repository to provide additional ventilation air to the underground. Use of the SVS minimizes dust particulate loading on the underground ventilation system's HEPA filtration units since the air flow directed to the construction (active mining) areas comes from the additional clean surface air. A portion of the salt-dust-laden air from the underground is exhausted up the Salt Handling Shaft (SHS). Ventilation air moving through the disposal area will continue to be routed through the Exhaust Shaft. The SHS exhaust point is classified as PIC 4, requiring an annual administrative review of facility uses to confirm absence of radioactive materials in forms and quantities not conforming to prescribed specifications and limits, confirming air emissions to be at or less than a 0.0001 potential fraction of the allowable dose limit, in accordance with ANSI/HPS N13.1-1999.

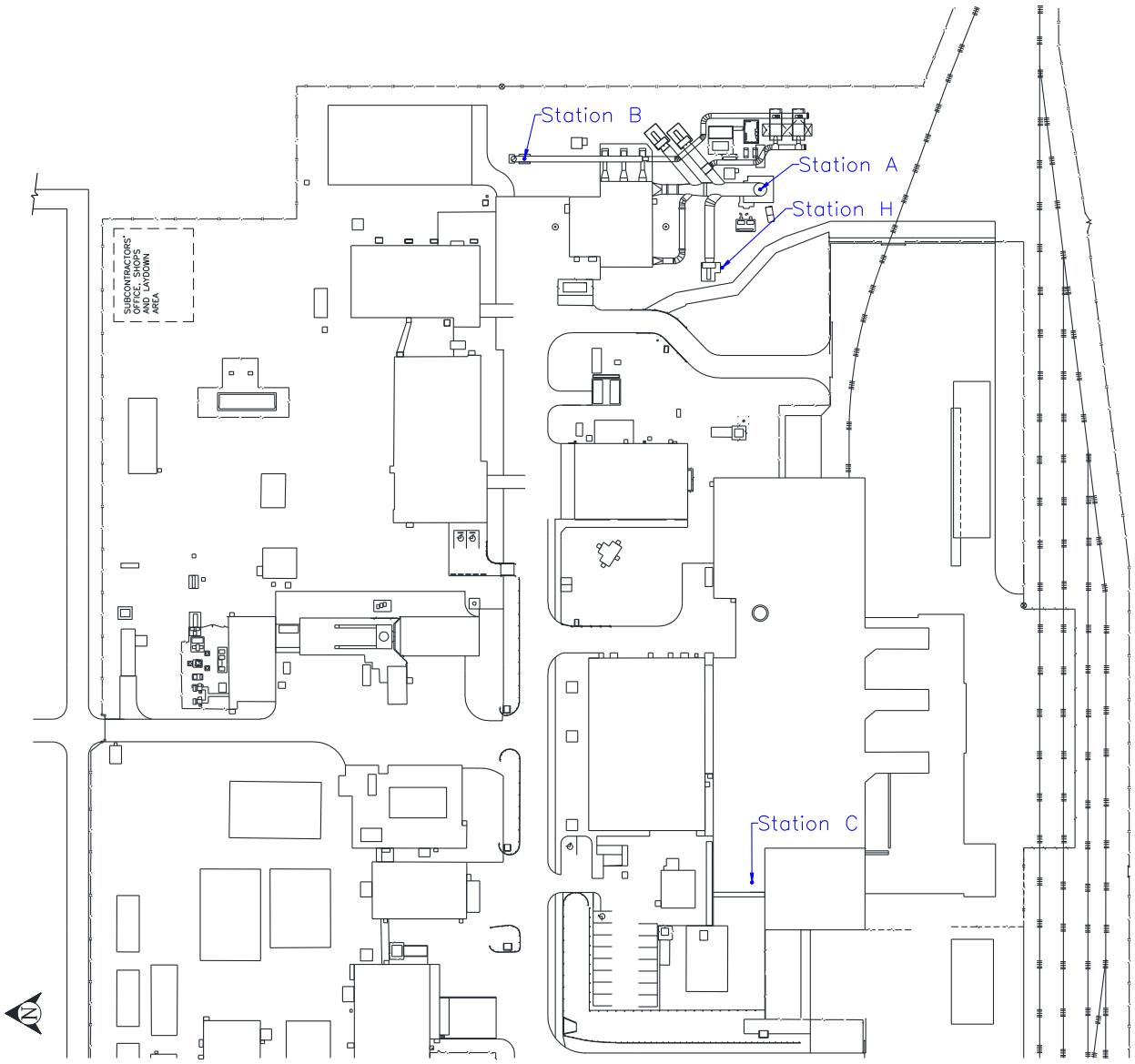

Figure 2. WIPP Rad Air Emissions Monitoring Locations

8.0 EFFLUENT CONTROLS

Radionuclide emissions from waste containers are controlled by filtered gas relief vents that must be fitted to all closed waste containers accepted at the WIPP (EPA, 2003). Each filter must exhibit filtering efficiencies of greater than 99.95 percent with 0.3 to 0.5 micron particles of dioctyl phthalate smoke (DOE, 1999).

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 monitors sampling filtered air exhausted from the underground are displayed in the Central Monitoring Room, a continuously occupied location from which WIPP operations are monitored. During HEPA-filtered operating conditions, the underground disposal area exhaust air passes through HEPA filtration units before being released to the atmosphere at Station B. During unfiltered operating conditions, the underground disposal area exhaust air is released to the atmosphere at the 700-C fan. The WHB exhaust air, which ventilates above-ground waste-handling operations in the WHB, is subject to continuous HEPA filtration before being released to the atmosphere at Station C. Stations B and C HEPA filtration units are polyalphaolefin-tested annually in accordance with WIPP procedures (NWP, 2023a, NWP, 2023b, and NWP, 2023c).

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 influx of outside air, which precludes a potential release of airborne contamination from inside the WHB to the environment. The underground ventilation system is composed of four circuits. Dividing of the air supply inhibits the spread of contamination in the event that radioactive material becomes airborne. Separation of the subsystem airflows is maintained by the use of air locks and bulkhead flow controls until the flows are recombined at the exhaust shaft. During SVS operation, salt-dust-laden air from the north and construction circuits is exhausted out the SHS. The north circuit supplies air to the non-nuclear experimental areas of the underground (generally north of the SHS): the non-nuclear construction area is north of and adjacent to the active waste disposal panel on the west side of the repository (between S-1600 and S-1950 and west of W-170), and is moved as needed to access the next area to be mined. 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).

8.1 Air Sampling and Analysis

Stations A, B, and C consist of skid-mounted fixed air samplers (FASs) used to collect representative samples of airborne particulates (ANSI/HPS N13.1–1999). 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. Station H consists of portable air samplers (PASs) used to collect representative samples

of airborne particulates (Blunt Consulting, 2022). Each PAS has a vacuum pump. Backup PASs are available in the event a Station H PAS encounters operational problems. Permanent site power is available for the Station H sampling equipment.

Approved and controlled operating procedures are used at the WIPP 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 and B FAS filters are collected daily, and more often as needed or as ventilation system configurations are changed, to define suspected underground effluent events. Station H FAS filters are collected daily during 700-C fan operation. 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, 2004).

An annual administrative review of the SVS operation was performed to confirm the absence of radioactive materials in form and quantities not conforming to prescribed specification and limits in accordance with the graded approach to sampling and monitoring in ANSI/HPS N13.1-1999.

9.0 DISTANCES TO NEAREST RECEPTORS FROM RELEASE POINTS

The WIPP is located in a low population density area that has less than 30 permanent residents living within a nominal 10-mile (16.1-km) radius (DOE, 2021). The area surrounding the WIPP 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 grazing, which is the only significant agricultural activity in the vicinity of the WIPP. Development of the natural resources results in a transient (nonpermanent) population consisting primarily of workers at two potash mines, and workers at numerous oil and gas wells located within 10 miles (16.1 km) of the WIPP.

In compliance with 40 CFR Part 61, Subpart H, which requires descriptions of the locations of population and food sources around the WIPP, the nearest permanent residence or school is identified as the newer James (Mills) Ranch residence located 3.36 miles (5.4 km) from the WIPP in the south-southwest sector. The original associated Mills Ranch house, also in the south-southwest 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 resident. This receptor is located 5.5 miles (8.85 km) west-northwest of the facility.

A non-WIPP business workspace (i.e., a construction office trailer at the nearest occupied point of the Utility Shaft project) was added in CY 2020. This workspace is located 0.5 miles (812 m) from the WIPP primary facility emission point in the west-northwest direction. This location is outside the Exclusive Use Area fence line. The occupant of this temporary office space is designated as the MEI during this reporting period.

The nearest farm producing vegetables is approximately 14 miles (23 km) from the WIPP in the southwest sector of the facility; milk produced commercially is approximately 45 miles (72 km)

from the WIPP in the northeast sector; and beef cattle are raised on the WIPP lands immediately outside the WIPP Exclusive Use Area.

10.0 INPUT DATA FOR CAP88-PC DOSE ASSESSMENT COMPUTER MODEL

Radionuclides from Station H: See Table 1 CY 2022 Summary of Radionuclide Effluents from Underground Storage Areas During Unfiltered Ventilation
Radionuclides from Station B: See Table 2 CY 2022 Summary of Radionuclide Effluents from Underground Storage Areas During Filtered Ventilation
Radionuclides from Station C: See Table 3 CY 2022 Summary of Radionuclide Effluents from the Waste Handling Building
Emission Point Data: See Table 4 CY 2022 Characteristics of WIPP Emission Points
Meteorological Data File: WIPP_022.wnd (CY 2022)
Population Data File: WIPP_022.pop (Population data for WIPP region)
Annual Precipitation: 28.50 centimeters per year (cm/yr) (CY 2022)
Annual Ambient Temperature: 18.06°C (CY 2022)
Lid (Mixing) Height: 1,000 m (default)
Agricultural Scenario: Local (default)
Absolute Humidity: 8 grams per cubic meter (g/m^3) (default)

Table 4. CY 2022 Characteristics of WIPP Emission Points

Characteristics	Unfiltered Air from Exhaust Shaft	Filtered Air from Exhaust Shaft	Filtered Air from WHB
Effective Station Height (m)	7.27	7.5	15.1
Effective Station Diameter (m)	4.66	1.8	2.3
Station Area (m^2)	17.0	2.5	4.5
Flow Rate (ft^3/min)	2.8×10^4 (max)	11.4×10^4 (max)	4.7×10^4 (max)
Flow Rate (m^3/min)	7.9×10^3 (max)	3.2×10^3 (max)	1.3×10^3 (max)
Exit Velocity (m/s)	7.8 (max)	21.1 (max)	5.3
Effective Exit Velocity (m/s)	5.49 (max)	21.1 (max)	5.3
Orientation	45° Angle	Vertical	Vertical
Shape	Rectangle	Round	Square
HEPA Filtered	No	Yes	Yes
Sampling Location	Stations A and H	Station B	Station C

11.0 DESCRIPTION OF CONSTRUCTION AND MODIFICATIONS COMPLETED DURING REPORT PERIOD

Construction of the Safety Significant Confinement Ventilation System (SSCVS) continued during this reporting period. Plans for the SSCVS include six exhaust fans with 22 HEPA filter banks and associated ductwork. The primary function of the SSCVS will be to remove airborne radioactive particulate from the exhaust air through HEPA filtration before the air is released to the environment. The SSCVS will supply additional air to the underground in order to achieve up to 540,000 cubic feet per minute of air to the WIPP underground in filtration mode. Construction of this system is expected to be completed as early as CY 2025. This ventilation flow increase was calculated to increase the dose to the public by less than 1 percent of the 10 mrem/yr regulatory standard. Confirmatory sampler compliance qualification testing will be completed in accordance with ANSI N13.1-1999 once construction is completed.

There were no modifications to the existing sampling equipment or sample filter flow rates. No modifications were undertaken during this period.

12.0 REFERENCES

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Subpart H. "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities." *Code of Federal Regulations*. U.S. Government Printing Office, Washington, D.C.

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Addendum A

CAP88-PC Version 4.1.1.0 Output Data

Utility Shaft Construction Office
(0.5 miles [812 meters] WNW)

Utility Shaft Construction Office
(0.5 miles [812 meters] WNW)
Synopsis Report

C A P 8 8 - P C

Version 4.1

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 Mar 29 15:46:08 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Effective Dose Equivalent (mrem)
7.20E-05

At This Location: 812 Meters West Northwest
Dataset Name: N_Ind22_S5.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 812 Meters West Northwest
Lifetime Fatal Cancer Risk: 2.80E-11

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

Organ	Dose Equivalent (mrem)
Adrenals	3.95E-05
UB_Wall	4.14E-05
Bone_Sur	1.20E-03
Brain	3.71E-05
Breasts	3.83E-05
St_Wall	3.95E-05
SI_Wall	4.01E-05
ULI_Wall	4.18E-05
LLI_Wall	4.80E-05
Kidneys	4.39E-05
Liver	1.32E-04
Muscle	4.08E-05
Ovaries	5.93E-05
Pancreas	3.96E-05
R_Marrow	1.04E-04
Skin	1.41E-04
Spleen	3.98E-05
Testes	5.92E-05
Thymus	3.90E-05
Thyroid	4.09E-05
GB_Wall	3.93E-05
Ht_Wall	4.00E-05
Uterus	4.06E-05
ET_Reg	4.14E-05
Lung	5.97E-05
Effectiv	7.20E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 2022

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	6.2E-09	2.4E-09	3.4E-08	4.3E-08
Pu-239	M	1.000	2.4E-08	4.4E-09	2.2E-08	5.0E-08
Am-241	M	1.000	1.8E-07	4.0E-09	2.2E-07	4.1E-07
Sr-90	M	1.000	3.9E-07	2.3E-07	3.3E-07	9.5E-07
Cs-137	F	1.000	2.4E-06	1.1E-06	3.0E-06	6.5E-06

Wed Mar 29 15:46:08 2023 SYNOPSIS
Page 1a

RADIONUCLIDE EMISSIONS DURING THE YEAR 2022

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
U-233	M	1.000	3.1E-08	1.0E-08	3.3E-08	7.4E-08
U-238	M	1.000	2.3E-08	1.0E-08	2.5E-08	5.8E-08

SITE INFORMATION

Temperature: 18.060 degrees C
Precipitation: 28.500 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 812 meters

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.50	15.10	7.27
Diameter (m):	1.80	2.30	4.66
Plume Rise Momentum (m/s): (Exit Velocity)	21.10	5.30	5.49

ADJUSTED 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

330	490	539	592	652	707	812
822	860	945	5100	5250	5400	7500
8850	11520	15610	16670	47000	70000	

Utility Shaft Construction Office

(0.5 miles [812 meters] WNW)

General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Wed Mar 29 15:46:08 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22_S5.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:08 2023 GENERAL
Page 1

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	2.85E-06	1.80E-03
Pu-239	M	1.000	2.85E-06	1.80E-03
Am-241	M	1.000	2.85E-06	1.80E-03
Sr-90	M	1.000	2.85E-06	1.80E-03
Cs-137	F	1.000	2.85E-06	1.80E-03
U-233	M	1.000	2.85E-06	1.80E-03
U-238	M	1.000	2.85E-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	1.00E-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
ENTERED 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

Utility Shaft Construction Office
(0.5 miles [812 meters] WNW)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Wed Mar 29 15:46:08 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22_S5.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:08 2023 WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.190	2.910	3.350	3.000	2.510	2.500	0.000	0.074
NNW	2.300	3.160	3.590	3.880	3.580	3.080	0.000	0.117
NW	2.310	3.620	3.690	4.470	4.120	3.530	0.000	0.182
WNW	2.140	2.990	2.710	3.570	4.010	3.670	0.000	0.119
W	1.930	2.250	2.500	4.140	4.420	3.750	0.000	0.068
WSW	1.770	2.840	2.820	4.100	3.890	3.270	0.000	0.052
SW	1.760	2.380	2.470	4.020	3.330	2.890	0.000	0.051
SSW	1.760	2.700	2.930	3.420	3.250	3.300	0.000	0.040
S	1.630	2.940	4.270	2.880	3.400	2.660	0.000	0.030
SSE	1.740	2.650	3.700	3.630	3.550	4.100	0.000	0.027
SE	1.590	2.220	3.140	3.660	3.130	3.080	0.000	0.023
ESE	1.490	2.240	2.600	3.090	2.370	0.000	0.000	0.021
E	1.570	2.840	4.170	5.590	4.670	1.740	0.000	0.041
ENE	1.720	2.770	3.700	4.890	3.420	0.770	0.000	0.052
NE	1.790	2.470	3.440	3.950	2.330	0.000	0.000	0.050
NNE	2.170	2.920	3.090	2.960	2.500	0.000	0.000	0.053

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	3.200	3.950	4.520	4.320	3.000	2.810	0.000
NNW	3.270	4.300	4.670	5.290	4.390	3.390	0.000
NW	3.350	4.760	5.050	5.610	4.700	3.790	0.000
WNW	3.140	4.320	4.270	4.700	4.510	4.020	0.000
W	2.930	3.500	3.940	5.600	5.170	4.020	0.000
WSW	2.640	3.770	4.120	5.750	4.850	3.730	0.000
SW	2.760	3.720	3.680	5.680	4.490	3.490	0.000
SSW	2.590	3.900	4.550	5.110	4.170	3.750	0.000
S	2.480	4.900	5.750	3.930	3.790	3.620	0.000
SSE	2.670	4.170	5.400	5.200	4.050	4.530	0.000
SE	2.390	3.100	4.230	5.010	3.800	3.290	0.000
ESE	2.370	3.110	3.890	5.140	3.460	0.000	0.000
E	2.390	4.130	5.780	7.550	6.010	2.570	0.000
ENE	2.640	4.260	5.610	6.490	4.060	0.770	0.000
NE	2.660	3.760	4.990	5.490	3.430	0.000	0.000
NNE	2.910	3.890	4.250	4.290	3.110	0.000	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2159	0.1271	0.2291	0.2947	0.1239	0.0093	0.0000
NNW	0.1247	0.0790	0.1525	0.3397	0.2813	0.0228	0.0000
NW	0.0767	0.0489	0.0884	0.3289	0.4081	0.0490	0.0000
WNW	0.0872	0.0423	0.0695	0.2374	0.4962	0.0675	0.0000
W	0.1159	0.0524	0.0833	0.3532	0.3765	0.0187	0.0000
WSW	0.1375	0.0601	0.1022	0.3766	0.2901	0.0335	0.0000
SW	0.1276	0.0560	0.1055	0.3996	0.2776	0.0337	0.0000
SSW	0.1472	0.0813	0.1318	0.3815	0.2126	0.0457	0.0000
S	0.1718	0.1365	0.4241	0.2127	0.0439	0.0110	0.0000
SSE	0.2015	0.1144	0.2769	0.2907	0.1111	0.0055	0.0000
SE	0.2694	0.1265	0.1945	0.3118	0.0914	0.0065	0.0000
ESE	0.2777	0.1055	0.2139	0.3036	0.0993	0.0000	0.0000
E	0.2103	0.0821	0.1562	0.3801	0.1683	0.0029	0.0000
ENE	0.2138	0.1133	0.1762	0.4396	0.0565	0.0006	0.0000
NE	0.2882	0.1217	0.2225	0.3454	0.0222	0.0000	0.0000
NNE	0.2863	0.1416	0.2753	0.2723	0.0244	0.0000	0.0000
TOTAL	0.1543	0.0806	0.1513	0.3268	0.2594	0.0276	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 18.1 degrees C
291.22 K
Precipitation: 28.5 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: 4.551 m/s

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

Utility Shaft Construction Office
(0.5 miles [812 meters] WNW)
Dose and Risk Summaries

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 Mar 29 15:46:08 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22_S5.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:08 2023 SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenals	3.95E-05
UB_Wall	4.14E-05
Bone_Sur	1.20E-03
Brain	3.71E-05
Breasts	3.83E-05
St_Wall	3.95E-05
SI_Wall	4.01E-05
ULI_Wall	4.18E-05
LLI_Wall	4.80E-05
Kidneys	4.39E-05
Liver	1.32E-04
Muscle	4.08E-05
Ovaries	5.93E-05
Pancreas	3.96E-05
R_Marrow	1.04E-04
Skin	1.41E-04
Spleen	3.98E-05
Testes	5.92E-05
Thymus	3.90E-05
Thyroid	4.09E-05
GB_Wall	3.93E-05
Ht_Wall	4.00E-05
Uterus	4.06E-05
ET_Reg	4.14E-05
Lung	5.97E-05
Effectiv	7.20E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	2.48E-05
INHALATION	2.73E-05
AIR IMMERSION	8.05E-10
GROUND SURFACE	1.99E-05
INTERNAL	5.21E-05
EXTERNAL	1.99E-05
TOTAL	7.20E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	2.65E-06
U-234	5.39E-14
Th-230	1.51E-17
Ra-226	1.51E-18
Rn-222	8.40E-20
Po-218	1.50E-24
Pb-214	5.49E-17
At-218	5.64E-24
Bi-214	3.21E-16
Rn-218	3.25E-26
Po-214	1.78E-20
Tl-210	1.25E-19
Pb-210	1.87E-19
Bi-210	3.02E-18
Hg-206	1.80E-25
Po-210	7.73E-22
Tl-206	7.06E-24
Pu-239	3.20E-06
U-235m	3.52E-18
U-235	2.56E-15
Th-231	2.61E-16
Pa-231	3.43E-19
Ac-227	1.02E-21
Th-227	4.84E-19
Fr-223	4.57E-21
Ra-223	5.41E-19
Rn-219	2.34E-19
At-219	0.00E+00
Bi-215	1.00E-24
Po-215	7.16E-22
Pb-211	4.60E-19
Bi-211	1.90E-19
Tl-207	2.38E-19
Po-211	9.13E-23
Am-241	2.18E-05
Np-237	1.08E-12
Pa-233	8.94E-12
U-233	2.96E-07
Th-229	1.88E-10
Ra-225	2.66E-11
Ac-225	3.18E-11
Fr-221	6.49E-11
At-217	5.48E-13
Bi-213	3.96E-10
Po-213	8.43E-14
Tl-209	1.02E-10
Pb-209	7.70E-12
Sr-90	3.99E-06
Y-90	5.43E-07

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Cs-137	2.02E-05
Ba-137m	1.91E-05
U-238	1.89E-07
Th-234	4.79E-09
Pa-234m	6.54E-08
Pa-234	1.29E-09
TOTAL	7.20E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	4.05E-13
Stomach	1.49E-12
Colon	4.29E-12
Liver	1.59E-12
LUNG	6.23E-12
Bone	7.33E-13
Skin	1.38E-13
Breast	1.59E-12
Ovary	6.85E-13
Bladder	9.98E-13
Kidneys	2.25E-13
Thyroid	1.16E-13
Leukemia	4.05E-12
Residual	5.46E-12
Total	2.80E-11
TOTAL	2.80E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.26E-11
INHALATION	4.95E-12
AIR IMMERSION	4.38E-16
GROUND SURFACE	1.05E-11
INTERNAL	1.75E-11
EXTERNAL	1.05E-11
TOTAL	2.80E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	4.76E-13
U-234	1.86E-20
Th-230	6.41E-24
Ra-226	8.20E-25
Rn-222	4.58E-26
Po-218	6.71E-31
Pb-214	2.93E-23
At-218	6.95E-31
Bi-214	1.69E-22
Rn-218	1.78E-32
Po-214	9.75E-27
Tl-210	6.68E-26
Pb-210	8.38E-26
Bi-210	3.35E-25
Hg-206	7.96E-32
Po-210	4.24E-28
Tl-206	7.93E-31
Pu-239	5.23E-13
U-235m	2.56E-24
U-235	1.39E-21
Th-231	1.19E-22
Pa-231	1.79E-25
Ac-227	3.80E-28
Th-227	2.62E-25
Fr-223	1.70E-27
Ra-223	2.92E-25
Rn-219	1.28E-25
At-219	0.00E+00
Bi-215	4.47E-31
Po-215	3.93E-28
Pb-211	1.65E-25
Bi-211	1.04E-25
Tl-207	3.06E-26
Po-211	5.00E-29
Am-241	3.59E-12
Np-237	5.32E-19
Pa-233	4.82E-18
U-233	2.91E-13
Th-229	9.92E-17
Ra-225	1.20E-17
Ac-225	1.68E-17
Fr-221	3.52E-17
At-217	2.99E-19
Bi-213	1.71E-16
Po-213	4.61E-20
Tl-209	5.45E-17
Pb-209	1.01E-18
Sr-90	2.34E-12
Y-90	6.47E-14
Cs-137	1.02E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Ba-137m	1.03E-11
U-238	1.84E-13
Th-234	2.48E-15
Pa-234m	1.15E-14
Pa-234	7.01E-16
TOTAL	2.80E-11

Wed Mar 29 15:46:08 2023 SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	1.2E-04	7.9E-05	7.0E-05	6.2E-05	5.4E-05	4.8E-05	4.0E-05
NNW	1.8E-04	1.2E-04	1.1E-04	9.8E-05	8.7E-05	7.8E-05	6.4E-05
NW	2.4E-04	1.8E-04	1.6E-04	1.5E-04	1.3E-04	1.2E-04	1.0E-04
WNW	1.6E-04	1.2E-04	1.1E-04	1.0E-04	9.3E-05	8.5E-05	7.2E-05
W	1.1E-04	7.4E-05	6.6E-05	5.9E-05	5.2E-05	4.7E-05	3.8E-05
WSW	8.5E-05	5.8E-05	5.1E-05	4.6E-05	4.0E-05	3.6E-05	3.0E-05
SW	8.7E-05	6.0E-05	5.4E-05	4.8E-05	4.2E-05	3.8E-05	3.1E-05
SSW	6.9E-05	4.6E-05	4.1E-05	3.7E-05	3.2E-05	2.9E-05	2.4E-05
S	5.1E-05	3.0E-05	2.6E-05	2.2E-05	1.9E-05	1.7E-05	1.4E-05
SSE	4.8E-05	2.9E-05	2.5E-05	2.2E-05	1.9E-05	1.7E-05	1.4E-05
SE	4.3E-05	2.6E-05	2.2E-05	1.9E-05	1.7E-05	1.5E-05	1.2E-05
ESE	4.4E-05	2.7E-05	2.3E-05	2.0E-05	1.8E-05	1.6E-05	1.3E-05
E	6.7E-05	4.0E-05	3.4E-05	3.0E-05	2.6E-05	2.3E-05	1.8E-05
ENE	8.7E-05	5.1E-05	4.4E-05	3.8E-05	3.3E-05	2.9E-05	2.3E-05
NE	9.2E-05	5.2E-05	4.5E-05	3.9E-05	3.3E-05	2.9E-05	2.3E-05
NNE	9.5E-05	5.6E-05	4.8E-05	4.2E-05	3.6E-05	3.2E-05	2.5E-05

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	3.9E-05	3.7E-05	3.2E-05	2.5E-06	2.4E-06	2.3E-06	1.4E-06
NNW	6.3E-05	5.9E-05	5.2E-05	4.3E-06	4.1E-06	3.9E-06	2.5E-06
NW	9.8E-05	9.2E-05	8.1E-05	7.1E-06	6.8E-06	6.6E-06	4.2E-06
WNW	7.1E-05	6.7E-05	5.9E-05	5.4E-06	5.1E-06	5.0E-06	3.1E-06
W	3.8E-05	3.5E-05	3.1E-05	2.5E-06	2.4E-06	2.3E-06	1.4E-06
WSW	2.9E-05	2.7E-05	2.4E-05	2.0E-06	1.9E-06	1.8E-06	1.2E-06
SW	3.1E-05	2.9E-05	2.5E-05	2.1E-06	2.0E-06	1.9E-06	1.2E-06
SSW	2.4E-05	2.2E-05	1.9E-05	1.6E-06	1.5E-06	1.5E-06	9.3E-07
S	1.3E-05	1.2E-05	1.1E-05	7.6E-07	7.3E-07	7.0E-07	4.4E-07
SSE	1.3E-05	1.2E-05	1.1E-05	7.7E-07	7.4E-07	7.1E-07	4.5E-07
SE	1.2E-05	1.1E-05	9.4E-06	6.9E-07	6.6E-07	6.4E-07	4.0E-07
ESE	1.2E-05	1.2E-05	9.9E-06	7.3E-07	7.0E-07	6.7E-07	4.2E-07
E	1.8E-05	1.7E-05	1.4E-05	1.1E-06	1.0E-06	9.7E-07	6.2E-07
ENE	2.2E-05	2.1E-05	1.8E-05	1.3E-06	1.2E-06	1.2E-06	7.4E-07
NE	2.3E-05	2.1E-05	1.8E-05	1.3E-06	1.2E-06	1.2E-06	7.4E-07
NNE	2.5E-05	2.3E-05	2.0E-05	1.4E-06	1.3E-06	1.3E-06	8.0E-07

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	1.2E-06	8.1E-07	5.5E-07	5.1E-07	1.3E-07	7.7E-08
NNW	2.0E-06	1.4E-06	9.5E-07	8.8E-07	2.4E-07	1.3E-07
NW	3.3E-06	2.3E-06	1.6E-06	1.5E-06	4.1E-07	2.3E-07
WNW	2.5E-06	1.8E-06	1.2E-06	1.1E-06	3.1E-07	1.8E-07
W	1.1E-06	8.1E-07	5.6E-07	5.1E-07	1.4E-07	8.1E-08
WSW	9.2E-07	6.5E-07	4.4E-07	4.1E-07	1.1E-07	6.3E-08
SW	9.7E-07	6.9E-07	4.7E-07	4.3E-07	1.2E-07	6.5E-08
SSW	7.4E-07	5.2E-07	3.6E-07	3.3E-07	8.7E-08	4.9E-08
S	3.5E-07	2.5E-07	1.7E-07	1.5E-07	4.2E-08	2.5E-08
SSE	3.6E-07	2.5E-07	1.7E-07	1.6E-07	4.4E-08	2.6E-08
SE	3.3E-07	2.3E-07	1.6E-07	1.5E-07	4.0E-08	2.4E-08
ESE	3.4E-07	2.4E-07	1.6E-07	1.5E-07	4.1E-08	2.4E-08
E	5.0E-07	3.5E-07	2.4E-07	2.2E-07	6.2E-08	3.7E-08
ENE	5.9E-07	4.2E-07	2.8E-07	2.6E-07	7.1E-08	4.2E-08
NE	5.9E-07	4.2E-07	2.8E-07	2.6E-07	7.1E-08	4.3E-08
NNE	6.4E-07	4.5E-07	3.0E-07	2.8E-07	7.6E-08	4.5E-08

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

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	4.8E-11	3.1E-11	2.7E-11	2.4E-11	2.1E-11	1.9E-11	1.6E-11
NNW	6.8E-11	4.8E-11	4.3E-11	3.8E-11	3.4E-11	3.0E-11	2.5E-11
NW	9.3E-11	6.9E-11	6.3E-11	5.7E-11	5.1E-11	4.6E-11	3.9E-11
WNW	6.0E-11	4.8E-11	4.4E-11	4.0E-11	3.6E-11	3.3E-11	2.8E-11
W	4.1E-11	2.9E-11	2.6E-11	2.3E-11	2.0E-11	1.8E-11	1.5E-11
WSW	3.3E-11	2.2E-11	2.0E-11	1.8E-11	1.6E-11	1.4E-11	1.2E-11
SW	3.4E-11	2.3E-11	2.1E-11	1.9E-11	1.6E-11	1.5E-11	1.2E-11
SSW	2.7E-11	1.8E-11	1.6E-11	1.4E-11	1.3E-11	1.1E-11	9.4E-12
S	2.0E-11	1.2E-11	1.0E-11	8.7E-12	7.5E-12	6.6E-12	5.3E-12
SSE	1.9E-11	1.1E-11	9.8E-12	8.6E-12	7.4E-12	6.6E-12	5.3E-12
SE	1.7E-11	1.0E-11	8.7E-12	7.6E-12	6.6E-12	5.8E-12	4.7E-12
ESE	1.7E-11	1.0E-11	9.1E-12	8.0E-12	6.9E-12	6.1E-12	5.0E-12
E	2.6E-11	1.5E-11	1.3E-11	1.2E-11	1.0E-11	8.9E-12	7.1E-12
ENE	3.4E-11	2.0E-11	1.7E-11	1.5E-11	1.3E-11	1.1E-11	9.0E-12
NE	3.6E-11	2.0E-11	1.8E-11	1.5E-11	1.3E-11	1.2E-11	9.2E-12
NNE	3.7E-11	2.2E-11	1.9E-11	1.6E-11	1.4E-11	1.3E-11	1.0E-11

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	1.5E-11	1.4E-11	1.2E-11	1.0E-12	9.7E-13	9.4E-13	5.9E-13
NNW	2.5E-11	2.3E-11	2.0E-11	1.7E-12	1.6E-12	1.6E-12	1.0E-12
NW	3.8E-11	3.6E-11	3.1E-11	2.8E-12	2.7E-12	2.6E-12	1.7E-12
WNW	2.8E-11	2.6E-11	2.3E-11	2.1E-12	2.0E-12	2.0E-12	1.2E-12
W	1.5E-11	1.4E-11	1.2E-11	9.9E-13	9.5E-13	9.1E-13	5.8E-13
WSW	1.1E-11	1.1E-11	9.3E-12	7.9E-13	7.6E-13	7.3E-13	4.6E-13
SW	1.2E-11	1.1E-11	9.8E-12	8.4E-13	8.1E-13	7.8E-13	4.9E-13
SSW	9.2E-12	8.6E-12	7.5E-12	6.4E-13	6.2E-13	5.9E-13	3.8E-13
S	5.2E-12	4.9E-12	4.2E-12	3.1E-13	3.0E-13	2.9E-13	1.8E-13
SSE	5.2E-12	4.8E-12	4.2E-12	3.2E-13	3.0E-13	2.9E-13	1.8E-13
SE	4.6E-12	4.3E-12	3.7E-12	2.8E-13	2.7E-13	2.6E-13	1.7E-13
ESE	4.9E-12	4.5E-12	3.9E-12	3.0E-13	2.9E-13	2.8E-13	1.8E-13
E	7.0E-12	6.5E-12	5.6E-12	4.3E-13	4.1E-13	4.0E-13	2.5E-13
ENE	8.8E-12	8.2E-12	7.0E-12	5.2E-13	5.0E-13	4.8E-13	3.1E-13
NE	9.0E-12	8.4E-12	7.1E-12	5.2E-13	5.0E-13	4.8E-13	3.1E-13
NNE	9.8E-12	9.1E-12	7.8E-12	5.7E-13	5.5E-13	5.3E-13	3.3E-13

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	4.7E-13	3.4E-13	2.3E-13	2.1E-13	5.7E-14	3.3E-14
NNW	7.9E-13	5.6E-13	3.9E-13	3.6E-13	9.7E-14	5.6E-14
NW	1.3E-12	9.4E-13	6.5E-13	6.0E-13	1.7E-13	9.4E-14
WNW	9.9E-13	7.1E-13	4.9E-13	4.6E-13	1.3E-13	7.2E-14
W	4.6E-13	3.3E-13	2.3E-13	2.1E-13	5.8E-14	3.4E-14
WSW	3.7E-13	2.6E-13	1.8E-13	1.7E-13	4.6E-14	2.6E-14
SW	3.9E-13	2.8E-13	1.9E-13	1.8E-13	4.8E-14	2.7E-14
SSW	3.0E-13	2.1E-13	1.5E-13	1.3E-13	3.6E-14	2.0E-14
S	1.5E-13	1.0E-13	7.1E-14	6.5E-14	1.8E-14	1.1E-14
SSE	1.5E-13	1.1E-13	7.2E-14	6.7E-14	1.9E-14	1.1E-14
SE	1.4E-13	9.7E-14	6.7E-14	6.1E-14	1.7E-14	1.0E-14
ESE	1.4E-13	1.0E-13	6.9E-14	6.3E-14	1.7E-14	1.0E-14
E	2.1E-13	1.5E-13	1.0E-13	9.3E-14	2.6E-14	1.6E-14
ENE	2.5E-13	1.8E-13	1.2E-13	1.1E-13	3.0E-14	1.8E-14
NE	2.5E-13	1.8E-13	1.2E-13	1.1E-13	3.1E-14	1.9E-14
NNE	2.7E-13	1.9E-13	1.3E-13	1.2E-13	3.3E-14	2.0E-14

Utility Shaft Construction Office
(0.5 miles [812 meters] WNW)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Wed Mar 29 15:46:08 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22_S5.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:08 2023 CHIQ
Page 1

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	330	490	539	592	652	707	812
N	3.818E-06	2.386E-06	2.105E-06	1.852E-06	1.616E-06	1.437E-06	1.167E-06
NNW	5.627E-06	3.792E-06	3.379E-06	2.998E-06	2.634E-06	2.353E-06	1.924E-06
NW	7.779E-06	5.616E-06	5.068E-06	4.546E-06	4.037E-06	3.636E-06	3.012E-06
WNW	5.091E-06	3.904E-06	3.562E-06	3.227E-06	2.890E-06	2.620E-06	2.191E-06
W	3.400E-06	2.290E-06	2.036E-06	1.802E-06	1.578E-06	1.406E-06	1.144E-06
WSW	2.686E-06	1.772E-06	1.573E-06	1.391E-06	1.219E-06	1.087E-06	8.874E-07
SW	2.754E-06	1.845E-06	1.643E-06	1.457E-06	1.280E-06	1.144E-06	9.363E-07
SSW	2.161E-06	1.414E-06	1.256E-06	1.112E-06	9.764E-07	8.722E-07	7.143E-07
S	1.549E-06	8.794E-07	7.596E-07	6.556E-07	5.617E-07	4.924E-07	3.916E-07
SSE	1.477E-06	8.634E-07	7.497E-07	6.498E-07	5.587E-07	4.909E-07	3.914E-07
SE	1.311E-06	7.627E-07	6.616E-07	5.730E-07	4.923E-07	4.323E-07	3.445E-07
ESE	1.343E-06	7.950E-07	6.921E-07	6.014E-07	5.182E-07	4.560E-07	3.643E-07
E	2.044E-06	1.181E-06	1.022E-06	8.821E-07	7.556E-07	6.619E-07	5.253E-07
ENE	2.667E-06	1.504E-06	1.296E-06	1.116E-06	9.529E-07	8.329E-07	6.589E-07
NE	2.788E-06	1.544E-06	1.325E-06	1.137E-06	9.677E-07	8.437E-07	6.648E-07
NNE	2.911E-06	1.660E-06	1.433E-06	1.235E-06	1.056E-06	9.234E-07	7.310E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.145E-06	1.068E-06	9.211E-07	6.416E-08	6.143E-08	5.890E-08	3.595E-08
NNW	1.889E-06	1.765E-06	1.527E-06	1.146E-07	1.098E-07	1.054E-07	6.496E-08
NW	2.961E-06	2.777E-06	2.421E-06	1.964E-07	1.884E-07	1.809E-07	1.125E-07
WNW	2.156E-06	2.027E-06	1.775E-06	1.483E-07	1.423E-07	1.367E-07	8.521E-08
W	1.123E-06	1.047E-06	9.030E-07	6.658E-08	6.383E-08	6.126E-08	3.787E-08
WSW	8.712E-07	8.136E-07	7.035E-07	5.282E-08	5.064E-08	4.861E-08	3.009E-08
SW	9.195E-07	8.595E-07	7.446E-07	5.654E-08	5.420E-08	5.202E-08	3.213E-08
SSW	7.015E-07	6.559E-07	5.685E-07	4.280E-08	4.102E-08	3.937E-08	2.427E-08
S	3.837E-07	3.556E-07	3.031E-07	1.859E-08	1.777E-08	1.702E-08	1.024E-08
SSE	3.835E-07	3.556E-07	3.032E-07	1.916E-08	1.834E-08	1.758E-08	1.070E-08
SE	3.376E-07	3.130E-07	2.669E-07	1.675E-08	1.604E-08	1.538E-08	9.427E-09
ESE	3.570E-07	3.312E-07	2.827E-07	1.780E-08	1.705E-08	1.634E-08	9.981E-09
E	5.146E-07	4.766E-07	4.056E-07	2.626E-08	2.517E-08	2.416E-08	1.494E-08
ENE	6.452E-07	5.970E-07	5.070E-07	3.113E-08	2.980E-08	2.857E-08	1.746E-08
NE	6.508E-07	6.014E-07	5.095E-07	2.974E-08	2.846E-08	2.727E-08	1.659E-08
NNE	7.159E-07	6.625E-07	5.627E-07	3.315E-08	3.170E-08	3.035E-08	1.828E-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	8850	11520	15610	16670	47000	70000
N	2.826E-08	1.950E-08	1.296E-08	1.186E-08	2.917E-09	1.600E-09
NNW	5.109E-08	3.559E-08	2.404E-08	2.207E-08	5.668E-09	3.136E-09
NW	8.864E-08	6.225E-08	4.258E-08	3.919E-08	1.038E-08	5.763E-09
WNW	6.721E-08	4.740E-08	3.262E-08	3.007E-08	8.071E-09	4.470E-09
W	2.982E-08	2.084E-08	1.414E-08	1.300E-08	3.411E-09	1.928E-09
WSW	2.369E-08	1.654E-08	1.119E-08	1.027E-08	2.651E-09	1.470E-09
SW	2.528E-08	1.761E-08	1.189E-08	1.091E-08	2.774E-09	1.512E-09
SSW	1.910E-08	1.327E-08	8.906E-09	8.165E-09	2.045E-09	1.112E-09
S	8.038E-09	5.503E-09	3.617E-09	3.302E-09	8.234E-10	4.705E-10
SSE	8.421E-09	5.813E-09	3.863E-09	3.535E-09	8.982E-10	5.145E-10
SE	7.464E-09	5.181E-09	3.457E-09	3.166E-09	8.050E-10	4.581E-10
ESE	7.862E-09	5.432E-09	3.608E-09	3.301E-09	8.211E-10	4.593E-10
E	1.182E-08	8.247E-09	5.552E-09	5.096E-09	1.331E-09	7.672E-10
ENE	1.379E-08	9.492E-09	6.248E-09	5.707E-09	1.404E-09	8.035E-10
NE	1.311E-08	9.016E-09	5.920E-09	5.405E-09	1.334E-09	7.697E-10
NNE	1.436E-08	9.793E-09	6.380E-09	5.814E-09	1.413E-09	8.141E-10

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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	330	490	539	592	652	707	812
N	3.501E-06	2.230E-06	1.977E-06	1.749E-06	1.534E-06	1.369E-06	1.120E-06
NNW	5.034E-06	3.513E-06	3.155E-06	2.819E-06	2.493E-06	2.239E-06	1.845E-06
NW	6.816E-06	5.141E-06	4.681E-06	4.233E-06	3.786E-06	3.430E-06	2.866E-06
WNW	4.367E-06	3.521E-06	3.246E-06	2.968E-06	2.682E-06	2.448E-06	2.068E-06
W	3.034E-06	2.130E-06	1.910E-06	1.702E-06	1.501E-06	1.344E-06	1.102E-06
WSW	2.417E-06	1.653E-06	1.478E-06	1.315E-06	1.159E-06	1.038E-06	8.529E-07
SW	2.468E-06	1.713E-06	1.537E-06	1.372E-06	1.213E-06	1.089E-06	8.975E-07
SSW	1.951E-06	1.316E-06	1.177E-06	1.048E-06	9.249E-07	8.298E-07	6.840E-07
S	1.452E-06	8.411E-07	7.295E-07	6.319E-07	5.433E-07	4.776E-07	3.814E-07
SSE	1.378E-06	8.227E-07	7.178E-07	6.249E-07	5.397E-07	4.758E-07	3.813E-07
SE	1.221E-06	7.266E-07	6.333E-07	5.509E-07	4.754E-07	4.188E-07	3.354E-07
ESE	1.246E-06	7.542E-07	6.599E-07	5.761E-07	4.987E-07	4.405E-07	3.540E-07
E	1.917E-06	1.135E-06	9.861E-07	8.551E-07	7.353E-07	6.460E-07	5.149E-07
ENE	2.516E-06	1.449E-06	1.254E-06	1.083E-06	9.286E-07	8.140E-07	6.466E-07
NE	2.634E-06	1.490E-06	1.284E-06	1.106E-06	9.443E-07	8.255E-07	6.530E-07
NNE	2.717E-06	1.588E-06	1.377E-06	1.192E-06	1.024E-06	8.983E-07	7.146E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.100E-06	1.028E-06	8.898E-07	6.376E-08	6.107E-08	5.855E-08	3.580E-08
NNW	1.812E-06	1.697E-06	1.475E-06	1.139E-07	1.092E-07	1.048E-07	6.469E-08
NW	2.819E-06	2.650E-06	2.322E-06	1.949E-07	1.870E-07	1.796E-07	1.119E-07
WNW	2.036E-06	1.920E-06	1.692E-06	1.471E-07	1.412E-07	1.356E-07	8.474E-08
W	1.082E-06	1.012E-06	8.764E-07	6.628E-08	6.355E-08	6.100E-08	3.776E-08
WSW	8.379E-07	7.840E-07	6.806E-07	5.250E-08	5.035E-08	4.834E-08	2.997E-08
SW	8.819E-07	8.261E-07	7.186E-07	5.616E-08	5.385E-08	5.169E-08	3.199E-08
SSW	6.721E-07	6.296E-07	5.480E-07	4.250E-08	4.075E-08	3.911E-08	2.416E-08
S	3.738E-07	3.469E-07	2.964E-07	1.851E-08	1.770E-08	1.695E-08	1.022E-08
SSE	3.738E-07	3.471E-07	2.969E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08
SE	3.288E-07	3.054E-07	2.611E-07	1.670E-08	1.599E-08	1.533E-08	9.406E-09
ESE	3.471E-07	3.226E-07	2.762E-07	1.775E-08	1.700E-08	1.630E-08	9.966E-09
E	5.045E-07	4.678E-07	3.990E-07	2.619E-08	2.510E-08	2.409E-08	1.491E-08
ENE	6.334E-07	5.868E-07	4.994E-07	3.105E-08	2.973E-08	2.850E-08	1.743E-08
NE	6.395E-07	5.916E-07	5.023E-07	2.970E-08	2.842E-08	2.723E-08	1.658E-08
NNE	7.001E-07	6.488E-07	5.526E-07	3.309E-08	3.164E-08	3.029E-08	1.826E-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	8850	11520	15610	16670	47000	70000
N	2.817E-08	1.945E-08	1.293E-08	1.183E-08	2.915E-09	1.601E-09
NNW	5.092E-08	3.550E-08	2.398E-08	2.202E-08	5.662E-09	3.136E-09
NW	8.826E-08	6.203E-08	4.244E-08	3.907E-08	1.036E-08	5.761E-09
WNW	6.690E-08	4.722E-08	3.251E-08	2.997E-08	8.057E-09	4.469E-09
W	2.975E-08	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	2.362E-08	1.649E-08	1.116E-08	1.025E-08	2.648E-09	1.471E-09
SW	2.519E-08	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.903E-08	1.323E-08	8.881E-09	8.143E-09	2.043E-09	1.112E-09
S	8.022E-09	5.495E-09	3.613E-09	3.298E-09	8.233E-10	4.708E-10
SSE	8.410E-09	5.808E-09	3.860E-09	3.532E-09	8.980E-10	5.146E-10
SE	7.452E-09	5.175E-09	3.453E-09	3.163E-09	8.049E-10	4.582E-10
ESE	7.853E-09	5.429E-09	3.606E-09	3.300E-09	8.214E-10	4.597E-10
E	1.180E-08	8.238E-09	5.546E-09	5.091E-09	1.331E-09	7.674E-10
ENE	1.376E-08	9.477E-09	6.239E-09	5.699E-09	1.403E-09	8.036E-10
NE	1.311E-08	9.014E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	1.435E-08	9.790E-09	6.379E-09	5.814E-09	1.414E-09	8.147E-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	330	490	539	592	652	707	812
N	3.572E-06	2.261E-06	2.002E-06	1.768E-06	1.549E-06	1.381E-06	1.128E-06
NNW	5.201E-06	3.588E-06	3.216E-06	2.867E-06	2.530E-06	2.268E-06	1.865E-06
NW	7.102E-06	5.277E-06	4.791E-06	4.321E-06	3.856E-06	3.487E-06	2.905E-06
WNW	4.560E-06	3.621E-06	3.328E-06	3.035E-06	2.736E-06	2.492E-06	2.099E-06
W	3.147E-06	2.180E-06	1.949E-06	1.733E-06	1.525E-06	1.363E-06	1.115E-06
WSW	2.499E-06	1.688E-06	1.506E-06	1.337E-06	1.177E-06	1.052E-06	8.626E-07
SW	2.550E-06	1.750E-06	1.566E-06	1.395E-06	1.231E-06	1.103E-06	9.077E-07
SSW	2.008E-06	1.342E-06	1.197E-06	1.064E-06	9.379E-07	8.404E-07	6.914E-07
S	1.475E-06	8.497E-07	7.362E-07	6.371E-07	5.473E-07	4.808E-07	3.836E-07
SSE	1.406E-06	8.337E-07	7.263E-07	6.315E-07	5.447E-07	4.797E-07	3.839E-07
SE	1.243E-06	7.355E-07	6.402E-07	5.562E-07	4.794E-07	4.221E-07	3.376E-07
ESE	1.270E-06	7.637E-07	6.673E-07	5.818E-07	5.031E-07	4.439E-07	3.562E-07
E	1.965E-06	1.153E-06	1.000E-06	8.657E-07	7.433E-07	6.522E-07	5.189E-07
ENE	2.567E-06	1.467E-06	1.268E-06	1.094E-06	9.366E-07	8.201E-07	6.506E-07
NE	2.679E-06	1.506E-06	1.296E-06	1.114E-06	9.509E-07	8.306E-07	6.563E-07
NNE	2.762E-06	1.604E-06	1.390E-06	1.202E-06	1.031E-06	9.037E-07	7.181E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.108E-06	1.035E-06	8.950E-07	6.382E-08	6.112E-08	5.860E-08	3.582E-08
NNW	1.832E-06	1.714E-06	1.488E-06	1.140E-07	1.093E-07	1.049E-07	6.475E-08
NW	2.857E-06	2.684E-06	2.348E-06	1.952E-07	1.873E-07	1.799E-07	1.120E-07
WNW	2.066E-06	1.947E-06	1.713E-06	1.474E-07	1.414E-07	1.359E-07	8.484E-08
W	1.095E-06	1.023E-06	8.844E-07	6.637E-08	6.363E-08	6.107E-08	3.779E-08
WSW	8.473E-07	7.923E-07	6.869E-07	5.258E-08	5.042E-08	4.840E-08	2.999E-08
SW	8.917E-07	8.348E-07	7.252E-07	5.624E-08	5.393E-08	5.176E-08	3.202E-08
SSW	6.793E-07	6.360E-07	5.529E-07	4.257E-08	4.081E-08	3.916E-08	2.418E-08
S	3.759E-07	3.487E-07	2.978E-07	1.853E-08	1.772E-08	1.696E-08	1.022E-08
SSE	3.763E-07	3.493E-07	2.986E-07	1.912E-08	1.830E-08	1.754E-08	1.068E-08
SE	3.309E-07	3.072E-07	2.625E-07	1.671E-08	1.600E-08	1.534E-08	9.410E-09
ESE	3.492E-07	3.245E-07	2.777E-07	1.776E-08	1.701E-08	1.631E-08	9.969E-09
E	5.084E-07	4.712E-07	4.015E-07	2.621E-08	2.512E-08	2.411E-08	1.492E-08
ENE	6.372E-07	5.901E-07	5.019E-07	3.106E-08	2.974E-08	2.851E-08	1.743E-08
NE	6.426E-07	5.944E-07	5.043E-07	2.971E-08	2.843E-08	2.724E-08	1.659E-08
NNE	7.035E-07	6.517E-07	5.547E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-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	8850	11520	15610	16670	47000	70000
N	2.818E-08	1.946E-08	1.293E-08	1.183E-08	2.916E-09	1.601E-09
NNW	5.096E-08	3.552E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	8.834E-08	6.208E-08	4.247E-08	3.910E-08	1.037E-08	5.762E-09
WNW	6.697E-08	4.726E-08	3.254E-08	2.999E-08	8.060E-09	4.469E-09
W	2.977E-08	2.081E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	2.363E-08	1.650E-08	1.117E-08	1.025E-08	2.649E-09	1.471E-09
SW	2.520E-08	1.757E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.904E-08	1.323E-08	8.886E-09	8.147E-09	2.043E-09	1.112E-09
S	8.025E-09	5.496E-09	3.613E-09	3.299E-09	8.233E-10	4.707E-10
SSE	8.412E-09	5.809E-09	3.860E-09	3.533E-09	8.980E-10	5.146E-10
SE	7.454E-09	5.176E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	7.855E-09	5.429E-09	3.607E-09	3.300E-09	8.213E-10	4.596E-10
E	1.181E-08	8.240E-09	5.548E-09	5.092E-09	1.331E-09	7.674E-10
ENE	1.376E-08	9.477E-09	6.239E-09	5.699E-09	1.403E-09	8.036E-10
NE	1.311E-08	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.701E-10
NNE	1.435E-08	9.790E-09	6.379E-09	5.814E-09	1.414E-09	8.146E-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	330	490	539	592	652	707	812
N	3.476E-06	2.227E-06	1.976E-06	1.749E-06	1.535E-06	1.371E-06	1.121E-06
NNW	4.915E-06	3.463E-06	3.116E-06	2.789E-06	2.471E-06	2.221E-06	1.833E-06
NW	6.592E-06	5.039E-06	4.600E-06	4.169E-06	3.738E-06	3.391E-06	2.840E-06
WNW	4.243E-06	3.460E-06	3.197E-06	2.929E-06	2.651E-06	2.423E-06	2.051E-06
W	2.941E-06	2.088E-06	1.877E-06	1.676E-06	1.481E-06	1.329E-06	1.092E-06
WSW	2.352E-06	1.624E-06	1.455E-06	1.297E-06	1.146E-06	1.028E-06	8.460E-07
SW	2.407E-06	1.687E-06	1.516E-06	1.356E-06	1.201E-06	1.079E-06	8.914E-07
SSW	1.913E-06	1.301E-06	1.165E-06	1.038E-06	9.177E-07	8.241E-07	6.802E-07
S	1.441E-06	8.379E-07	7.271E-07	6.302E-07	5.421E-07	4.766E-07	3.808E-07
SSE	1.358E-06	8.154E-07	7.122E-07	6.207E-07	5.365E-07	4.733E-07	3.797E-07
SE	1.209E-06	7.221E-07	6.299E-07	5.483E-07	4.734E-07	4.174E-07	3.345E-07
ESE	1.235E-06	7.502E-07	6.569E-07	5.739E-07	4.971E-07	4.393E-07	3.532E-07
E	1.866E-06	1.115E-06	9.708E-07	8.434E-07	7.265E-07	6.391E-07	5.105E-07
ENE	2.467E-06	1.432E-06	1.241E-06	1.074E-06	9.215E-07	8.084E-07	6.431E-07
NE	2.600E-06	1.479E-06	1.276E-06	1.099E-06	9.396E-07	8.219E-07	6.507E-07
NNE	2.698E-06	1.583E-06	1.373E-06	1.189E-06	1.022E-06	8.967E-07	7.137E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.101E-06	1.029E-06	8.910E-07	6.380E-08	6.111E-08	5.859E-08	3.582E-08
NNW	1.801E-06	1.688E-06	1.468E-06	1.138E-07	1.091E-07	1.047E-07	6.468E-08
NW	2.794E-06	2.629E-06	2.306E-06	1.947E-07	1.868E-07	1.795E-07	1.118E-07
WNW	2.020E-06	1.906E-06	1.681E-06	1.470E-07	1.410E-07	1.355E-07	8.469E-08
W	1.073E-06	1.003E-06	8.700E-07	6.622E-08	6.350E-08	6.095E-08	3.773E-08
WSW	8.311E-07	7.782E-07	6.763E-07	5.247E-08	5.032E-08	4.831E-08	2.995E-08
SW	8.760E-07	8.210E-07	7.149E-07	5.614E-08	5.383E-08	5.168E-08	3.198E-08
SSW	6.685E-07	6.265E-07	5.456E-07	4.249E-08	4.073E-08	3.910E-08	2.416E-08
S	3.732E-07	3.464E-07	2.960E-07	1.851E-08	1.770E-08	1.695E-08	1.022E-08
SSE	3.722E-07	3.458E-07	2.959E-07	1.910E-08	1.828E-08	1.752E-08	1.068E-08
SE	3.279E-07	3.046E-07	2.606E-07	1.669E-08	1.599E-08	1.533E-08	9.406E-09
ESE	3.464E-07	3.220E-07	2.758E-07	1.775E-08	1.700E-08	1.630E-08	9.967E-09
E	5.003E-07	4.642E-07	3.963E-07	2.617E-08	2.509E-08	2.407E-08	1.491E-08
ENE	6.300E-07	5.839E-07	4.973E-07	3.106E-08	2.974E-08	2.851E-08	1.744E-08
NE	6.372E-07	5.897E-07	5.009E-07	2.969E-08	2.841E-08	2.723E-08	1.658E-08
NNE	6.992E-07	6.481E-07	5.520E-07	3.309E-08	3.164E-08	3.030E-08	1.826E-08

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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	8850	11520	15610	16670	47000	70000
N	2.818E-08	1.946E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	5.092E-08	3.550E-08	2.398E-08	2.202E-08	5.663E-09	3.136E-09
NW	8.822E-08	6.201E-08	4.243E-08	3.906E-08	1.036E-08	5.761E-09
WNW	6.688E-08	4.720E-08	3.250E-08	2.996E-08	8.056E-09	4.469E-09
W	2.973E-08	2.079E-08	1.411E-08	1.297E-08	3.408E-09	1.928E-09
WSW	2.361E-08	1.649E-08	1.116E-08	1.025E-08	2.648E-09	1.471E-09
SW	2.518E-08	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.513E-09
SSW	1.903E-08	1.322E-08	8.881E-09	8.143E-09	2.043E-09	1.112E-09
S	8.023E-09	5.495E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	8.409E-09	5.807E-09	3.859E-09	3.532E-09	8.981E-10	5.146E-10
SE	7.452E-09	5.175E-09	3.453E-09	3.163E-09	8.049E-10	4.583E-10
ESE	7.854E-09	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.597E-10
E	1.180E-08	8.236E-09	5.546E-09	5.090E-09	1.331E-09	7.674E-10
ENE	1.377E-08	9.483E-09	6.243E-09	5.703E-09	1.404E-09	8.036E-10
NE	1.311E-08	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	1.435E-08	9.791E-09	6.380E-09	5.815E-09	1.414E-09	8.147E-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	330	490	539	592	652	707	812
N	3.547E-06	2.258E-06	2.001E-06	1.768E-06	1.550E-06	1.383E-06	1.130E-06
NNW	5.082E-06	3.539E-06	3.177E-06	2.837E-06	2.508E-06	2.250E-06	1.853E-06
NW	6.876E-06	5.176E-06	4.710E-06	4.258E-06	3.807E-06	3.448E-06	2.879E-06
WNW	4.437E-06	3.561E-06	3.279E-06	2.996E-06	2.705E-06	2.467E-06	2.082E-06
W	3.053E-06	2.138E-06	1.916E-06	1.707E-06	1.505E-06	1.347E-06	1.104E-06
WSW	2.433E-06	1.660E-06	1.484E-06	1.320E-06	1.163E-06	1.042E-06	8.557E-07
SW	2.489E-06	1.724E-06	1.546E-06	1.379E-06	1.219E-06	1.094E-06	9.016E-07
SSW	1.970E-06	1.326E-06	1.185E-06	1.055E-06	9.308E-07	8.347E-07	6.877E-07
S	1.464E-06	8.466E-07	7.339E-07	6.355E-07	5.461E-07	4.799E-07	3.830E-07
SSE	1.386E-06	8.265E-07	7.208E-07	6.274E-07	5.416E-07	4.773E-07	3.823E-07
SE	1.231E-06	7.310E-07	6.368E-07	5.537E-07	4.775E-07	4.206E-07	3.367E-07
ESE	1.258E-06	7.598E-07	6.644E-07	5.797E-07	5.015E-07	4.428E-07	3.555E-07
E	1.914E-06	1.133E-06	9.845E-07	8.538E-07	7.344E-07	6.453E-07	5.145E-07
ENE	2.518E-06	1.450E-06	1.255E-06	1.084E-06	9.293E-07	8.146E-07	6.470E-07
NE	2.645E-06	1.494E-06	1.287E-06	1.108E-06	9.462E-07	8.270E-07	6.540E-07
NNE	2.744E-06	1.599E-06	1.386E-06	1.199E-06	1.029E-06	9.022E-07	7.172E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.109E-06	1.036E-06	8.964E-07	6.386E-08	6.116E-08	5.864E-08	3.584E-08
NNW	1.821E-06	1.705E-06	1.481E-06	1.140E-07	1.093E-07	1.049E-07	6.474E-08
NW	2.832E-06	2.663E-06	2.332E-06	1.951E-07	1.872E-07	1.798E-07	1.120E-07
WNW	2.050E-06	1.933E-06	1.702E-06	1.472E-07	1.413E-07	1.358E-07	8.480E-08
W	1.085E-06	1.014E-06	8.780E-07	6.631E-08	6.357E-08	6.102E-08	3.777E-08
WSW	8.405E-07	7.865E-07	6.826E-07	5.254E-08	5.039E-08	4.837E-08	2.998E-08
SW	8.859E-07	8.297E-07	7.215E-07	5.622E-08	5.391E-08	5.175E-08	3.201E-08
SSW	6.757E-07	6.329E-07	5.506E-07	4.255E-08	4.079E-08	3.915E-08	2.418E-08
S	3.753E-07	3.483E-07	2.975E-07	1.853E-08	1.772E-08	1.696E-08	1.022E-08
SSE	3.748E-07	3.480E-07	2.976E-07	1.911E-08	1.830E-08	1.753E-08	1.068E-08
SE	3.300E-07	3.064E-07	2.619E-07	1.671E-08	1.600E-08	1.534E-08	9.410E-09
ESE	3.486E-07	3.239E-07	2.772E-07	1.776E-08	1.701E-08	1.631E-08	9.969E-09
E	5.041E-07	4.675E-07	3.988E-07	2.619E-08	2.511E-08	2.409E-08	1.491E-08
ENE	6.338E-07	5.871E-07	4.997E-07	3.107E-08	2.975E-08	2.852E-08	1.744E-08
NE	6.404E-07	5.925E-07	5.029E-07	2.970E-08	2.842E-08	2.724E-08	1.658E-08
NNE	7.026E-07	6.510E-07	5.542E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-08

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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	8850	11520	15610	16670	47000	70000
N	2.819E-08	1.947E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	5.095E-08	3.552E-08	2.399E-08	2.203E-08	5.664E-09	3.136E-09
NW	8.831E-08	6.206E-08	4.246E-08	3.909E-08	1.037E-08	5.762E-09
WNW	6.695E-08	4.724E-08	3.253E-08	2.998E-08	8.059E-09	4.469E-09
W	2.975E-08	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	2.363E-08	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	2.520E-08	1.757E-08	1.186E-08	1.089E-08	2.772E-09	1.512E-09
SSW	1.904E-08	1.323E-08	8.886E-09	8.147E-09	2.043E-09	1.112E-09
S	8.026E-09	5.497E-09	3.613E-09	3.299E-09	8.234E-10	4.707E-10
SSE	8.411E-09	5.809E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	7.454E-09	5.176E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	7.855E-09	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	1.180E-08	8.239E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	1.377E-08	9.483E-09	6.243E-09	5.703E-09	1.404E-09	8.036E-10
NE	1.311E-08	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.701E-10
NNE	1.435E-08	9.791E-09	6.380E-09	5.814E-09	1.414E-09	8.146E-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	330	490	539	592	652	707	812
N	3.525E-06	2.245E-06	1.990E-06	1.760E-06	1.543E-06	1.377E-06	1.125E-06
NNW	5.053E-06	3.524E-06	3.165E-06	2.827E-06	2.500E-06	2.244E-06	1.849E-06
NW	6.836E-06	5.154E-06	4.692E-06	4.243E-06	3.795E-06	3.437E-06	2.872E-06
WNW	4.398E-06	3.539E-06	3.261E-06	2.981E-06	2.693E-06	2.457E-06	2.075E-06
W	3.039E-06	2.132E-06	1.911E-06	1.703E-06	1.502E-06	1.345E-06	1.103E-06
WSW	2.422E-06	1.655E-06	1.480E-06	1.317E-06	1.161E-06	1.039E-06	8.540E-07
SW	2.476E-06	1.717E-06	1.541E-06	1.375E-06	1.215E-06	1.091E-06	8.994E-07
SSW	1.960E-06	1.321E-06	1.181E-06	1.051E-06	9.277E-07	8.322E-07	6.858E-07
S	1.458E-06	8.439E-07	7.318E-07	6.338E-07	5.448E-07	4.788E-07	3.822E-07
SSE	1.381E-06	8.243E-07	7.191E-07	6.260E-07	5.405E-07	4.765E-07	3.818E-07
SE	1.226E-06	7.288E-07	6.351E-07	5.523E-07	4.764E-07	4.197E-07	3.361E-07
ESE	1.252E-06	7.570E-07	6.622E-07	5.779E-07	5.002E-07	4.417E-07	3.548E-07
E	1.912E-06	1.132E-06	9.843E-07	8.537E-07	7.343E-07	6.452E-07	5.144E-07
ENE	2.514E-06	1.449E-06	1.254E-06	1.083E-06	9.286E-07	8.140E-07	6.466E-07
NE	2.638E-06	1.492E-06	1.285E-06	1.106E-06	9.451E-07	8.261E-07	6.534E-07
NNE	2.731E-06	1.594E-06	1.382E-06	1.196E-06	1.026E-06	9.004E-07	7.160E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.105E-06	1.032E-06	8.935E-07	6.382E-08	6.112E-08	5.860E-08	3.583E-08
NNW	1.816E-06	1.701E-06	1.478E-06	1.139E-07	1.092E-07	1.048E-07	6.472E-08
NW	2.825E-06	2.656E-06	2.327E-06	1.950E-07	1.871E-07	1.797E-07	1.119E-07
WNW	2.043E-06	1.926E-06	1.697E-06	1.472E-07	1.412E-07	1.357E-07	8.477E-08
W	1.083E-06	1.013E-06	8.769E-07	6.629E-08	6.356E-08	6.101E-08	3.776E-08
WSW	8.389E-07	7.850E-07	6.814E-07	5.252E-08	5.037E-08	4.835E-08	2.997E-08
SW	8.837E-07	8.278E-07	7.200E-07	5.620E-08	5.388E-08	5.172E-08	3.200E-08
SSW	6.739E-07	6.313E-07	5.493E-07	4.253E-08	4.077E-08	3.913E-08	2.417E-08
S	3.746E-07	3.476E-07	2.969E-07	1.852E-08	1.771E-08	1.696E-08	1.022E-08
SSE	3.742E-07	3.475E-07	2.972E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08
SE	3.294E-07	3.059E-07	2.616E-07	1.670E-08	1.600E-08	1.534E-08	9.408E-09
ESE	3.478E-07	3.233E-07	2.768E-07	1.776E-08	1.700E-08	1.630E-08	9.968E-09
E	5.040E-07	4.675E-07	3.987E-07	2.619E-08	2.510E-08	2.409E-08	1.491E-08
ENE	6.334E-07	5.868E-07	4.995E-07	3.107E-08	2.974E-08	2.851E-08	1.744E-08
NE	6.398E-07	5.920E-07	5.026E-07	2.970E-08	2.842E-08	2.724E-08	1.658E-08
NNE	7.015E-07	6.500E-07	5.534E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-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	8850	11520	15610	16670	47000	70000
N	2.818E-08	1.946E-08	1.294E-08	1.183E-08	2.916E-09	1.601E-09
NNW	5.094E-08	3.551E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	8.828E-08	6.205E-08	4.245E-08	3.908E-08	1.037E-08	5.762E-09
WNW	6.693E-08	4.723E-08	3.252E-08	2.997E-08	8.058E-09	4.469E-09
W	2.975E-08	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	2.362E-08	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	2.519E-08	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.904E-08	1.323E-08	8.884E-09	8.145E-09	2.043E-09	1.112E-09
S	8.024E-09	5.496E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	8.410E-09	5.808E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	7.453E-09	5.175E-09	3.454E-09	3.163E-09	8.049E-10	4.582E-10
ESE	7.854E-09	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	1.180E-08	8.238E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	1.377E-08	9.481E-09	6.241E-09	5.701E-09	1.403E-09	8.036E-10
NE	1.311E-08	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	1.435E-08	9.791E-09	6.380E-09	5.814E-09	1.414E-09	8.147E-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	330	490	539	592	652	707	812
N	3.522E-06	2.247E-06	1.992E-06	1.761E-06	1.544E-06	1.378E-06	1.126E-06
NNW	5.028E-06	3.514E-06	3.157E-06	2.821E-06	2.495E-06	2.241E-06	1.847E-06
NW	6.786E-06	5.132E-06	4.675E-06	4.229E-06	3.785E-06	3.429E-06	2.866E-06
WNW	4.373E-06	3.527E-06	3.252E-06	2.973E-06	2.687E-06	2.452E-06	2.072E-06
W	3.018E-06	2.122E-06	1.904E-06	1.697E-06	1.498E-06	1.341E-06	1.100E-06
WSW	2.407E-06	1.649E-06	1.475E-06	1.313E-06	1.158E-06	1.037E-06	8.525E-07
SW	2.463E-06	1.712E-06	1.536E-06	1.372E-06	1.213E-06	1.089E-06	8.982E-07
SSW	1.952E-06	1.318E-06	1.178E-06	1.049E-06	9.264E-07	8.311E-07	6.851E-07
S	1.456E-06	8.435E-07	7.315E-07	6.336E-07	5.447E-07	4.787E-07	3.822E-07
SSE	1.377E-06	8.228E-07	7.180E-07	6.252E-07	5.399E-07	4.760E-07	3.814E-07
SE	1.224E-06	7.280E-07	6.345E-07	5.519E-07	4.761E-07	4.195E-07	3.359E-07
ESE	1.250E-06	7.564E-07	6.618E-07	5.776E-07	5.000E-07	4.415E-07	3.547E-07
E	1.900E-06	1.127E-06	9.805E-07	8.508E-07	7.321E-07	6.435E-07	5.133E-07
ENE	2.502E-06	1.445E-06	1.251E-06	1.081E-06	9.269E-07	8.127E-07	6.458E-07
NE	2.630E-06	1.489E-06	1.284E-06	1.105E-06	9.441E-07	8.253E-07	6.529E-07
NNE	2.728E-06	1.593E-06	1.381E-06	1.195E-06	1.026E-06	9.002E-07	7.160E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.106E-06	1.033E-06	8.942E-07	6.384E-08	6.113E-08	5.862E-08	3.583E-08
NNW	1.814E-06	1.699E-06	1.477E-06	1.139E-07	1.092E-07	1.048E-07	6.472E-08
NW	2.820E-06	2.651E-06	2.323E-06	1.950E-07	1.871E-07	1.797E-07	1.119E-07
WNW	2.040E-06	1.924E-06	1.695E-06	1.471E-07	1.412E-07	1.357E-07	8.476E-08
W	1.081E-06	1.011E-06	8.754E-07	6.628E-08	6.355E-08	6.100E-08	3.776E-08
WSW	8.375E-07	7.838E-07	6.805E-07	5.252E-08	5.036E-08	4.835E-08	2.997E-08
SW	8.826E-07	8.268E-07	7.193E-07	5.619E-08	5.388E-08	5.172E-08	3.200E-08
SSW	6.732E-07	6.307E-07	5.489E-07	4.253E-08	4.077E-08	3.913E-08	2.417E-08
S	3.746E-07	3.476E-07	2.969E-07	1.852E-08	1.771E-08	1.696E-08	1.022E-08
SSE	3.739E-07	3.473E-07	2.970E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08
SE	3.293E-07	3.058E-07	2.615E-07	1.670E-08	1.600E-08	1.534E-08	9.409E-09
ESE	3.478E-07	3.232E-07	2.767E-07	1.776E-08	1.700E-08	1.630E-08	9.968E-09
E	5.030E-07	4.666E-07	3.981E-07	2.618E-08	2.510E-08	2.409E-08	1.491E-08
ENE	6.326E-07	5.861E-07	4.990E-07	3.107E-08	2.975E-08	2.852E-08	1.744E-08
NE	6.394E-07	5.916E-07	5.023E-07	2.970E-08	2.842E-08	2.723E-08	1.658E-08
NNE	7.014E-07	6.500E-07	5.534E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-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	8850	11520	15610	16670	47000	70000
N	2.819E-08	1.946E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	5.094E-08	3.551E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	8.828E-08	6.205E-08	4.245E-08	3.908E-08	1.037E-08	5.762E-09
WNW	6.692E-08	4.723E-08	3.252E-08	2.997E-08	8.058E-09	4.469E-09
W	2.975E-08	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	2.362E-08	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	2.519E-08	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.904E-08	1.323E-08	8.884E-09	8.145E-09	2.043E-09	1.112E-09
S	8.024E-09	5.496E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	8.410E-09	5.808E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	7.453E-09	5.175E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	7.854E-09	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	1.180E-08	8.238E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	1.377E-08	9.483E-09	6.243E-09	5.702E-09	1.404E-09	8.036E-10
NE	1.311E-08	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	1.435E-08	9.791E-09	6.380E-09	5.815E-09	1.414E-09	8.147E-10

Exclusive Use Area Fence Line

(0.41 miles [652 meters] WNW)

Exclusive Use Area Fence Line
(0.41 miles [652 meters] WNW)
Synopsis Report

C A P 8 8 - P C

Version 4.1

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 Mar 29 15:46:47 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 882220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Effective Dose Equivalent (mrem)
9.35E-05

At This Location: 652 Meters West Northwest
Dataset Name: N_Ind22f.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 652 Meters West Northwest
Lifetime Fatal Cancer Risk: 3.63E-11

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

Organ	Dose Equivalent (mrem)
Adrenals	5.11E-05
UB_Wall	5.36E-05
Bone_Sur	1.56E-03
Brain	4.80E-05
Breasts	4.96E-05
St_Wall	5.12E-05
SI_Wall	5.20E-05
ULI_Wall	5.41E-05
LLI_Wall	6.22E-05
Kidneys	5.69E-05
Liver	1.72E-04
Muscle	5.29E-05
Ovaries	7.70E-05
Pancreas	5.13E-05
R_Marrow	1.35E-04
Skin	1.82E-04
Spleen	5.15E-05
Testes	7.69E-05
Thymus	5.06E-05
Thyroid	5.30E-05
GB_Wall	5.09E-05
Ht_Wall	5.18E-05
Uterus	5.25E-05
ET_Reg	5.37E-05
Lung	7.75E-05
Effectiv	9.35E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 2022

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	6.2E-09	2.4E-09	3.4E-08	4.3E-08
Pu-239	M	1.000	2.4E-08	4.4E-09	2.2E-08	5.0E-08
Am-241	M	1.000	1.8E-07	4.0E-09	2.2E-07	4.1E-07
Sr-90	M	1.000	3.9E-07	2.3E-07	3.3E-07	9.5E-07
Cs-137	F	1.000	2.4E-06	1.1E-06	3.0E-06	6.5E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2022

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
U-233	M	1.000	3.1E-08	1.0E-08	3.3E-08	7.4E-08
U-238	M	1.000	2.3E-08	1.0E-08	2.5E-08	5.8E-08

SITE INFORMATION

Temperature:	18.060	degrees C
Precipitation:	28.500	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):	7.50	15.10	7.27
Diameter (m):	1.80	2.30	4.66
Plume Rise Momentum (m/s): (Exit Velocity)	21.10	5.30	5.49

ADJUSTED 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		

Exclusive Use Area Fence Line
(0.41 miles [652 meters] WNW)
General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Wed Mar 29 15:46:47 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 882220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22f.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:47 2023 GENERAL
Page 1

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	2.85E-06	1.80E-03
Pu-239	M	1.000	2.85E-06	1.80E-03
Am-241	M	1.000	2.85E-06	1.80E-03
Sr-90	M	1.000	2.85E-06	1.80E-03
Cs-137	F	1.000	2.85E-06	1.80E-03
U-233	M	1.000	2.85E-06	1.80E-03
U-238	M	1.000	2.85E-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	1.00E-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
ENTERED 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

Exclusive Use Area Fence Line
(0.41 miles [652 meters] WNW)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Wed Mar 29 15:46:47 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 882220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22f.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:47 2023 WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.190	2.910	3.350	3.000	2.510	2.500	0.000	0.074
NNW	2.300	3.160	3.590	3.880	3.580	3.080	0.000	0.117
NW	2.310	3.620	3.690	4.470	4.120	3.530	0.000	0.182
WNW	2.140	2.990	2.710	3.570	4.010	3.670	0.000	0.119
W	1.930	2.250	2.500	4.140	4.420	3.750	0.000	0.068
WSW	1.770	2.840	2.820	4.100	3.890	3.270	0.000	0.052
SW	1.760	2.380	2.470	4.020	3.330	2.890	0.000	0.051
SSW	1.760	2.700	2.930	3.420	3.250	3.300	0.000	0.040
S	1.630	2.940	4.270	2.880	3.400	2.660	0.000	0.030
SSE	1.740	2.650	3.700	3.630	3.550	4.100	0.000	0.027
SE	1.590	2.220	3.140	3.660	3.130	3.080	0.000	0.023
ESE	1.490	2.240	2.600	3.090	2.370	0.000	0.000	0.021
E	1.570	2.840	4.170	5.590	4.670	1.740	0.000	0.041
ENE	1.720	2.770	3.700	4.890	3.420	0.770	0.000	0.052
NE	1.790	2.470	3.440	3.950	2.330	0.000	0.000	0.050
NNE	2.170	2.920	3.090	2.960	2.500	0.000	0.000	0.053

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	3.200	3.950	4.520	4.320	3.000	2.810	0.000
NNW	3.270	4.300	4.670	5.290	4.390	3.390	0.000
NW	3.350	4.760	5.050	5.610	4.700	3.790	0.000
WNW	3.140	4.320	4.270	4.700	4.510	4.020	0.000
W	2.930	3.500	3.940	5.600	5.170	4.020	0.000
WSW	2.640	3.770	4.120	5.750	4.850	3.730	0.000
SW	2.760	3.720	3.680	5.680	4.490	3.490	0.000
SSW	2.590	3.900	4.550	5.110	4.170	3.750	0.000
S	2.480	4.900	5.750	3.930	3.790	3.620	0.000
SSE	2.670	4.170	5.400	5.200	4.050	4.530	0.000
SE	2.390	3.100	4.230	5.010	3.800	3.290	0.000
ESE	2.370	3.110	3.890	5.140	3.460	0.000	0.000
E	2.390	4.130	5.780	7.550	6.010	2.570	0.000
ENE	2.640	4.260	5.610	6.490	4.060	0.770	0.000
NE	2.660	3.760	4.990	5.490	3.430	0.000	0.000
NNE	2.910	3.890	4.250	4.290	3.110	0.000	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2159	0.1271	0.2291	0.2947	0.1239	0.0093	0.0000
NNW	0.1247	0.0790	0.1525	0.3397	0.2813	0.0228	0.0000
NW	0.0767	0.0489	0.0884	0.3289	0.4081	0.0490	0.0000
WNW	0.0872	0.0423	0.0695	0.2374	0.4962	0.0675	0.0000
W	0.1159	0.0524	0.0833	0.3532	0.3765	0.0187	0.0000
WSW	0.1375	0.0601	0.1022	0.3766	0.2901	0.0335	0.0000
SW	0.1276	0.0560	0.1055	0.3996	0.2776	0.0337	0.0000
SSW	0.1472	0.0813	0.1318	0.3815	0.2126	0.0457	0.0000
S	0.1718	0.1365	0.4241	0.2127	0.0439	0.0110	0.0000
SSE	0.2015	0.1144	0.2769	0.2907	0.1111	0.0055	0.0000
SE	0.2694	0.1265	0.1945	0.3118	0.0914	0.0065	0.0000
ESE	0.2777	0.1055	0.2139	0.3036	0.0993	0.0000	0.0000
E	0.2103	0.0821	0.1562	0.3801	0.1683	0.0029	0.0000
ENE	0.2138	0.1133	0.1762	0.4396	0.0565	0.0006	0.0000
NE	0.2882	0.1217	0.2225	0.3454	0.0222	0.0000	0.0000
NNE	0.2863	0.1416	0.2753	0.2723	0.0244	0.0000	0.0000
TOTAL	0.1543	0.0806	0.1513	0.3268	0.2594	0.0276	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 18.1 degrees C
291.22 K
Precipitation: 28.5 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: 4.551 m/s

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

Exclusive Use Area Fence Line
(0.41 miles [652 meters] WNW)
Dose and Risk Summaries

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 Mar 29 15:46:47 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 882220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22f.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:47 2023 SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenals	5.11E-05
UB_Wall	5.36E-05
Bone_Sur	1.56E-03
Brain	4.80E-05
Breasts	4.96E-05
St_Wall	5.12E-05
SI_Wall	5.20E-05
ULI_Wall	5.41E-05
LLI_Wall	6.22E-05
Kidneys	5.69E-05
Liver	1.72E-04
Muscle	5.29E-05
Ovaries	7.70E-05
Pancreas	5.13E-05
R_Marrow	1.35E-04
Skin	1.82E-04
Spleen	5.15E-05
Testes	7.69E-05
Thymus	5.06E-05
Thyroid	5.30E-05
GB_Wall	5.09E-05
Ht_Wall	5.18E-05
Uterus	5.25E-05
ET_Reg	5.37E-05
Lung	7.75E-05
Effectiv	9.35E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	3.21E-05
INHALATION	3.56E-05
AIR IMMERSION	9.21E-10
GROUND SURFACE	2.58E-05
INTERNAL	6.77E-05
EXTERNAL	2.58E-05
TOTAL	9.35E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	3.49E-06
U-234	7.01E-14
Th-230	1.96E-17
Ra-226	1.96E-18
Rn-222	1.09E-19
Po-218	1.95E-24
Pb-214	7.14E-17
At-218	7.35E-24
Bi-214	4.17E-16
Rn-218	4.25E-26
Po-214	2.31E-20
Tl-210	1.63E-19
Pb-210	2.44E-19
Bi-210	3.94E-18
Hg-206	2.44E-25
Po-210	1.01E-21
Tl-206	9.19E-24
Pu-239	4.15E-06
U-235m	3.74E-18
U-235	3.31E-15
Th-231	3.38E-16
Pa-231	4.44E-19
Ac-227	1.31E-21
Th-227	6.26E-19
Fr-223	5.91E-21
Ra-223	7.00E-19
Rn-219	3.03E-19
At-219	0.00E+00
Bi-215	1.30E-24
Po-215	9.26E-22
Pb-211	5.95E-19
Bi-211	2.45E-19
Tl-207	3.08E-19
Po-211	1.18E-22
Am-241	2.84E-05
Np-237	1.41E-12
Pa-233	1.16E-11
U-233	3.84E-07
Th-229	2.43E-10
Ra-225	3.44E-11
Ac-225	4.12E-11
Fr-221	8.40E-11
At-217	7.09E-13
Bi-213	5.12E-10
Po-213	1.09E-13
Tl-209	1.32E-10
Pb-209	9.96E-12
Sr-90	5.15E-06
Y-90	7.00E-07
Cs-137	2.62E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Ba-137m	2.47E-05
U-238	2.45E-07
Th-234	6.19E-09
Pa-234m	8.46E-08
Pa-234	1.67E-09
TOTAL	9.35E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	5.25E-13
Stomach	1.93E-12
Colon	5.55E-12
Liver	2.07E-12
LUNG	8.09E-12
Bone	9.54E-13
Skin	1.79E-13
Breast	2.06E-12
Ovary	8.89E-13
Bladder	1.29E-12
Kidneys	2.92E-13
Thyroid	1.50E-13
Leukemia	5.24E-12
Residual	7.08E-12
Total	3.63E-11
TOTAL	3.63E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.63E-11
INHALATION	6.45E-12
AIR IMMERSION	5.00E-16
GROUND SURFACE	1.35E-11
INTERNAL	2.27E-11
EXTERNAL	1.35E-11
TOTAL	3.63E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	6.28E-13
U-234	2.42E-20
Th-230	8.34E-24
Ra-226	1.07E-24
Rn-222	5.97E-26
Po-218	8.73E-31
Pb-214	3.82E-23
At-218	9.05E-31
Bi-214	2.20E-22
Rn-218	2.32E-32
Po-214	1.27E-26
Tl-210	8.70E-26
Pb-210	1.09E-25
Bi-210	4.36E-25
Hg-206	1.08E-31
Po-210	5.52E-28
Tl-206	1.03E-30
Pu-239	6.78E-13
U-235m	2.72E-24
U-235	1.79E-21
Th-231	1.54E-22
Pa-231	2.32E-25
Ac-227	4.91E-28
Th-227	3.39E-25
Fr-223	2.20E-27
Ra-223	3.78E-25
Rn-219	1.66E-25
At-219	0.00E+00
Bi-215	5.81E-31
Po-215	5.08E-28
Pb-211	2.13E-25
Bi-211	1.34E-25
Tl-207	3.96E-26
Po-211	6.47E-29
Am-241	4.67E-12
Np-237	6.92E-19
Pa-233	6.26E-18
U-233	3.77E-13
Th-229	1.28E-16
Ra-225	1.56E-17
Ac-225	2.17E-17
Fr-221	4.56E-17
At-217	3.87E-19
Bi-213	2.22E-16
Po-213	5.96E-20
Tl-209	7.05E-17
Pb-209	1.31E-18
Sr-90	3.01E-12
Y-90	8.34E-14
Cs-137	1.32E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Ba-137m	1.34E-11
U-238	2.38E-13
Th-234	3.20E-15
Pa-234m	1.48E-14
Pa-234	9.07E-16
TOTAL	3.63E-11

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

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	1.2E-04	7.9E-05	7.0E-05	6.2E-05	5.4E-05	4.8E-05	3.9E-05
NNW	1.7E-04	1.2E-04	1.1E-04	9.8E-05	8.7E-05	7.8E-05	6.3E-05
NW	2.3E-04	1.8E-04	1.6E-04	1.5E-04	1.3E-04	1.2E-04	9.8E-05
WNW	1.5E-04	1.2E-04	1.1E-04	1.0E-04	9.3E-05	8.5E-05	7.1E-05
W	1.0E-04	7.4E-05	6.6E-05	5.9E-05	5.2E-05	4.7E-05	3.8E-05
WSW	8.1E-05	5.8E-05	5.1E-05	4.6E-05	4.0E-05	3.6E-05	2.9E-05
SW	8.3E-05	6.0E-05	5.4E-05	4.8E-05	4.2E-05	3.8E-05	3.1E-05
SSW	6.6E-05	4.6E-05	4.1E-05	3.7E-05	3.2E-05	2.9E-05	2.4E-05
S	4.8E-05	3.0E-05	2.6E-05	2.2E-05	1.9E-05	1.7E-05	1.3E-05
SSE	4.5E-05	2.9E-05	2.5E-05	2.2E-05	1.9E-05	1.7E-05	1.3E-05
SE	4.0E-05	2.6E-05	2.2E-05	1.9E-05	1.7E-05	1.5E-05	1.2E-05
ESE	4.1E-05	2.7E-05	2.3E-05	2.0E-05	1.8E-05	1.6E-05	1.2E-05
E	6.3E-05	4.0E-05	3.4E-05	3.0E-05	2.6E-05	2.3E-05	1.8E-05
ENE	8.2E-05	5.1E-05	4.4E-05	3.8E-05	3.3E-05	2.9E-05	2.2E-05
NE	8.6E-05	5.2E-05	4.5E-05	3.9E-05	3.3E-05	2.9E-05	2.3E-05
NNE	8.9E-05	5.6E-05	4.8E-05	4.2E-05	3.6E-05	3.2E-05	2.5E-05

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	3.7E-05	3.2E-05	2.5E-06	2.4E-06	2.3E-06	1.4E-06	1.2E-06
NNW	5.9E-05	5.2E-05	4.3E-06	4.1E-06	3.9E-06	2.5E-06	2.0E-06
NW	9.2E-05	8.1E-05	7.1E-06	6.8E-06	6.6E-06	4.2E-06	3.3E-06
WNW	6.7E-05	5.9E-05	5.4E-06	5.1E-06	5.0E-06	3.1E-06	2.5E-06
W	3.5E-05	3.1E-05	2.5E-06	2.4E-06	2.3E-06	1.4E-06	1.1E-06
WSW	2.7E-05	2.4E-05	2.0E-06	1.9E-06	1.8E-06	1.2E-06	9.2E-07
SW	2.9E-05	2.5E-05	2.1E-06	2.0E-06	1.9E-06	1.2E-06	9.7E-07
SSW	2.2E-05	1.9E-05	1.6E-06	1.5E-06	1.5E-06	9.3E-07	7.4E-07
S	1.2E-05	1.1E-05	7.6E-07	7.3E-07	7.0E-07	4.4E-07	3.5E-07
SSE	1.2E-05	1.1E-05	7.7E-07	7.4E-07	7.1E-07	4.5E-07	3.6E-07
SE	1.1E-05	9.4E-06	6.9E-07	6.6E-07	6.4E-07	4.0E-07	3.3E-07
ESE	1.2E-05	9.9E-06	7.3E-07	7.0E-07	6.7E-07	4.2E-07	3.4E-07
E	1.7E-05	1.4E-05	1.1E-06	1.0E-06	9.7E-07	6.2E-07	5.0E-07
ENE	2.1E-05	1.8E-05	1.3E-06	1.2E-06	1.2E-06	7.4E-07	5.9E-07
NE	2.1E-05	1.8E-05	1.3E-06	1.2E-06	1.2E-06	7.4E-07	5.9E-07
NNE	2.3E-05	2.0E-05	1.4E-06	1.3E-06	1.3E-06	8.0E-07	6.4E-07

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

	Distance (m)				
Direction	11520	15610	16670	47000	70000
N	8.1E-07	5.5E-07	5.1E-07	1.3E-07	7.7E-08
NNW	1.4E-06	9.5E-07	8.8E-07	2.4E-07	1.3E-07
NW	2.3E-06	1.6E-06	1.5E-06	4.1E-07	2.3E-07
WNW	1.8E-06	1.2E-06	1.1E-06	3.1E-07	1.8E-07
W	8.1E-07	5.6E-07	5.1E-07	1.4E-07	8.1E-08
WSW	6.5E-07	4.4E-07	4.1E-07	1.1E-07	6.3E-08
SW	6.9E-07	4.7E-07	4.3E-07	1.2E-07	6.5E-08
SSW	5.2E-07	3.6E-07	3.3E-07	8.7E-08	4.9E-08
S	2.5E-07	1.7E-07	1.5E-07	4.2E-08	2.5E-08
SSE	2.5E-07	1.7E-07	1.6E-07	4.4E-08	2.6E-08
SE	2.3E-07	1.6E-07	1.5E-07	4.0E-08	2.4E-08
ESE	2.4E-07	1.6E-07	1.5E-07	4.1E-08	2.4E-08
E	3.5E-07	2.4E-07	2.2E-07	6.2E-08	3.7E-08
ENE	4.2E-07	2.8E-07	2.6E-07	7.1E-08	4.2E-08
NE	4.2E-07	2.8E-07	2.6E-07	7.1E-08	4.3E-08
NNE	4.5E-07	3.0E-07	2.8E-07	7.6E-08	4.5E-08

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

	Distance (m)						
Direction	347	490	539	592	652	707	822
N	4.6E-11	3.1E-11	2.7E-11	2.4E-11	2.1E-11	1.9E-11	1.5E-11
NNW	6.6E-11	4.8E-11	4.3E-11	3.8E-11	3.4E-11	3.0E-11	2.5E-11
NW	9.0E-11	6.9E-11	6.3E-11	5.7E-11	5.1E-11	4.6E-11	3.8E-11
WNW	5.9E-11	4.8E-11	4.4E-11	4.0E-11	3.6E-11	3.3E-11	2.8E-11
W	4.0E-11	2.9E-11	2.6E-11	2.3E-11	2.0E-11	1.8E-11	1.5E-11
WSW	3.1E-11	2.2E-11	2.0E-11	1.8E-11	1.6E-11	1.4E-11	1.1E-11
SW	3.2E-11	2.3E-11	2.1E-11	1.9E-11	1.6E-11	1.5E-11	1.2E-11
SSW	2.5E-11	1.8E-11	1.6E-11	1.4E-11	1.3E-11	1.1E-11	9.2E-12
S	1.9E-11	1.2E-11	1.0E-11	8.7E-12	7.5E-12	6.6E-12	5.2E-12
SSE	1.8E-11	1.1E-11	9.8E-12	8.6E-12	7.4E-12	6.6E-12	5.2E-12
SE	1.6E-11	1.0E-11	8.7E-12	7.6E-12	6.6E-12	5.8E-12	4.6E-12
ESE	1.6E-11	1.0E-11	9.1E-12	8.0E-12	6.9E-12	6.1E-12	4.9E-12
E	2.4E-11	1.5E-11	1.3E-11	1.2E-11	1.0E-11	8.9E-12	7.0E-12
ENE	3.2E-11	2.0E-11	1.7E-11	1.5E-11	1.3E-11	1.1E-11	8.8E-12
NE	3.3E-11	2.0E-11	1.8E-11	1.5E-11	1.3E-11	1.2E-11	9.0E-12
NNE	3.5E-11	2.2E-11	1.9E-11	1.6E-11	1.4E-11	1.3E-11	9.8E-12

	Distance (m)						
Direction	860	945	5100	5250	5400	7500	8850
N	1.4E-11	1.2E-11	1.0E-12	9.7E-13	9.4E-13	5.9E-13	4.7E-13
NNW	2.3E-11	2.0E-11	1.7E-12	1.6E-12	1.6E-12	1.0E-12	7.9E-13
NW	3.6E-11	3.1E-11	2.8E-12	2.7E-12	2.6E-12	1.7E-12	1.3E-12
WNW	2.6E-11	2.3E-11	2.1E-12	2.0E-12	2.0E-12	1.2E-12	9.9E-13
W	1.4E-11	1.2E-11	9.9E-13	9.5E-13	9.1E-13	5.8E-13	4.6E-13
WSW	1.1E-11	9.3E-12	7.9E-13	7.6E-13	7.3E-13	4.6E-13	3.7E-13
SW	1.1E-11	9.8E-12	8.4E-13	8.1E-13	7.8E-13	4.9E-13	3.9E-13
SSW	8.6E-12	7.5E-12	6.4E-13	6.2E-13	5.9E-13	3.8E-13	3.0E-13
S	4.9E-12	4.2E-12	3.1E-13	3.0E-13	2.9E-13	1.8E-13	1.5E-13
SSE	4.8E-12	4.2E-12	3.2E-13	3.0E-13	2.9E-13	1.8E-13	1.5E-13
SE	4.3E-12	3.7E-12	2.8E-13	2.7E-13	2.6E-13	1.7E-13	1.4E-13
ESE	4.5E-12	3.9E-12	3.0E-13	2.9E-13	2.8E-13	1.8E-13	1.4E-13
E	6.5E-12	5.6E-12	4.3E-13	4.1E-13	4.0E-13	2.5E-13	2.1E-13
ENE	8.2E-12	7.0E-12	5.2E-13	5.0E-13	4.8E-13	3.1E-13	2.5E-13
NE	8.4E-12	7.1E-12	5.2E-13	5.0E-13	4.8E-13	3.1E-13	2.5E-13
NNE	9.1E-12	7.8E-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
N	3.4E-13	2.3E-13	2.1E-13	5.7E-14	3.3E-14
NNW	5.6E-13	3.9E-13	3.6E-13	9.7E-14	5.6E-14
NW	9.4E-13	6.5E-13	6.0E-13	1.7E-13	9.4E-14
WNW	7.1E-13	4.9E-13	4.6E-13	1.3E-13	7.2E-14
W	3.3E-13	2.3E-13	2.1E-13	5.8E-14	3.4E-14
WSW	2.6E-13	1.8E-13	1.7E-13	4.6E-14	2.6E-14
SW	2.8E-13	1.9E-13	1.8E-13	4.8E-14	2.7E-14
SSW	2.1E-13	1.5E-13	1.3E-13	3.6E-14	2.0E-14
S	1.0E-13	7.1E-14	6.5E-14	1.8E-14	1.1E-14
SSE	1.1E-13	7.2E-14	6.7E-14	1.9E-14	1.1E-14
SE	9.7E-14	6.7E-14	6.1E-14	1.7E-14	1.0E-14
ESE	1.0E-13	6.9E-14	6.3E-14	1.7E-14	1.0E-14
E	1.5E-13	1.0E-13	9.3E-14	2.6E-14	1.6E-14
ENE	1.8E-13	1.2E-13	1.1E-13	3.0E-14	1.8E-14
NE	1.8E-13	1.2E-13	1.1E-13	3.1E-14	1.9E-14
NNE	1.9E-13	1.3E-13	1.2E-13	3.3E-14	2.0E-14

Exclusive Use Area Fence Line
(0.41 miles [652 meters] WNW)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Wed Mar 29 15:46:47 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 882220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Ind22f.DAT
Dataset Date: Mar 29, 2023 03:46 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd

Wed Mar 29 15:46:47 2023 CHIQ
Page 1

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	3.612E-06	2.386E-06	2.105E-06	1.852E-06	1.616E-06	1.437E-06	1.145E-06
NNW	5.394E-06	3.792E-06	3.379E-06	2.998E-06	2.634E-06	2.353E-06	1.889E-06
NW	7.539E-06	5.616E-06	5.068E-06	4.546E-06	4.037E-06	3.636E-06	2.961E-06
WNW	4.979E-06	3.904E-06	3.562E-06	3.227E-06	2.890E-06	2.620E-06	2.156E-06
W	3.264E-06	2.290E-06	2.036E-06	1.802E-06	1.578E-06	1.406E-06	1.123E-06
WSW	2.568E-06	1.772E-06	1.573E-06	1.391E-06	1.219E-06	1.087E-06	8.712E-07
SW	2.639E-06	1.845E-06	1.643E-06	1.457E-06	1.280E-06	1.144E-06	9.195E-07
SSW	2.062E-06	1.414E-06	1.256E-06	1.112E-06	9.764E-07	8.722E-07	7.015E-07
S	1.448E-06	8.794E-07	7.596E-07	6.556E-07	5.617E-07	4.924E-07	3.837E-07
SSE	1.386E-06	8.634E-07	7.497E-07	6.498E-07	5.587E-07	4.909E-07	3.835E-07
SE	1.229E-06	7.627E-07	6.616E-07	5.730E-07	4.923E-07	4.323E-07	3.376E-07
ESE	1.262E-06	7.950E-07	6.921E-07	6.014E-07	5.182E-07	4.560E-07	3.570E-07
E	1.917E-06	1.181E-06	1.022E-06	8.821E-07	7.556E-07	6.619E-07	5.146E-07
ENE	2.491E-06	1.504E-06	1.296E-06	1.116E-06	9.529E-07	8.329E-07	6.452E-07
NE	2.598E-06	1.544E-06	1.325E-06	1.137E-06	9.677E-07	8.437E-07	6.508E-07
NNE	2.724E-06	1.660E-06	1.433E-06	1.235E-06	1.056E-06	9.234E-07	7.159E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.068E-06	9.211E-07	6.416E-08	6.143E-08	5.890E-08	3.595E-08	2.826E-08
NNW	1.765E-06	1.527E-06	1.146E-07	1.098E-07	1.054E-07	6.496E-08	5.109E-08
NW	2.777E-06	2.421E-06	1.964E-07	1.884E-07	1.809E-07	1.125E-07	8.864E-08
WNW	2.027E-06	1.775E-06	1.483E-07	1.423E-07	1.367E-07	8.521E-08	6.721E-08
W	1.047E-06	9.030E-07	6.658E-08	6.383E-08	6.126E-08	3.787E-08	2.982E-08
WSW	8.136E-07	7.035E-07	5.282E-08	5.064E-08	4.861E-08	3.009E-08	2.369E-08
SW	8.595E-07	7.446E-07	5.654E-08	5.420E-08	5.202E-08	3.213E-08	2.528E-08
SSW	6.559E-07	5.685E-07	4.280E-08	4.102E-08	3.937E-08	2.427E-08	1.910E-08
S	3.556E-07	3.031E-07	1.859E-08	1.777E-08	1.702E-08	1.024E-08	8.038E-09
SSE	3.556E-07	3.032E-07	1.916E-08	1.834E-08	1.758E-08	1.070E-08	8.421E-09
SE	3.130E-07	2.669E-07	1.675E-08	1.604E-08	1.538E-08	9.427E-09	7.464E-09
ESE	3.312E-07	2.827E-07	1.780E-08	1.705E-08	1.634E-08	9.981E-09	7.862E-09
E	4.766E-07	4.056E-07	2.626E-08	2.517E-08	2.416E-08	1.494E-08	1.182E-08
ENE	5.970E-07	5.070E-07	3.113E-08	2.980E-08	2.857E-08	1.746E-08	1.379E-08
NE	6.014E-07	5.095E-07	2.974E-08	2.846E-08	2.727E-08	1.659E-08	1.311E-08
NNE	6.625E-07	5.627E-07	3.315E-08	3.170E-08	3.035E-08	1.828E-08	1.436E-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	1.950E-08	1.296E-08	1.186E-08	2.917E-09	1.600E-09
NNW	3.559E-08	2.404E-08	2.207E-08	5.668E-09	3.136E-09
NW	6.225E-08	4.258E-08	3.919E-08	1.038E-08	5.763E-09
WNW	4.740E-08	3.262E-08	3.007E-08	8.071E-09	4.470E-09
W	2.084E-08	1.414E-08	1.300E-08	3.411E-09	1.928E-09
WSW	1.654E-08	1.119E-08	1.027E-08	2.651E-09	1.470E-09
SW	1.761E-08	1.189E-08	1.091E-08	2.774E-09	1.512E-09
SSW	1.327E-08	8.906E-09	8.165E-09	2.045E-09	1.112E-09
S	5.503E-09	3.617E-09	3.302E-09	8.234E-10	4.705E-10
SSE	5.813E-09	3.863E-09	3.535E-09	8.982E-10	5.145E-10
SE	5.181E-09	3.457E-09	3.166E-09	8.050E-10	4.581E-10
ESE	5.432E-09	3.608E-09	3.301E-09	8.211E-10	4.593E-10
E	8.247E-09	5.552E-09	5.096E-09	1.331E-09	7.672E-10
ENE	9.492E-09	6.248E-09	5.707E-09	1.404E-09	8.035E-10
NE	9.016E-09	5.920E-09	5.405E-09	1.334E-09	7.697E-10
NNE	9.793E-09	6.380E-09	5.814E-09	1.413E-09	8.141E-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	3.320E-06	2.230E-06	1.977E-06	1.749E-06	1.534E-06	1.369E-06	1.100E-06
NNW	4.846E-06	3.513E-06	3.155E-06	2.819E-06	2.493E-06	2.239E-06	1.812E-06
NW	6.642E-06	5.141E-06	4.681E-06	4.233E-06	3.786E-06	3.430E-06	2.819E-06
WNW	4.297E-06	3.521E-06	3.246E-06	2.968E-06	2.682E-06	2.448E-06	2.036E-06
W	2.929E-06	2.130E-06	1.910E-06	1.702E-06	1.501E-06	1.344E-06	1.082E-06
WSW	2.322E-06	1.653E-06	1.478E-06	1.315E-06	1.159E-06	1.038E-06	8.379E-07
SW	2.375E-06	1.713E-06	1.537E-06	1.372E-06	1.213E-06	1.089E-06	8.819E-07
SSW	1.869E-06	1.316E-06	1.177E-06	1.048E-06	9.249E-07	8.298E-07	6.721E-07
S	1.361E-06	8.411E-07	7.295E-07	6.319E-07	5.433E-07	4.776E-07	3.738E-07
SSE	1.297E-06	8.227E-07	7.178E-07	6.249E-07	5.397E-07	4.758E-07	3.738E-07
SE	1.149E-06	7.266E-07	6.333E-07	5.509E-07	4.754E-07	4.188E-07	3.288E-07
ESE	1.175E-06	7.542E-07	6.599E-07	5.761E-07	4.987E-07	4.405E-07	3.471E-07
E	1.804E-06	1.135E-06	9.861E-07	8.551E-07	7.353E-07	6.460E-07	5.045E-07
ENE	2.357E-06	1.449E-06	1.254E-06	1.083E-06	9.286E-07	8.140E-07	6.334E-07
NE	2.462E-06	1.490E-06	1.284E-06	1.106E-06	9.443E-07	8.255E-07	6.395E-07
NNE	2.552E-06	1.588E-06	1.377E-06	1.192E-06	1.024E-06	8.983E-07	7.001E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.028E-06	8.898E-07	6.376E-08	6.107E-08	5.855E-08	3.580E-08	2.817E-08
NNW	1.697E-06	1.475E-06	1.139E-07	1.092E-07	1.048E-07	6.469E-08	5.092E-08
NW	2.650E-06	2.322E-06	1.949E-07	1.870E-07	1.796E-07	1.119E-07	8.826E-08
WNW	1.920E-06	1.692E-06	1.471E-07	1.412E-07	1.356E-07	8.474E-08	6.690E-08
W	1.012E-06	8.764E-07	6.628E-08	6.355E-08	6.100E-08	3.776E-08	2.975E-08
WSW	7.840E-07	6.806E-07	5.250E-08	5.035E-08	4.834E-08	2.997E-08	2.362E-08
SW	8.261E-07	7.186E-07	5.616E-08	5.385E-08	5.169E-08	3.199E-08	2.519E-08
SSW	6.296E-07	5.480E-07	4.250E-08	4.075E-08	3.911E-08	2.416E-08	1.903E-08
S	3.469E-07	2.964E-07	1.851E-08	1.770E-08	1.695E-08	1.022E-08	8.022E-09
SSE	3.471E-07	2.969E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08	8.410E-09
SE	3.054E-07	2.611E-07	1.670E-08	1.599E-08	1.533E-08	9.406E-09	7.452E-09
ESE	3.226E-07	2.762E-07	1.775E-08	1.700E-08	1.630E-08	9.966E-09	7.853E-09
E	4.678E-07	3.990E-07	2.619E-08	2.510E-08	2.409E-08	1.491E-08	1.180E-08
ENE	5.868E-07	4.994E-07	3.105E-08	2.973E-08	2.850E-08	1.743E-08	1.376E-08
NE	5.916E-07	5.023E-07	2.970E-08	2.842E-08	2.723E-08	1.658E-08	1.311E-08
NNE	6.488E-07	5.526E-07	3.309E-08	3.164E-08	3.029E-08	1.826E-08	1.435E-08

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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	1.945E-08	1.293E-08	1.183E-08	2.915E-09	1.601E-09
NNW	3.550E-08	2.398E-08	2.202E-08	5.662E-09	3.136E-09
NW	6.203E-08	4.244E-08	3.907E-08	1.036E-08	5.761E-09
WNW	4.722E-08	3.251E-08	2.997E-08	8.057E-09	4.469E-09
W	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	1.649E-08	1.116E-08	1.025E-08	2.648E-09	1.471E-09
SW	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.323E-08	8.881E-09	8.143E-09	2.043E-09	1.112E-09
S	5.495E-09	3.613E-09	3.298E-09	8.233E-10	4.708E-10
SSE	5.808E-09	3.860E-09	3.532E-09	8.980E-10	5.146E-10
SE	5.175E-09	3.453E-09	3.163E-09	8.049E-10	4.582E-10
ESE	5.429E-09	3.606E-09	3.300E-09	8.214E-10	4.597E-10
E	8.238E-09	5.546E-09	5.091E-09	1.331E-09	7.674E-10
ENE	9.477E-09	6.239E-09	5.699E-09	1.403E-09	8.036E-10
NE	9.014E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	9.790E-09	6.379E-09	5.814E-09	1.414E-09	8.147E-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	3.385E-06	2.261E-06	2.002E-06	1.768E-06	1.549E-06	1.381E-06	1.108E-06
NNW	5.000E-06	3.588E-06	3.216E-06	2.867E-06	2.530E-06	2.268E-06	1.832E-06
NW	6.907E-06	5.277E-06	4.791E-06	4.321E-06	3.856E-06	3.487E-06	2.857E-06
WNW	4.479E-06	3.621E-06	3.328E-06	3.035E-06	2.736E-06	2.492E-06	2.066E-06
W	3.032E-06	2.180E-06	1.949E-06	1.733E-06	1.525E-06	1.363E-06	1.095E-06
WSW	2.396E-06	1.688E-06	1.506E-06	1.337E-06	1.177E-06	1.052E-06	8.473E-07
SW	2.451E-06	1.750E-06	1.566E-06	1.395E-06	1.231E-06	1.103E-06	8.917E-07
SSW	1.921E-06	1.342E-06	1.197E-06	1.064E-06	9.379E-07	8.404E-07	6.793E-07
S	1.381E-06	8.497E-07	7.362E-07	6.371E-07	5.473E-07	4.808E-07	3.759E-07
SSE	1.322E-06	8.337E-07	7.263E-07	6.315E-07	5.447E-07	4.797E-07	3.763E-07
SE	1.169E-06	7.355E-07	6.402E-07	5.562E-07	4.794E-07	4.221E-07	3.309E-07
ESE	1.196E-06	7.637E-07	6.673E-07	5.818E-07	5.031E-07	4.439E-07	3.492E-07
E	1.847E-06	1.153E-06	1.000E-06	8.657E-07	7.433E-07	6.522E-07	5.084E-07
ENE	2.403E-06	1.467E-06	1.268E-06	1.094E-06	9.366E-07	8.201E-07	6.372E-07
NE	2.502E-06	1.506E-06	1.296E-06	1.114E-06	9.509E-07	8.306E-07	6.426E-07
NNE	2.592E-06	1.604E-06	1.390E-06	1.202E-06	1.031E-06	9.037E-07	7.035E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.035E-06	8.950E-07	6.382E-08	6.112E-08	5.860E-08	3.582E-08	2.818E-08
NNW	1.714E-06	1.488E-06	1.140E-07	1.093E-07	1.049E-07	6.475E-08	5.096E-08
NW	2.684E-06	2.348E-06	1.952E-07	1.873E-07	1.799E-07	1.120E-07	8.834E-08
WNW	1.947E-06	1.713E-06	1.474E-07	1.414E-07	1.359E-07	8.484E-08	6.697E-08
W	1.023E-06	8.844E-07	6.637E-08	6.363E-08	6.107E-08	3.779E-08	2.977E-08
WSW	7.923E-07	6.869E-07	5.258E-08	5.042E-08	4.840E-08	2.999E-08	2.363E-08
SW	8.348E-07	7.252E-07	5.624E-08	5.393E-08	5.176E-08	3.202E-08	2.520E-08
SSW	6.360E-07	5.529E-07	4.257E-08	4.081E-08	3.916E-08	2.418E-08	1.904E-08
S	3.487E-07	2.978E-07	1.853E-08	1.772E-08	1.696E-08	1.022E-08	8.025E-09
SSE	3.493E-07	2.986E-07	1.912E-08	1.830E-08	1.754E-08	1.068E-08	8.412E-09
SE	3.072E-07	2.625E-07	1.671E-08	1.600E-08	1.534E-08	9.410E-09	7.454E-09
ESE	3.245E-07	2.777E-07	1.776E-08	1.701E-08	1.631E-08	9.969E-09	7.855E-09
E	4.712E-07	4.015E-07	2.621E-08	2.512E-08	2.411E-08	1.492E-08	1.181E-08
ENE	5.901E-07	5.019E-07	3.106E-08	2.974E-08	2.851E-08	1.743E-08	1.376E-08
NE	5.944E-07	5.043E-07	2.971E-08	2.843E-08	2.724E-08	1.659E-08	1.311E-08
NNE	6.517E-07	5.547E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-08	1.435E-08

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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	1.946E-08	1.293E-08	1.183E-08	2.916E-09	1.601E-09
NNW	3.552E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	6.208E-08	4.247E-08	3.910E-08	1.037E-08	5.762E-09
WNW	4.726E-08	3.254E-08	2.999E-08	8.060E-09	4.469E-09
W	2.081E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	1.650E-08	1.117E-08	1.025E-08	2.649E-09	1.471E-09
SW	1.757E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.323E-08	8.886E-09	8.147E-09	2.043E-09	1.112E-09
S	5.496E-09	3.613E-09	3.299E-09	8.233E-10	4.707E-10
SSE	5.809E-09	3.860E-09	3.533E-09	8.980E-10	5.146E-10
SE	5.176E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	5.429E-09	3.607E-09	3.300E-09	8.213E-10	4.596E-10
E	8.240E-09	5.548E-09	5.092E-09	1.331E-09	7.674E-10
ENE	9.477E-09	6.239E-09	5.699E-09	1.403E-09	8.036E-10
NE	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.701E-10
NNE	9.790E-09	6.379E-09	5.814E-09	1.414E-09	8.146E-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	3.299E-06	2.227E-06	1.976E-06	1.749E-06	1.535E-06	1.371E-06	1.101E-06
NNW	4.738E-06	3.463E-06	3.116E-06	2.789E-06	2.471E-06	2.221E-06	1.801E-06
NW	6.436E-06	5.039E-06	4.600E-06	4.169E-06	3.738E-06	3.391E-06	2.794E-06
WNW	4.182E-06	3.460E-06	3.197E-06	2.929E-06	2.651E-06	2.423E-06	2.020E-06
W	2.843E-06	2.088E-06	1.877E-06	1.676E-06	1.481E-06	1.329E-06	1.073E-06
WSW	2.262E-06	1.624E-06	1.455E-06	1.297E-06	1.146E-06	1.028E-06	8.311E-07
SW	2.319E-06	1.687E-06	1.516E-06	1.356E-06	1.201E-06	1.079E-06	8.760E-07
SSW	1.834E-06	1.301E-06	1.165E-06	1.038E-06	9.177E-07	8.241E-07	6.685E-07
S	1.351E-06	8.379E-07	7.271E-07	6.302E-07	5.421E-07	4.766E-07	3.732E-07
SSE	1.279E-06	8.154E-07	7.122E-07	6.207E-07	5.365E-07	4.733E-07	3.722E-07
SE	1.138E-06	7.221E-07	6.299E-07	5.483E-07	4.734E-07	4.174E-07	3.279E-07
ESE	1.165E-06	7.502E-07	6.569E-07	5.739E-07	4.971E-07	4.393E-07	3.464E-07
E	1.758E-06	1.115E-06	9.708E-07	8.434E-07	7.265E-07	6.391E-07	5.003E-07
ENE	2.314E-06	1.432E-06	1.241E-06	1.074E-06	9.215E-07	8.084E-07	6.300E-07
NE	2.432E-06	1.479E-06	1.276E-06	1.099E-06	9.396E-07	8.219E-07	6.372E-07
NNE	2.536E-06	1.583E-06	1.373E-06	1.189E-06	1.022E-06	8.967E-07	6.992E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.029E-06	8.910E-07	6.380E-08	6.111E-08	5.859E-08	3.582E-08	2.818E-08
NNW	1.688E-06	1.468E-06	1.138E-07	1.091E-07	1.047E-07	6.468E-08	5.092E-08
NW	2.629E-06	2.306E-06	1.947E-07	1.868E-07	1.795E-07	1.118E-07	8.822E-08
WNW	1.906E-06	1.681E-06	1.470E-07	1.410E-07	1.355E-07	8.469E-08	6.688E-08
W	1.003E-06	8.700E-07	6.622E-08	6.350E-08	6.095E-08	3.773E-08	2.973E-08
WSW	7.782E-07	6.763E-07	5.247E-08	5.032E-08	4.831E-08	2.995E-08	2.361E-08
SW	8.210E-07	7.149E-07	5.614E-08	5.383E-08	5.168E-08	3.198E-08	2.518E-08
SSW	6.265E-07	5.456E-07	4.249E-08	4.073E-08	3.910E-08	2.416E-08	1.903E-08
S	3.464E-07	2.960E-07	1.851E-08	1.770E-08	1.695E-08	1.022E-08	8.023E-09
SSE	3.458E-07	2.959E-07	1.910E-08	1.828E-08	1.752E-08	1.068E-08	8.409E-09
SE	3.046E-07	2.606E-07	1.669E-08	1.599E-08	1.533E-08	9.406E-09	7.452E-09
ESE	3.220E-07	2.758E-07	1.775E-08	1.700E-08	1.630E-08	9.967E-09	7.854E-09
E	4.642E-07	3.963E-07	2.617E-08	2.509E-08	2.407E-08	1.491E-08	1.180E-08
ENE	5.839E-07	4.973E-07	3.106E-08	2.974E-08	2.851E-08	1.744E-08	1.377E-08
NE	5.897E-07	5.009E-07	2.969E-08	2.841E-08	2.723E-08	1.658E-08	1.311E-08
NNE	6.481E-07	5.520E-07	3.309E-08	3.164E-08	3.030E-08	1.826E-08	1.435E-08

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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	1.946E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	3.550E-08	2.398E-08	2.202E-08	5.663E-09	3.136E-09
NW	6.201E-08	4.243E-08	3.906E-08	1.036E-08	5.761E-09
WNW	4.720E-08	3.250E-08	2.996E-08	8.056E-09	4.469E-09
W	2.079E-08	1.411E-08	1.297E-08	3.408E-09	1.928E-09
WSW	1.649E-08	1.116E-08	1.025E-08	2.648E-09	1.471E-09
SW	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.513E-09
SSW	1.322E-08	8.881E-09	8.143E-09	2.043E-09	1.112E-09
S	5.495E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	5.807E-09	3.859E-09	3.532E-09	8.981E-10	5.146E-10
SE	5.175E-09	3.453E-09	3.163E-09	8.049E-10	4.583E-10
ESE	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.597E-10
E	8.236E-09	5.546E-09	5.090E-09	1.331E-09	7.674E-10
ENE	9.483E-09	6.243E-09	5.703E-09	1.404E-09	8.036E-10
NE	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	9.791E-09	6.380E-09	5.815E-09	1.414E-09	8.147E-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	3.364E-06	2.258E-06	2.001E-06	1.768E-06	1.550E-06	1.383E-06	1.109E-06
NNW	4.891E-06	3.539E-06	3.177E-06	2.837E-06	2.508E-06	2.250E-06	1.821E-06
NW	6.700E-06	5.176E-06	4.710E-06	4.258E-06	3.807E-06	3.448E-06	2.832E-06
WNW	4.364E-06	3.561E-06	3.279E-06	2.996E-06	2.705E-06	2.467E-06	2.050E-06
W	2.946E-06	2.138E-06	1.916E-06	1.707E-06	1.505E-06	1.347E-06	1.085E-06
WSW	2.336E-06	1.660E-06	1.484E-06	1.320E-06	1.163E-06	1.042E-06	8.405E-07
SW	2.395E-06	1.724E-06	1.546E-06	1.379E-06	1.219E-06	1.094E-06	8.859E-07
SSW	1.887E-06	1.326E-06	1.185E-06	1.055E-06	9.308E-07	8.347E-07	6.757E-07
S	1.372E-06	8.466E-07	7.339E-07	6.355E-07	5.461E-07	4.799E-07	3.753E-07
SSE	1.304E-06	8.265E-07	7.208E-07	6.274E-07	5.416E-07	4.773E-07	3.748E-07
SE	1.158E-06	7.310E-07	6.368E-07	5.537E-07	4.775E-07	4.206E-07	3.300E-07
ESE	1.186E-06	7.598E-07	6.644E-07	5.797E-07	5.015E-07	4.428E-07	3.486E-07
E	1.800E-06	1.133E-06	9.845E-07	8.538E-07	7.344E-07	6.453E-07	5.041E-07
ENE	2.359E-06	1.450E-06	1.255E-06	1.084E-06	9.293E-07	8.146E-07	6.338E-07
NE	2.472E-06	1.494E-06	1.287E-06	1.108E-06	9.462E-07	8.270E-07	6.404E-07
NNE	2.576E-06	1.599E-06	1.386E-06	1.199E-06	1.029E-06	9.022E-07	7.026E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.036E-06	8.964E-07	6.386E-08	6.116E-08	5.864E-08	3.584E-08	2.819E-08
NNW	1.705E-06	1.481E-06	1.140E-07	1.093E-07	1.049E-07	6.474E-08	5.095E-08
NW	2.663E-06	2.332E-06	1.951E-07	1.872E-07	1.798E-07	1.120E-07	8.831E-08
WNW	1.933E-06	1.702E-06	1.472E-07	1.413E-07	1.358E-07	8.480E-08	6.695E-08
W	1.014E-06	8.780E-07	6.631E-08	6.357E-08	6.102E-08	3.777E-08	2.975E-08
WSW	7.865E-07	6.826E-07	5.254E-08	5.039E-08	4.837E-08	2.998E-08	2.363E-08
SW	8.297E-07	7.215E-07	5.622E-08	5.391E-08	5.175E-08	3.201E-08	2.520E-08
SSW	6.329E-07	5.506E-07	4.255E-08	4.079E-08	3.915E-08	2.418E-08	1.904E-08
S	3.483E-07	2.975E-07	1.853E-08	1.772E-08	1.696E-08	1.022E-08	8.026E-09
SSE	3.480E-07	2.976E-07	1.911E-08	1.830E-08	1.753E-08	1.068E-08	8.411E-09
SE	3.064E-07	2.619E-07	1.671E-08	1.600E-08	1.534E-08	9.410E-09	7.454E-09
ESE	3.239E-07	2.772E-07	1.776E-08	1.701E-08	1.631E-08	9.969E-09	7.855E-09
E	4.675E-07	3.988E-07	2.619E-08	2.511E-08	2.409E-08	1.491E-08	1.180E-08
ENE	5.871E-07	4.997E-07	3.107E-08	2.975E-08	2.852E-08	1.744E-08	1.377E-08
NE	5.925E-07	5.029E-07	2.970E-08	2.842E-08	2.724E-08	1.658E-08	1.311E-08
NNE	6.510E-07	5.542E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-08	1.435E-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	1.947E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	3.552E-08	2.399E-08	2.203E-08	5.664E-09	3.136E-09
NW	6.206E-08	4.246E-08	3.909E-08	1.037E-08	5.762E-09
WNW	4.724E-08	3.253E-08	2.998E-08	8.059E-09	4.469E-09
W	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	1.757E-08	1.186E-08	1.089E-08	2.772E-09	1.512E-09
SSW	1.323E-08	8.886E-09	8.147E-09	2.043E-09	1.112E-09
S	5.497E-09	3.613E-09	3.299E-09	8.234E-10	4.707E-10
SSE	5.809E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	5.176E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	8.239E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	9.483E-09	6.243E-09	5.703E-09	1.404E-09	8.036E-10
NE	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.701E-10
NNE	9.791E-09	6.380E-09	5.814E-09	1.414E-09	8.146E-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	3.343E-06	2.245E-06	1.990E-06	1.760E-06	1.543E-06	1.377E-06	1.105E-06
NNW	4.865E-06	3.524E-06	3.165E-06	2.827E-06	2.500E-06	2.244E-06	1.816E-06
NW	6.662E-06	5.154E-06	4.692E-06	4.243E-06	3.795E-06	3.437E-06	2.825E-06
WNW	4.327E-06	3.539E-06	3.261E-06	2.981E-06	2.693E-06	2.457E-06	2.043E-06
W	2.933E-06	2.132E-06	1.911E-06	1.703E-06	1.502E-06	1.345E-06	1.083E-06
WSW	2.326E-06	1.655E-06	1.480E-06	1.317E-06	1.161E-06	1.039E-06	8.389E-07
SW	2.383E-06	1.717E-06	1.541E-06	1.375E-06	1.215E-06	1.091E-06	8.837E-07
SSW	1.876E-06	1.321E-06	1.181E-06	1.051E-06	9.277E-07	8.322E-07	6.739E-07
S	1.366E-06	8.439E-07	7.318E-07	6.338E-07	5.448E-07	4.788E-07	3.746E-07
SSE	1.300E-06	8.243E-07	7.191E-07	6.260E-07	5.405E-07	4.765E-07	3.742E-07
SE	1.153E-06	7.288E-07	6.351E-07	5.523E-07	4.764E-07	4.197E-07	3.294E-07
ESE	1.180E-06	7.570E-07	6.622E-07	5.779E-07	5.002E-07	4.417E-07	3.478E-07
E	1.799E-06	1.132E-06	9.843E-07	8.537E-07	7.343E-07	6.452E-07	5.040E-07
ENE	2.355E-06	1.449E-06	1.254E-06	1.083E-06	9.286E-07	8.140E-07	6.334E-07
NE	2.466E-06	1.492E-06	1.285E-06	1.106E-06	9.451E-07	8.261E-07	6.398E-07
NNE	2.564E-06	1.594E-06	1.382E-06	1.196E-06	1.026E-06	9.004E-07	7.015E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.032E-06	8.935E-07	6.382E-08	6.112E-08	5.860E-08	3.583E-08	2.818E-08
NNW	1.701E-06	1.478E-06	1.139E-07	1.092E-07	1.048E-07	6.472E-08	5.094E-08
NW	2.656E-06	2.327E-06	1.950E-07	1.871E-07	1.797E-07	1.119E-07	8.828E-08
WNW	1.926E-06	1.697E-06	1.472E-07	1.412E-07	1.357E-07	8.477E-08	6.693E-08
W	1.013E-06	8.769E-07	6.629E-08	6.356E-08	6.101E-08	3.776E-08	2.975E-08
WSW	7.850E-07	6.814E-07	5.252E-08	5.037E-08	4.835E-08	2.997E-08	2.362E-08
SW	8.278E-07	7.200E-07	5.620E-08	5.388E-08	5.172E-08	3.200E-08	2.519E-08
SSW	6.313E-07	5.493E-07	4.253E-08	4.077E-08	3.913E-08	2.417E-08	1.904E-08
S	3.476E-07	2.969E-07	1.852E-08	1.771E-08	1.696E-08	1.022E-08	8.024E-09
SSE	3.475E-07	2.972E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08	8.410E-09
SE	3.059E-07	2.616E-07	1.670E-08	1.600E-08	1.534E-08	9.408E-09	7.453E-09
ESE	3.233E-07	2.768E-07	1.776E-08	1.700E-08	1.630E-08	9.968E-09	7.854E-09
E	4.675E-07	3.987E-07	2.619E-08	2.510E-08	2.409E-08	1.491E-08	1.180E-08
ENE	5.868E-07	4.995E-07	3.107E-08	2.974E-08	2.851E-08	1.744E-08	1.377E-08
NE	5.920E-07	5.026E-07	2.970E-08	2.842E-08	2.724E-08	1.658E-08	1.311E-08
NNE	6.500E-07	5.534E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-08	1.435E-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	1.946E-08	1.294E-08	1.183E-08	2.916E-09	1.601E-09
NNW	3.551E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	6.205E-08	4.245E-08	3.908E-08	1.037E-08	5.762E-09
WNW	4.723E-08	3.252E-08	2.997E-08	8.058E-09	4.469E-09
W	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.323E-08	8.884E-09	8.145E-09	2.043E-09	1.112E-09
S	5.496E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	5.808E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	5.175E-09	3.454E-09	3.163E-09	8.049E-10	4.582E-10
ESE	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	8.238E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	9.481E-09	6.241E-09	5.701E-09	1.403E-09	8.036E-10
NE	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	9.791E-09	6.380E-09	5.814E-09	1.414E-09	8.147E-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	3.341E-06	2.247E-06	1.992E-06	1.761E-06	1.544E-06	1.378E-06	1.106E-06
NNW	4.841E-06	3.514E-06	3.157E-06	2.821E-06	2.495E-06	2.241E-06	1.814E-06
NW	6.616E-06	5.132E-06	4.675E-06	4.229E-06	3.785E-06	3.429E-06	2.820E-06
WNW	4.304E-06	3.527E-06	3.252E-06	2.973E-06	2.687E-06	2.452E-06	2.040E-06
W	2.913E-06	2.122E-06	1.904E-06	1.697E-06	1.498E-06	1.341E-06	1.081E-06
WSW	2.313E-06	1.649E-06	1.475E-06	1.313E-06	1.158E-06	1.037E-06	8.375E-07
SW	2.370E-06	1.712E-06	1.536E-06	1.372E-06	1.213E-06	1.089E-06	8.826E-07
SSW	1.869E-06	1.318E-06	1.178E-06	1.049E-06	9.264E-07	8.311E-07	6.732E-07
S	1.365E-06	8.435E-07	7.315E-07	6.336E-07	5.447E-07	4.787E-07	3.746E-07
SSE	1.296E-06	8.228E-07	7.180E-07	6.252E-07	5.399E-07	4.760E-07	3.739E-07
SE	1.151E-06	7.280E-07	6.345E-07	5.519E-07	4.761E-07	4.195E-07	3.293E-07
ESE	1.179E-06	7.564E-07	6.618E-07	5.776E-07	5.000E-07	4.415E-07	3.478E-07
E	1.788E-06	1.127E-06	9.805E-07	8.508E-07	7.321E-07	6.435E-07	5.030E-07
ENE	2.345E-06	1.445E-06	1.251E-06	1.081E-06	9.269E-07	8.127E-07	6.326E-07
NE	2.459E-06	1.489E-06	1.284E-06	1.105E-06	9.441E-07	8.253E-07	6.394E-07
NNE	2.562E-06	1.593E-06	1.381E-06	1.195E-06	1.026E-06	9.002E-07	7.014E-07

	Distance (meters)						
Dir	860	945	5100	5250	5400	7500	8850
N	1.033E-06	8.942E-07	6.384E-08	6.113E-08	5.862E-08	3.583E-08	2.819E-08
NNW	1.699E-06	1.477E-06	1.139E-07	1.092E-07	1.048E-07	6.472E-08	5.094E-08
NW	2.651E-06	2.323E-06	1.950E-07	1.871E-07	1.797E-07	1.119E-07	8.828E-08
WNW	1.924E-06	1.695E-06	1.471E-07	1.412E-07	1.357E-07	8.476E-08	6.692E-08
W	1.011E-06	8.754E-07	6.628E-08	6.355E-08	6.100E-08	3.776E-08	2.975E-08
WSW	7.838E-07	6.805E-07	5.252E-08	5.036E-08	4.835E-08	2.997E-08	2.362E-08
SW	8.268E-07	7.193E-07	5.619E-08	5.388E-08	5.172E-08	3.200E-08	2.519E-08
SSW	6.307E-07	5.489E-07	4.253E-08	4.077E-08	3.913E-08	2.417E-08	1.904E-08
S	3.476E-07	2.969E-07	1.852E-08	1.771E-08	1.696E-08	1.022E-08	8.024E-09
SSE	3.473E-07	2.970E-07	1.911E-08	1.829E-08	1.753E-08	1.068E-08	8.410E-09
SE	3.058E-07	2.615E-07	1.670E-08	1.600E-08	1.534E-08	9.409E-09	7.453E-09
ESE	3.232E-07	2.767E-07	1.776E-08	1.700E-08	1.630E-08	9.968E-09	7.854E-09
E	4.666E-07	3.981E-07	2.618E-08	2.510E-08	2.409E-08	1.491E-08	1.180E-08
ENE	5.861E-07	4.990E-07	3.107E-08	2.975E-08	2.852E-08	1.744E-08	1.377E-08
NE	5.916E-07	5.023E-07	2.970E-08	2.842E-08	2.723E-08	1.658E-08	1.311E-08
NNE	6.500E-07	5.534E-07	3.310E-08	3.165E-08	3.030E-08	1.826E-08	1.435E-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	1.946E-08	1.294E-08	1.184E-08	2.916E-09	1.601E-09
NNW	3.551E-08	2.399E-08	2.203E-08	5.663E-09	3.136E-09
NW	6.205E-08	4.245E-08	3.908E-08	1.037E-08	5.762E-09
WNW	4.723E-08	3.252E-08	2.997E-08	8.058E-09	4.469E-09
W	2.080E-08	1.412E-08	1.298E-08	3.409E-09	1.928E-09
WSW	1.650E-08	1.116E-08	1.025E-08	2.649E-09	1.471E-09
SW	1.756E-08	1.186E-08	1.089E-08	2.771E-09	1.512E-09
SSW	1.323E-08	8.884E-09	8.145E-09	2.043E-09	1.112E-09
S	5.496E-09	3.613E-09	3.299E-09	8.234E-10	4.708E-10
SSE	5.808E-09	3.860E-09	3.533E-09	8.981E-10	5.146E-10
SE	5.175E-09	3.454E-09	3.164E-09	8.049E-10	4.582E-10
ESE	5.429E-09	3.607E-09	3.300E-09	8.214E-10	4.596E-10
E	8.238E-09	5.547E-09	5.091E-09	1.331E-09	7.674E-10
ENE	9.483E-09	6.243E-09	5.702E-09	1.404E-09	8.036E-10
NE	9.015E-09	5.920E-09	5.405E-09	1.335E-09	7.702E-10
NNE	9.791E-09	6.380E-09	5.815E-09	1.414E-09	8.147E-10

Maximum Residential Location

(5.5 miles [8,850 meters] WNW)

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Synopsis Report

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

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

Non-Radon Population Assessment
Wed Mar 29 15:48:24 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Effective Dose Equivalent (mrem)
2.49E-06

At This Location: 8850 Meters West Northwest
Dataset Name: N_Pop22.DAT
Dataset Date: Mar 29, 2023 03:48 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd
Pop File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_022.pop

Wed Mar 29 15:48:24 2023 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 8850 Meters West Northwest
Lifetime Fatal Cancer Risk: 9.95E-13

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

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenals	1.42E-06	8.49E-06
UB_Wall	1.49E-06	8.90E-06
Bone_Sur	3.88E-05	1.97E-04
Brain	1.34E-06	7.96E-06
Breasts	1.38E-06	8.24E-06
St_Wall	1.43E-06	8.50E-06
SI_Wall	1.45E-06	8.63E-06
ULI_Wall	1.51E-06	8.99E-06
LLI_Wall	1.73E-06	1.04E-05
Kidneys	1.57E-06	9.23E-06
Liver	4.38E-06	2.33E-05
Muscle	1.47E-06	8.79E-06
Ovaries	2.06E-06	1.18E-05
Pancreas	1.43E-06	8.51E-06
R_Marrow	3.61E-06	2.04E-05
Skin	5.12E-06	3.07E-05
Spleen	1.43E-06	8.55E-06
Testes	2.06E-06	1.17E-05
Thymus	1.41E-06	8.39E-06
Thyroid	1.47E-06	8.80E-06
GB_Wall	1.42E-06	8.44E-06
Ht_Wall	1.44E-06	8.60E-06
Uterus	1.46E-06	8.72E-06
ET_Reg	1.48E-06	8.67E-06
Lung	2.07E-06	1.17E-05
Effectiv	2.49E-06	1.41E-05

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

Risk Range	# of People	# of People in This Risk Range or Higher	Deaths in This Risk Range	Deaths in This Risk Range or Higher
1.0E+00 TO 1.0E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-01 TO 1.0E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-02 TO 1.0E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-03 TO 1.0E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-04 TO 1.0E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-05 TO 1.0E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LESS THAN 1.0E-06	1.16E+05	1.16E+05	1.25E-05	1.25E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 2022

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	6.2E-09	2.4E-09	3.4E-08	4.3E-08
Pu-239	M	1.000	2.4E-08	4.4E-09	2.2E-08	5.0E-08
Am-241	M	1.000	1.8E-07	4.0E-09	2.2E-07	4.1E-07
Sr-90	M	1.000	3.9E-07	2.3E-07	3.3E-07	9.5E-07
Cs-137	F	1.000	2.4E-06	1.1E-06	3.0E-06	6.5E-06
U-233	M	1.000	3.1E-08	1.0E-08	3.3E-08	7.4E-08
U-238	M	1.000	2.3E-08	1.0E-08	2.5E-08	5.8E-08

SITE INFORMATION

Temperature:	18.060 degrees C
Precipitation:	28.500 cm/y
Humidity:	8.000 g/cu m
Mixing Height:	1000.0 m

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.50	15.10	7.27
Diameter (m):	1.80	2.30	4.66
Plume Rise Momentum (m/s): (Exit Velocity)	21.10	5.30	5.49

ADJUSTED 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

Beef Cattle Density:	4.13E-02
Milk Cattle Density:	1.14E-03
Land Fraction Cultivated for Vegetable Crops:	1.38E-03

POPULATION DATA

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
WNW	0	0	0	0	0	2	0
W	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
SSW	0	0	0	3	0	0	0
S	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0	0	0	0	68	0	0
NNW	0	0	0	0	0	22	0
NW	0	0	0	0	0	0	0
WNW	0	5	1448	0	0	0	31
W	0	0	33546	0	0	0	0
WSW	0	0	1502	0	0	0	14
SW	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
S	0	3	0	0	0	0	0
SSE	0	0	0	0	0	64	22
SE	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	2202
E	0	0	0	0	0	0	3056
ENE	0	0	0	0	0	213	0
NE	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0	0	0	0	0	0
NNW	0	0	0	0	0	0
NW	0	0	1153	13177	0	0
WNW	0	0	0	0	0	0
W	0	0	0	0	0	0
WSW	0	0	0	0	0	0
SW	0	0	0	0	0	0
SSW	0	0	0	0	0	0
S	0	0	0	57	0	0
SSE	0	0	0	0	0	0
SE	0	0	0	0	0	0
ESE	0	0	0	0	0	0
E	0	0	0	0	0	0
ENE	0	477	40508	0	0	0
NE	0	0	6529	0	0	0
NNE	0	0	0	11668	0	0

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Population Assessment
Wed Mar 29 15:48:24 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Pop22.DAT
Dataset Date: Mar 29, 2023 03:48 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_022.pop

Wed Mar 29 15:48:24 2023 GENERAL
Page 1

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	2.85E-06	1.80E-03
Pu-239	M	1.000	2.85E-06	1.80E-03
Am-241	M	1.000	2.85E-06	1.80E-03
Sr-90	M	1.000	2.85E-06	1.80E-03
Cs-137	F	1.000	2.85E-06	1.80E-03
U-233	M	1.000	2.85E-06	1.80E-03
U-238	M	1.000	2.85E-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	1.00E-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)

NUMBER OF BEEF CATTLE

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	13	7	2	4	10	62	19
NNW	13	7	2	4	10	62	19
NW	13	7	2	4	10	62	19
WNW	13	7	2	4	10	62	19
W	13	7	2	4	10	62	19
WSW	13	7	2	4	10	62	19
SW	13	7	2	4	10	62	19
SSW	13	7	2	4	10	62	19
S	13	7	2	4	10	62	19
SSE	13	7	2	4	10	62	19
SE	13	7	2	4	10	62	19
ESE	13	7	2	4	10	62	19
E	13	7	2	4	10	62	19
ENE	13	7	2	4	10	62	19
NE	13	7	2	4	10	62	19
NNE	13	7	2	4	10	62	19

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	42	104	1529	236	294	502	499
NNW	42	104	1529	236	294	502	499
NW	42	104	1529	236	294	502	499
WNW	42	104	1529	236	294	502	499
W	42	104	1529	236	294	502	499
WSW	42	104	1529	236	294	502	499
SW	42	104	1529	236	294	502	499
SSW	42	104	1529	236	294	502	499
S	42	104	1529	236	294	502	499
SSE	42	104	1529	236	294	502	499
SE	42	104	1529	236	294	502	499
ESE	42	104	1529	236	294	502	499
E	42	104	1529	236	294	502	499
ENE	42	104	1529	236	294	502	499
NE	42	104	1529	236	294	502	499
NNE	42	104	1529	236	294	502	499

NUMBER OF BEEF CATTLE

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	52	600	467	685	26	39
NNW	52	600	467	685	26	39
NW	52	600	467	685	26	39
WNW	52	600	467	685	26	39
W	52	600	467	685	26	39
WSW	52	600	467	685	26	39
SW	52	600	467	685	26	39
SSW	52	600	467	685	26	39
S	52	600	467	685	26	39
SSE	52	600	467	685	26	39
SE	52	600	467	685	26	39
ESE	52	600	467	685	26	39
E	52	600	467	685	26	39
ENE	52	600	467	685	26	39
NE	52	600	467	685	26	39
NNE	52	600	467	685	26	39

NUMBER OF MILK CATTLE

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0	0	0	0	0	2	1
NNW	0	0	0	0	0	2	1
NW	0	0	0	0	0	2	1
WNW	0	0	0	0	0	2	1
W	0	0	0	0	0	2	1
WSW	0	0	0	0	0	2	1
SW	0	0	0	0	0	2	1
SSW	0	0	0	0	0	2	1
S	0	0	0	0	0	2	1
SSE	0	0	0	0	0	2	1
SE	0	0	0	0	0	2	1
ESE	0	0	0	0	0	2	1
E	0	0	0	0	0	2	1
ENE	0	0	0	0	0	2	1
NE	0	0	0	0	0	2	1
NNE	0	0	0	0	0	2	1

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	1	3	42	7	8	14	14
NNW	1	3	42	7	8	14	14
NW	1	3	42	7	8	14	14
WNW	1	3	42	7	8	14	14
W	1	3	42	7	8	14	14
WSW	1	3	42	7	8	14	14
SW	1	3	42	7	8	14	14
SSW	1	3	42	7	8	14	14
S	1	3	42	7	8	14	14
SSE	1	3	42	7	8	14	14
SE	1	3	42	7	8	14	14
ESE	1	3	42	7	8	14	14
E	1	3	42	7	8	14	14
ENE	1	3	42	7	8	14	14
NE	1	3	42	7	8	14	14
NNE	1	3	42	7	8	14	14

NUMBER OF MILK CATTLE

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	1	17	13	19	1	1
NNW	1	17	13	19	1	1
NW	1	17	13	19	1	1
WNW	1	17	13	19	1	1
W	1	17	13	19	1	1
WSW	1	17	13	19	1	1
SW	1	17	13	19	1	1
SSW	1	17	13	19	1	1
S	1	17	13	19	1	1
SSE	1	17	13	19	1	1
SE	1	17	13	19	1	1
ESE	1	17	13	19	1	1
E	1	17	13	19	1	1
ENE	1	17	13	19	1	1
NE	1	17	13	19	1	1
NNE	1	17	13	19	1	1

AREA OF VEGETABLE CROP PRODUCTION (M**2)

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NNW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
WNW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
W	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
WSW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SSW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
S	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SSE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
ESE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
E	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
ENE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NNE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NNW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
WNW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
W	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
WSW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SSW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
S	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SSE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
ESE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
E	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
ENE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NNE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05

AREA OF VEGETABLE CROP PRODUCTION (M**2)

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NNW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
WNW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
W	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
WSW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SSW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
S	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SSE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
ESE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
E	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
ENE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NNE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04

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
ENTERED 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 (Actual fractions of food types from outside area can be greater than the minimum fractions listed below.)	
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

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Population Assessment
Wed Mar 29 15:48:24 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Pop22.DAT
Dataset Date: Mar 29, 2023 03:48 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_022.pop

Wed Mar 29 15:48:24 2023 WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.190	2.910	3.350	3.000	2.510	2.500	0.000	0.074
NNW	2.300	3.160	3.590	3.880	3.580	3.080	0.000	0.117
NW	2.310	3.620	3.690	4.470	4.120	3.530	0.000	0.182
WNW	2.140	2.990	2.710	3.570	4.010	3.670	0.000	0.119
W	1.930	2.250	2.500	4.140	4.420	3.750	0.000	0.068
WSW	1.770	2.840	2.820	4.100	3.890	3.270	0.000	0.052
SW	1.760	2.380	2.470	4.020	3.330	2.890	0.000	0.051
SSW	1.760	2.700	2.930	3.420	3.250	3.300	0.000	0.040
S	1.630	2.940	4.270	2.880	3.400	2.660	0.000	0.030
SSE	1.740	2.650	3.700	3.630	3.550	4.100	0.000	0.027
SE	1.590	2.220	3.140	3.660	3.130	3.080	0.000	0.023
ESE	1.490	2.240	2.600	3.090	2.370	0.000	0.000	0.021
E	1.570	2.840	4.170	5.590	4.670	1.740	0.000	0.041
ENE	1.720	2.770	3.700	4.890	3.420	0.770	0.000	0.052
NE	1.790	2.470	3.440	3.950	2.330	0.000	0.000	0.050
NNE	2.170	2.920	3.090	2.960	2.500	0.000	0.000	0.053

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	3.200	3.950	4.520	4.320	3.000	2.810	0.000
NNW	3.270	4.300	4.670	5.290	4.390	3.390	0.000
NW	3.350	4.760	5.050	5.610	4.700	3.790	0.000
WNW	3.140	4.320	4.270	4.700	4.510	4.020	0.000
W	2.930	3.500	3.940	5.600	5.170	4.020	0.000
WSW	2.640	3.770	4.120	5.750	4.850	3.730	0.000
SW	2.760	3.720	3.680	5.680	4.490	3.490	0.000
SSW	2.590	3.900	4.550	5.110	4.170	3.750	0.000
S	2.480	4.900	5.750	3.930	3.790	3.620	0.000
SSE	2.670	4.170	5.400	5.200	4.050	4.530	0.000
SE	2.390	3.100	4.230	5.010	3.800	3.290	0.000
ESE	2.370	3.110	3.890	5.140	3.460	0.000	0.000
E	2.390	4.130	5.780	7.550	6.010	2.570	0.000
ENE	2.640	4.260	5.610	6.490	4.060	0.770	0.000
NE	2.660	3.760	4.990	5.490	3.430	0.000	0.000
NNE	2.910	3.890	4.250	4.290	3.110	0.000	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2159	0.1271	0.2291	0.2947	0.1239	0.0093	0.0000
NNW	0.1247	0.0790	0.1525	0.3397	0.2813	0.0228	0.0000
NW	0.0767	0.0489	0.0884	0.3289	0.4081	0.0490	0.0000
WNW	0.0872	0.0423	0.0695	0.2374	0.4962	0.0675	0.0000
W	0.1159	0.0524	0.0833	0.3532	0.3765	0.0187	0.0000
WSW	0.1375	0.0601	0.1022	0.3766	0.2901	0.0335	0.0000
SW	0.1276	0.0560	0.1055	0.3996	0.2776	0.0337	0.0000
SSW	0.1472	0.0813	0.1318	0.3815	0.2126	0.0457	0.0000
S	0.1718	0.1365	0.4241	0.2127	0.0439	0.0110	0.0000
SSE	0.2015	0.1144	0.2769	0.2907	0.1111	0.0055	0.0000
SE	0.2694	0.1265	0.1945	0.3118	0.0914	0.0065	0.0000
ESE	0.2777	0.1055	0.2139	0.3036	0.0993	0.0000	0.0000
E	0.2103	0.0821	0.1562	0.3801	0.1683	0.0029	0.0000
ENE	0.2138	0.1133	0.1762	0.4396	0.0565	0.0006	0.0000
NE	0.2882	0.1217	0.2225	0.3454	0.0222	0.0000	0.0000
NNE	0.2863	0.1416	0.2753	0.2723	0.0244	0.0000	0.0000
TOTAL	0.1543	0.0806	0.1513	0.3268	0.2594	0.0276	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 18.1 degrees C
291.22 K
Precipitation: 28.5 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: 4.551 m/s

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

Maximum Residential Location

(5.5 miles [8,850 meters] WNW)

Dose and Risk Summaries

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

Non-Radon Population Assessment
Wed Mar 29 15:48:24 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Pop22.DAT
Dataset Date: Mar 29, 2023 03:48 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd
Pop File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_022.pop

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenals	1.42E-06	8.49E-06
UB_Wall	1.49E-06	8.90E-06
Bone_Sur	3.88E-05	1.97E-04
Brain	1.34E-06	7.96E-06
Breasts	1.38E-06	8.24E-06
St_Wall	1.43E-06	8.50E-06
SI_Wall	1.45E-06	8.63E-06
ULI_Wall	1.51E-06	8.99E-06
LLI_Wall	1.73E-06	1.04E-05
Kidneys	1.57E-06	9.23E-06
Liver	4.38E-06	2.33E-05
Muscle	1.47E-06	8.79E-06
Ovaries	2.06E-06	1.18E-05
Pancreas	1.43E-06	8.51E-06
R_Marrow	3.61E-06	2.04E-05
Skin	5.12E-06	3.07E-05
Spleen	1.43E-06	8.55E-06
Testes	2.06E-06	1.17E-05
Thymus	1.41E-06	8.39E-06
Thyroid	1.47E-06	8.80E-06
GB_Wall	1.42E-06	8.44E-06
Ht_Wall	1.44E-06	8.60E-06
Uterus	1.46E-06	8.72E-06
ET_Reg	1.48E-06	8.67E-06
Lung	2.07E-06	1.17E-05
Effectiv	2.49E-06	1.41E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	9.02E-07	5.42E-06
INHALATION	8.69E-07	4.31E-06
AIR IMMERSION	4.09E-11	2.03E-10
GROUND SURFACE	7.22E-07	4.34E-06
INTERNAL	1.77E-06	9.72E-06
EXTERNAL	7.22E-07	4.34E-06
TOTAL	2.49E-06	1.41E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
Pu-238	8.15E-08	4.05E-07
U-234	1.93E-15	1.16E-14
Th-230	5.40E-19	3.24E-18
Ra-226	5.39E-20	3.24E-19
Rn-222	3.00E-21	1.80E-20
Po-218	5.36E-26	3.22E-25
Pb-214	1.96E-18	1.18E-17
At-218	2.02E-25	1.21E-24
Bi-214	1.15E-17	6.88E-17
Rn-218	8.97E-28	6.88E-29
Po-214	6.35E-22	3.81E-21
Tl-210	4.47E-21	2.68E-20
Pb-210	6.69E-21	4.01E-20
Bi-210	1.08E-19	6.48E-19
Hg-206	0.00E+00	0.00E+00
Po-210	2.76E-23	1.66E-22
Tl-206	2.19E-25	2.23E-25
Pu-239	1.04E-07	5.19E-07
U-235m	7.81E-19	5.88E-18
U-235	9.35E-17	5.62E-16
Th-231	9.53E-18	5.73E-17
Pa-231	1.25E-20	7.53E-20
Ac-227	3.70E-23	2.23E-22
Th-227	1.77E-20	1.06E-19
Fr-223	1.67E-22	1.00E-21
Ra-223	1.98E-20	1.19E-19
Rn-219	8.55E-21	5.15E-20
At-219	0.00E+00	0.00E+00
Bi-215	0.00E+00	0.00E+00
Po-215	2.61E-23	1.57E-22
Pb-211	1.68E-20	1.01E-19
Bi-211	6.92E-21	4.16E-20
Tl-207	8.70E-21	5.23E-20
Po-211	3.33E-24	2.00E-23
Am-241	6.98E-07	3.48E-06
Np-237	3.90E-14	2.34E-13
Pa-233	3.22E-13	1.93E-12
U-233	9.68E-09	4.94E-08
Th-229	6.82E-12	4.10E-11
Ra-225	9.67E-13	5.81E-12
Ac-225	1.16E-12	6.96E-12
Fr-221	2.36E-12	1.42E-11
At-217	1.99E-14	1.20E-13
Bi-213	1.44E-11	8.65E-11
Po-213	3.07E-15	1.84E-14
Tl-209	3.70E-12	2.23E-11
Pb-209	2.80E-13	1.68E-12
Sr-90	1.47E-07	8.80E-07
Y-90	2.00E-08	1.20E-07

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
Cs-137	7.32E-07	4.40E-06
Ba-137m	6.92E-07	4.16E-06
U-238	6.20E-09	3.16E-08
Th-234	1.74E-10	1.05E-09
Pa-234m	2.38E-09	1.43E-08
Pa-234	4.70E-11	2.82E-10
TOTAL	2.49E-06	1.41E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagu	1.46E-14	1.13E-12
Stomach	5.39E-14	4.18E-12
Colon	1.55E-13	1.21E-11
Liver	5.32E-14	3.72E-12
LUNG	2.13E-13	1.54E-11
Bone	2.40E-14	1.62E-12
Skin	5.04E-15	3.92E-13
Breast	5.75E-14	4.47E-12
Ovary	2.41E-14	1.80E-12
Bladder	3.61E-14	2.79E-12
Kidneys	8.05E-15	6.16E-13
Thyroid	4.18E-15	3.24E-13
Leukemia	1.48E-13	1.14E-11
Residual	1.98E-13	1.53E-11
Total	9.95E-13	7.53E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	4.58E-13	3.56E-11
INHALATION	1.58E-13	1.01E-11
AIR IMMERSION	2.23E-17	1.43E-15
GROUND SURFACE	3.79E-13	2.95E-11
INTERNAL	6.15E-13	4.57E-11
EXTERNAL	3.79E-13	2.95E-11
TOTAL	9.95E-13	7.53E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Pu-238	1.47E-14	9.44E-13
U-234	6.65E-22	5.20E-20
Th-230	2.29E-25	1.78E-23
Ra-226	2.93E-26	2.28E-24
Rn-222	1.64E-27	1.27E-25
Po-218	2.40E-32	1.86E-30
Pb-214	1.05E-24	8.15E-23
At-218	2.48E-32	1.93E-30
Bi-214	6.05E-24	4.70E-22
Rn-218	4.90E-34	4.87E-34
Po-214	3.48E-28	2.71E-26
Tl-210	2.39E-27	1.86E-25
Pb-210	2.99E-27	2.33E-25
Bi-210	1.20E-26	9.31E-25
Hg-206	0.00E+00	0.00E+00
Po-210	1.52E-29	1.18E-27
Tl-206	2.46E-32	3.24E-31
Pu-239	1.70E-14	1.10E-12
U-235m	5.67E-25	5.53E-23
U-235	5.06E-23	3.94E-21
Th-231	4.35E-24	3.39E-22
Pa-231	6.53E-27	5.09E-25
Ac-227	1.38E-29	1.08E-27
Th-227	9.57E-27	7.46E-25
Fr-223	6.21E-29	4.84E-27
Ra-223	1.07E-26	8.31E-25
Rn-219	4.68E-27	3.65E-25
At-219	0.00E+00	0.00E+00
Bi-215	0.00E+00	0.00E+00
Po-215	1.43E-29	1.12E-27
Pb-211	6.00E-27	4.68E-25
Bi-211	3.78E-27	2.94E-25
Tl-207	1.12E-27	8.71E-26
Po-211	1.82E-30	1.42E-28
Am-241	1.15E-13	7.43E-12
Np-237	1.92E-20	1.49E-18
Pa-233	1.74E-19	1.35E-17
U-233	9.42E-15	6.11E-13
Th-229	3.61E-18	2.81E-16
Ra-225	4.38E-19	3.40E-17
Ac-225	6.10E-19	4.75E-17
Fr-221	1.28E-18	9.97E-17
At-217	1.09E-20	8.47E-19
Bi-213	6.23E-18	4.85E-16
Po-213	1.68E-21	1.30E-19
Tl-209	1.98E-18	1.54E-16
Pb-209	3.69E-20	2.87E-18
Sr-90	8.57E-14	6.66E-12
Y-90	2.38E-15	1.85E-13

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Cs-137	3.70E-13	2.88E-11
Ba-137m	3.74E-13	2.91E-11
U-238	5.97E-15	3.87E-13
Th-234	9.03E-17	7.04E-15
Pa-234m	4.17E-16	3.25E-14
Pa-234	2.55E-17	1.99E-15
TOTAL	9.95E-13	7.53E-11

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

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-06	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	1.5E-06	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-07	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-07	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	1.2E-06	5.0E-07	0.0E+00	0.0E+00	0.0E+00	2.1E-07
W	0.0E+00	0.0E+00	2.2E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	1.8E-07	0.0E+00	0.0E+00	0.0E+00	7.5E-08
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	1.6E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.5E-08	3.0E-08
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-08
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.4E-08
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-08	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	2.2E-07	2.0E-07	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	2.2E-08	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	4.4E-08	4.1E-08	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	4.1E-08	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	4.0E-08	0.0E+00	0.0E+00

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E-09	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	4.4E-09	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-09	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-09	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	6.0E-09	7.2E-07	0.0E+00	0.0E+00	0.0E+00	6.5E-09
W	0.0E+00	0.0E+00	7.5E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	2.6E-07	0.0E+00	0.0E+00	0.0E+00	1.0E-09
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	4.9E-10	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-09	6.7E-10
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-08
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-07
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-08	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	2.6E-07	2.7E-06	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	1.3E-09	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	2.1E-08	1.6E-06	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	2.7E-07	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	4.7E-07	0.0E+00	0.0E+00

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

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-13	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	5.9E-13	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E-14	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.6E-14	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	4.8E-13	2.0E-13	0.0E+00	0.0E+00	0.0E+00	8.5E-14
W	0.0E+00	0.0E+00	9.1E-14	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	7.2E-14	0.0E+00	0.0E+00	0.0E+00	3.1E-14
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	6.9E-14	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-14	1.3E-14
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-14
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-14
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-14	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	9.1E-14	8.4E-14	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	9.7E-15	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	1.9E-14	1.8E-14	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	1.8E-14	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	1.8E-14	0.0E+00	0.0E+00

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-14	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	2.3E-14	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.4E-14	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-14	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	3.1E-14	3.7E-12	0.0E+00	0.0E+00	0.0E+00	3.4E-14
W	0.0E+00	0.0E+00	4.0E-11	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	1.4E-12	0.0E+00	0.0E+00	0.0E+00	5.6E-15
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	2.7E-15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-14	3.7E-15
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-13
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-13
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-14	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	1.4E-12	1.4E-11	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	7.2E-15	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	1.2E-13	9.2E-12	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	1.5E-12	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	2.7E-12	0.0E+00	0.0E+00

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Population Assessment
Wed Mar 29 15:48:24 2023

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2022

Comments: NESHAPs Report for CY 2022 (Version 4.1.1.0)

Dataset Name: N_Pop22.DAT
Dataset Date: Mar 29, 2023 03:48 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_022.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_022.pop

Wed Mar 29 15:48:24 2023 CHIQ
Page 1

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	2000	4500	5100	5450	6200	8850	11500
N	2.806E-07	7.691E-08	6.416E-08	5.809E-08	4.787E-08	2.826E-08	1.955E-08
NNW	4.808E-07	1.372E-07	1.146E-07	1.040E-07	8.601E-08	5.109E-08	3.567E-08
NW	7.953E-07	2.345E-07	1.964E-07	1.785E-07	1.482E-07	8.864E-08	6.239E-08
WNW	5.945E-07	1.768E-07	1.483E-07	1.349E-07	1.121E-07	6.721E-08	4.750E-08
W	2.801E-07	7.963E-08	6.658E-08	6.044E-08	5.006E-08	2.982E-08	2.089E-08
WSW	2.209E-07	6.308E-08	5.282E-08	4.796E-08	3.974E-08	2.369E-08	1.657E-08
SW	2.359E-07	6.758E-08	5.654E-08	5.132E-08	4.250E-08	2.528E-08	1.765E-08
SSW	1.797E-07	5.117E-08	4.280E-08	3.884E-08	3.214E-08	1.910E-08	1.330E-08
S	8.649E-08	2.237E-08	1.859E-08	1.678E-08	1.374E-08	8.038E-09	5.516E-09
SSE	8.713E-08	2.296E-08	1.916E-08	1.733E-08	1.426E-08	8.421E-09	5.827E-09
SE	7.626E-08	1.996E-08	1.675E-08	1.517E-08	1.252E-08	7.464E-09	5.193E-09
ESE	8.111E-08	2.124E-08	1.780E-08	1.612E-08	1.328E-08	7.862E-09	5.445E-09
E	1.165E-07	3.121E-08	2.626E-08	2.383E-08	1.973E-08	1.182E-08	8.266E-09
ENE	1.424E-07	3.719E-08	3.113E-08	2.818E-08	2.322E-08	1.379E-08	9.515E-09
NE	1.401E-07	3.548E-08	2.974E-08	2.689E-08	2.212E-08	1.311E-08	9.038E-09
NNE	1.568E-07	3.982E-08	3.315E-08	2.992E-08	2.451E-08	1.436E-08	9.817E-09

Distance (meters)

Dir	13000	16000	32500	48500	51750	56250	61500
N	1.658E-08	1.253E-08	4.779E-09	2.792E-09	2.544E-09	2.239E-09	1.912E-09
NNW	3.046E-08	2.328E-08	9.160E-09	5.431E-09	4.961E-09	4.376E-09	3.728E-09
NW	5.354E-08	4.128E-08	1.661E-08	9.955E-09	9.107E-09	8.048E-09	6.827E-09
WNW	4.088E-08	3.164E-08	1.286E-08	7.741E-09	7.084E-09	6.257E-09	5.291E-09
W	1.787E-08	1.370E-08	5.475E-09	3.271E-09	2.995E-09	2.654E-09	2.286E-09
WSW	1.416E-08	1.083E-08	4.276E-09	2.541E-09	2.322E-09	2.051E-09	1.747E-09
SW	1.507E-08	1.151E-08	4.500E-09	2.656E-09	2.423E-09	2.132E-09	1.801E-09
SSW	1.133E-08	8.620E-09	3.332E-09	1.958E-09	1.785E-09	1.571E-09	1.326E-09
S	4.658E-09	3.495E-09	1.331E-09	7.896E-10	7.232E-10	6.432E-10	5.581E-10
SSE	4.941E-09	3.736E-09	1.451E-09	8.612E-10	7.887E-10	7.009E-10	6.107E-10
SE	4.411E-09	3.345E-09	1.303E-09	7.717E-10	7.062E-10	6.269E-10	5.448E-10
ESE	4.617E-09	3.490E-09	1.341E-09	7.862E-10	7.175E-10	6.339E-10	5.484E-10
E	7.046E-09	5.376E-09	2.136E-09	1.277E-09	1.171E-09	1.042E-09	9.087E-10
ENE	8.037E-09	6.039E-09	2.298E-09	1.345E-09	1.230E-09	1.093E-09	9.575E-10
NE	7.626E-09	5.721E-09	2.177E-09	1.279E-09	1.170E-09	1.042E-09	9.164E-10
NNE	8.258E-09	6.161E-09	2.311E-09	1.354E-09	1.239E-09	1.103E-09	9.693E-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	64250	67250	72000	76750	79600	79850
N	1.801E-09	1.692E-09	1.538E-09	1.403E-09	1.329E-09	1.323E-09
NNW	3.518E-09	3.310E-09	3.017E-09	2.759E-09	2.617E-09	2.605E-09
NW	6.451E-09	6.077E-09	5.549E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.001E-09	4.713E-09	4.305E-09	3.944E-09	3.744E-09	3.727E-09
W	2.159E-09	2.034E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.699E-09	1.597E-09	1.454E-09	1.328E-09	1.258E-09	1.252E-09
SSW	1.250E-09	1.175E-09	1.069E-09	9.756E-10	9.244E-10	9.201E-10
S	5.270E-10	4.962E-10	4.531E-10	4.155E-10	3.952E-10	3.934E-10
SSE	5.766E-10	5.427E-10	4.953E-10	4.540E-10	4.315E-10	4.296E-10
SE	5.140E-10	4.836E-10	4.408E-10	4.035E-10	3.833E-10	3.816E-10
ESE	5.168E-10	4.855E-10	4.415E-10	4.032E-10	3.823E-10	3.805E-10
E	8.586E-10	8.088E-10	7.390E-10	6.782E-10	6.450E-10	6.422E-10
ENE	9.027E-10	8.486E-10	7.731E-10	7.077E-10	6.723E-10	6.694E-10
NE	8.642E-10	8.126E-10	7.407E-10	6.785E-10	6.450E-10	6.422E-10
NNE	9.140E-10	8.595E-10	7.835E-10	7.177E-10	6.823E-10	6.793E-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	2000	4500	5100	5450	6200	8850	11500
N	2.761E-07	7.637E-08	6.376E-08	5.775E-08	4.763E-08	2.817E-08	1.950E-08
NNW	4.733E-07	1.362E-07	1.139E-07	1.034E-07	8.558E-08	5.092E-08	3.558E-08
NW	7.802E-07	2.325E-07	1.949E-07	1.772E-07	1.473E-07	8.826E-08	6.217E-08
WNW	5.820E-07	1.752E-07	1.471E-07	1.339E-07	1.114E-07	6.690E-08	4.732E-08
W	2.767E-07	7.923E-08	6.628E-08	6.019E-08	4.987E-08	2.975E-08	2.085E-08
WSW	2.176E-07	6.265E-08	5.250E-08	4.769E-08	3.955E-08	2.362E-08	1.653E-08
SW	2.320E-07	6.709E-08	5.616E-08	5.101E-08	4.227E-08	2.519E-08	1.760E-08
SSW	1.766E-07	5.077E-08	4.250E-08	3.859E-08	3.195E-08	1.903E-08	1.326E-08
S	8.559E-08	2.226E-08	1.851E-08	1.671E-08	1.370E-08	8.022E-09	5.508E-09
SSE	8.639E-08	2.289E-08	1.911E-08	1.729E-08	1.423E-08	8.410E-09	5.821E-09
SE	7.553E-08	1.988E-08	1.670E-08	1.512E-08	1.248E-08	7.452E-09	5.187E-09
ESE	8.037E-08	2.117E-08	1.775E-08	1.608E-08	1.325E-08	7.853E-09	5.441E-09
E	1.156E-07	3.110E-08	2.619E-08	2.377E-08	1.969E-08	1.180E-08	8.257E-09
ENE	1.416E-07	3.709E-08	3.105E-08	2.811E-08	2.317E-08	1.376E-08	9.500E-09
NE	1.394E-07	3.542E-08	2.970E-08	2.686E-08	2.210E-08	1.311E-08	9.036E-09
NNE	1.557E-07	3.973E-08	3.309E-08	2.987E-08	2.448E-08	1.435E-08	9.814E-09

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.654E-08	1.251E-08	4.774E-09	2.790E-09	2.543E-09	2.238E-09	1.913E-09
NNW	3.038E-08	2.323E-08	9.148E-09	5.425E-09	4.956E-09	4.373E-09	3.728E-09
NW	5.336E-08	4.115E-08	1.657E-08	9.939E-09	9.094E-09	8.037E-09	6.825E-09
WNW	4.073E-08	3.153E-08	1.283E-08	7.728E-09	7.072E-09	6.248E-09	5.289E-09
W	1.783E-08	1.368E-08	5.470E-09	3.269E-09	2.993E-09	2.652E-09	2.285E-09
WSW	1.412E-08	1.081E-08	4.271E-09	2.538E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.503E-08	1.148E-08	4.494E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.129E-08	8.597E-09	3.327E-09	1.956E-09	1.784E-09	1.570E-09	1.326E-09
S	4.651E-09	3.491E-09	1.330E-09	7.895E-10	7.232E-10	6.432E-10	5.585E-10
SSE	4.937E-09	3.733E-09	1.450E-09	8.611E-10	7.886E-10	7.008E-10	6.108E-10
SE	4.406E-09	3.341E-09	1.303E-09	7.716E-10	7.061E-10	6.268E-10	5.450E-10
ESE	4.615E-09	3.488E-09	1.341E-09	7.865E-10	7.178E-10	6.342E-10	5.488E-10
E	7.039E-09	5.371E-09	2.135E-09	1.277E-09	1.171E-09	1.042E-09	9.090E-10
ENE	8.025E-09	6.031E-09	2.296E-09	1.344E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.178E-09	1.279E-09	1.171E-09	1.043E-09	9.169E-10
NNE	8.257E-09	6.161E-09	2.312E-09	1.355E-09	1.240E-09	1.103E-09	9.699E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.519E-09	3.311E-09	3.017E-09	2.759E-09	2.617E-09	2.605E-09
NW	6.449E-09	6.076E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.000E-09	4.712E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.699E-09	1.598E-09	1.454E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.251E-09	1.175E-09	1.069E-09	9.760E-10	9.249E-10	9.205E-10
S	5.274E-10	4.965E-10	4.534E-10	4.158E-10	3.955E-10	3.938E-10
SSE	5.767E-10	5.429E-10	4.955E-10	4.541E-10	4.317E-10	4.298E-10
SE	5.142E-10	4.837E-10	4.410E-10	4.037E-10	3.835E-10	3.818E-10
ESE	5.172E-10	4.859E-10	4.419E-10	4.035E-10	3.826E-10	3.808E-10
E	8.588E-10	8.090E-10	7.393E-10	6.784E-10	6.453E-10	6.425E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.696E-10
NE	8.647E-10	8.131E-10	7.412E-10	6.790E-10	6.454E-10	6.426E-10
NNE	9.147E-10	8.601E-10	7.840E-10	7.182E-10	6.828E-10	6.798E-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	2000	4500	5100	5450	6200	8850	11500
N	2.768E-07	7.644E-08	6.382E-08	5.780E-08	4.766E-08	2.818E-08	1.950E-08
NNW	4.750E-07	1.364E-07	1.140E-07	1.035E-07	8.567E-08	5.096E-08	3.560E-08
NW	7.839E-07	2.330E-07	1.952E-07	1.775E-07	1.475E-07	8.834E-08	6.221E-08
WNW	5.850E-07	1.756E-07	1.474E-07	1.341E-07	1.115E-07	6.697E-08	4.736E-08
W	2.777E-07	7.934E-08	6.637E-08	6.026E-08	4.992E-08	2.977E-08	2.086E-08
WSW	2.184E-07	6.275E-08	5.258E-08	4.776E-08	3.959E-08	2.363E-08	1.654E-08
SW	2.329E-07	6.719E-08	5.624E-08	5.107E-08	4.232E-08	2.520E-08	1.761E-08
SSW	1.773E-07	5.086E-08	4.257E-08	3.864E-08	3.199E-08	1.904E-08	1.326E-08
S	8.577E-08	2.228E-08	1.853E-08	1.672E-08	1.371E-08	8.025E-09	5.510E-09
SSE	8.658E-08	2.290E-08	1.912E-08	1.730E-08	1.424E-08	8.412E-09	5.823E-09
SE	7.569E-08	1.990E-08	1.671E-08	1.513E-08	1.249E-08	7.454E-09	5.188E-09
ESE	8.052E-08	2.119E-08	1.776E-08	1.608E-08	1.326E-08	7.855E-09	5.442E-09
E	1.159E-07	3.113E-08	2.621E-08	2.379E-08	1.970E-08	1.181E-08	8.259E-09
ENE	1.419E-07	3.710E-08	3.106E-08	2.812E-08	2.317E-08	1.376E-08	9.500E-09
NE	1.396E-07	3.544E-08	2.971E-08	2.686E-08	2.210E-08	1.311E-08	9.036E-09
NNE	1.559E-07	3.974E-08	3.310E-08	2.988E-08	2.448E-08	1.435E-08	9.814E-09

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.655E-08	1.251E-08	4.774E-09	2.790E-09	2.543E-09	2.238E-09	1.912E-09
NNW	3.040E-08	2.324E-08	9.150E-09	5.426E-09	4.957E-09	4.373E-09	3.728E-09
NW	5.340E-08	4.117E-08	1.658E-08	9.942E-09	9.097E-09	8.039E-09	6.825E-09
WNW	4.076E-08	3.156E-08	1.284E-08	7.731E-09	7.075E-09	6.250E-09	5.289E-09
W	1.784E-08	1.368E-08	5.471E-09	3.270E-09	2.993E-09	2.653E-09	2.285E-09
WSW	1.413E-08	1.081E-08	4.272E-09	2.539E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.504E-08	1.149E-08	4.495E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.130E-08	8.601E-09	3.328E-09	1.956E-09	1.784E-09	1.570E-09	1.326E-09
S	4.652E-09	3.492E-09	1.331E-09	7.895E-10	7.232E-10	6.432E-10	5.584E-10
SSE	4.938E-09	3.734E-09	1.451E-09	8.611E-10	7.886E-10	7.008E-10	6.108E-10
SE	4.407E-09	3.342E-09	1.303E-09	7.716E-10	7.061E-10	6.268E-10	5.450E-10
ESE	4.615E-09	3.488E-09	1.341E-09	7.864E-10	7.177E-10	6.341E-10	5.487E-10
E	7.041E-09	5.372E-09	2.136E-09	1.277E-09	1.171E-09	1.042E-09	9.090E-10
ENE	8.025E-09	6.030E-09	2.296E-09	1.344E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.177E-09	1.279E-09	1.171E-09	1.042E-09	9.168E-10
NNE	8.257E-09	6.161E-09	2.312E-09	1.355E-09	1.240E-09	1.103E-09	9.698E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.518E-09	3.310E-09	3.017E-09	2.759E-09	2.617E-09	2.605E-09
NW	6.450E-09	6.076E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.000E-09	4.712E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.699E-09	1.598E-09	1.454E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.250E-09	1.175E-09	1.069E-09	9.759E-10	9.248E-10	9.204E-10
S	5.273E-10	4.965E-10	4.533E-10	4.158E-10	3.954E-10	3.937E-10
SSE	5.766E-10	5.428E-10	4.954E-10	4.541E-10	4.316E-10	4.297E-10
SE	5.142E-10	4.837E-10	4.409E-10	4.037E-10	3.834E-10	3.817E-10
ESE	5.171E-10	4.858E-10	4.418E-10	4.034E-10	3.825E-10	3.807E-10
E	8.588E-10	8.090E-10	7.392E-10	6.784E-10	6.452E-10	6.424E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.695E-10
NE	8.646E-10	8.130E-10	7.411E-10	6.789E-10	6.453E-10	6.425E-10
NNE	9.145E-10	8.600E-10	7.839E-10	7.181E-10	6.827E-10	6.797E-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	2000	4500	5100	5450	6200	8850	11500
N	2.764E-07	7.642E-08	6.380E-08	5.779E-08	4.765E-08	2.818E-08	1.951E-08
NNW	4.726E-07	1.362E-07	1.138E-07	1.033E-07	8.556E-08	5.092E-08	3.558E-08
NW	7.783E-07	2.323E-07	1.947E-07	1.771E-07	1.472E-07	8.822E-08	6.215E-08
WNW	5.806E-07	1.751E-07	1.470E-07	1.338E-07	1.113E-07	6.688E-08	4.730E-08
W	2.759E-07	7.915E-08	6.622E-08	6.014E-08	4.984E-08	2.973E-08	2.084E-08
WSW	2.171E-07	6.260E-08	5.247E-08	4.767E-08	3.953E-08	2.361E-08	1.653E-08
SW	2.317E-07	6.705E-08	5.614E-08	5.099E-08	4.226E-08	2.518E-08	1.760E-08
SSW	1.764E-07	5.075E-08	4.249E-08	3.857E-08	3.195E-08	1.903E-08	1.325E-08
S	8.557E-08	2.226E-08	1.851E-08	1.671E-08	1.370E-08	8.023E-09	5.508E-09
SSE	8.629E-08	2.288E-08	1.910E-08	1.728E-08	1.423E-08	8.409E-09	5.821E-09
SE	7.548E-08	1.988E-08	1.669E-08	1.512E-08	1.248E-08	7.452E-09	5.187E-09
ESE	8.034E-08	2.117E-08	1.775E-08	1.607E-08	1.325E-08	7.854E-09	5.442E-09
E	1.154E-07	3.108E-08	2.617E-08	2.375E-08	1.968E-08	1.180E-08	8.255E-09
ENE	1.415E-07	3.710E-08	3.106E-08	2.812E-08	2.318E-08	1.377E-08	9.506E-09
NE	1.392E-07	3.541E-08	2.969E-08	2.685E-08	2.209E-08	1.311E-08	9.036E-09
NNE	1.557E-07	3.973E-08	3.309E-08	2.987E-08	2.448E-08	1.435E-08	9.815E-09

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.655E-08	1.251E-08	4.775E-09	2.791E-09	2.543E-09	2.238E-09	1.913E-09
NNW	3.038E-08	2.323E-08	9.148E-09	5.426E-09	4.956E-09	4.373E-09	3.728E-09
NW	5.335E-08	4.114E-08	1.657E-08	9.938E-09	9.093E-09	8.037E-09	6.825E-09
WNW	4.071E-08	3.152E-08	1.283E-08	7.727E-09	7.072E-09	6.248E-09	5.289E-09
W	1.783E-08	1.367E-08	5.469E-09	3.268E-09	2.992E-09	2.652E-09	2.285E-09
WSW	1.412E-08	1.081E-08	4.271E-09	2.538E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.503E-08	1.148E-08	4.494E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.129E-08	8.597E-09	3.327E-09	1.956E-09	1.784E-09	1.570E-09	1.327E-09
S	4.651E-09	3.491E-09	1.331E-09	7.896E-10	7.233E-10	6.433E-10	5.585E-10
SSE	4.936E-09	3.733E-09	1.450E-09	8.611E-10	7.886E-10	7.009E-10	6.109E-10
SE	4.406E-09	3.341E-09	1.303E-09	7.716E-10	7.061E-10	6.269E-10	5.451E-10
ESE	4.615E-09	3.488E-09	1.341E-09	7.865E-10	7.178E-10	6.342E-10	5.489E-10
E	7.037E-09	5.370E-09	2.135E-09	1.277E-09	1.171E-09	1.042E-09	9.089E-10
ENE	8.030E-09	6.034E-09	2.297E-09	1.345E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.178E-09	1.279E-09	1.171E-09	1.043E-09	9.170E-10
NNE	8.258E-09	6.162E-09	2.313E-09	1.355E-09	1.240E-09	1.103E-09	9.700E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.519E-09	3.311E-09	3.018E-09	2.760E-09	2.618E-09	2.606E-09
NW	6.449E-09	6.075E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	4.999E-09	4.711E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.616E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.700E-09	1.598E-09	1.455E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.251E-09	1.175E-09	1.069E-09	9.761E-10	9.249E-10	9.206E-10
S	5.274E-10	4.966E-10	4.534E-10	4.158E-10	3.955E-10	3.938E-10
SSE	5.767E-10	5.429E-10	4.955E-10	4.542E-10	4.317E-10	4.298E-10
SE	5.143E-10	4.838E-10	4.410E-10	4.037E-10	3.835E-10	3.818E-10
ESE	5.172E-10	4.859E-10	4.419E-10	4.035E-10	3.826E-10	3.808E-10
E	8.587E-10	8.090E-10	7.392E-10	6.783E-10	6.452E-10	6.424E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.695E-10
NE	8.648E-10	8.132E-10	7.412E-10	6.790E-10	6.455E-10	6.427E-10
NNE	9.147E-10	8.602E-10	7.841E-10	7.183E-10	6.828E-10	6.798E-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	2000	4500	5100	5450	6200	8850	11500
N	2.771E-07	7.650E-08	6.386E-08	5.784E-08	4.769E-08	2.819E-08	1.951E-08
NNW	4.743E-07	1.364E-07	1.140E-07	1.035E-07	8.565E-08	5.095E-08	3.559E-08
NW	7.820E-07	2.328E-07	1.951E-07	1.774E-07	1.474E-07	8.831E-08	6.220E-08
WNW	5.836E-07	1.754E-07	1.472E-07	1.340E-07	1.115E-07	6.695E-08	4.734E-08
W	2.769E-07	7.926E-08	6.631E-08	6.021E-08	4.989E-08	2.975E-08	2.085E-08
WSW	2.180E-07	6.270E-08	5.254E-08	4.773E-08	3.957E-08	2.363E-08	1.654E-08
SW	2.326E-07	6.716E-08	5.622E-08	5.106E-08	4.230E-08	2.520E-08	1.761E-08
SSW	1.771E-07	5.084E-08	4.255E-08	3.863E-08	3.198E-08	1.904E-08	1.326E-08
S	8.575E-08	2.228E-08	1.853E-08	1.672E-08	1.371E-08	8.026E-09	5.510E-09
SSE	8.648E-08	2.290E-08	1.911E-08	1.729E-08	1.423E-08	8.411E-09	5.822E-09
SE	7.564E-08	1.989E-08	1.671E-08	1.513E-08	1.249E-08	7.454E-09	5.188E-09
ESE	8.049E-08	2.119E-08	1.776E-08	1.608E-08	1.326E-08	7.855E-09	5.442E-09
E	1.157E-07	3.111E-08	2.619E-08	2.377E-08	1.969E-08	1.180E-08	8.257E-09
ENE	1.417E-07	3.711E-08	3.107E-08	2.813E-08	2.318E-08	1.377E-08	9.506E-09
NE	1.394E-07	3.543E-08	2.970E-08	2.686E-08	2.210E-08	1.311E-08	9.036E-09
NNE	1.559E-07	3.974E-08	3.310E-08	2.988E-08	2.448E-08	1.435E-08	9.815E-09

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.655E-08	1.251E-08	4.775E-09	2.791E-09	2.543E-09	2.238E-09	1.913E-09
NNW	3.040E-08	2.324E-08	9.150E-09	5.427E-09	4.957E-09	4.374E-09	3.728E-09
NW	5.339E-08	4.117E-08	1.658E-08	9.941E-09	9.096E-09	8.039E-09	6.825E-09
WNW	4.075E-08	3.155E-08	1.283E-08	7.730E-09	7.074E-09	6.250E-09	5.289E-09
W	1.784E-08	1.368E-08	5.470E-09	3.269E-09	2.993E-09	2.652E-09	2.285E-09
WSW	1.413E-08	1.081E-08	4.272E-09	2.539E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.503E-08	1.149E-08	4.495E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.130E-08	8.601E-09	3.328E-09	1.956E-09	1.784E-09	1.570E-09	1.326E-09
S	4.652E-09	3.492E-09	1.331E-09	7.896E-10	7.232E-10	6.432E-10	5.584E-10
SSE	4.937E-09	3.734E-09	1.451E-09	8.611E-10	7.886E-10	7.008E-10	6.108E-10
SE	4.407E-09	3.342E-09	1.303E-09	7.716E-10	7.061E-10	6.269E-10	5.450E-10
ESE	4.615E-09	3.489E-09	1.341E-09	7.865E-10	7.178E-10	6.341E-10	5.488E-10
E	7.039E-09	5.371E-09	2.135E-09	1.277E-09	1.171E-09	1.042E-09	9.089E-10
ENE	8.030E-09	6.034E-09	2.297E-09	1.345E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.178E-09	1.279E-09	1.171E-09	1.043E-09	9.168E-10
NNE	8.257E-09	6.161E-09	2.312E-09	1.355E-09	1.240E-09	1.103E-09	9.698E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.519E-09	3.311E-09	3.017E-09	2.759E-09	2.617E-09	2.605E-09
NW	6.449E-09	6.076E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.000E-09	4.712E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.699E-09	1.598E-09	1.454E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.251E-09	1.175E-09	1.069E-09	9.760E-10	9.248E-10	9.205E-10
S	5.273E-10	4.965E-10	4.533E-10	4.158E-10	3.954E-10	3.937E-10
SSE	5.767E-10	5.429E-10	4.955E-10	4.541E-10	4.316E-10	4.297E-10
SE	5.142E-10	4.837E-10	4.410E-10	4.037E-10	3.834E-10	3.817E-10
ESE	5.171E-10	4.858E-10	4.418E-10	4.034E-10	3.825E-10	3.808E-10
E	8.587E-10	8.090E-10	7.392E-10	6.783E-10	6.452E-10	6.424E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.695E-10
NE	8.646E-10	8.131E-10	7.411E-10	6.789E-10	6.454E-10	6.425E-10
NNE	9.146E-10	8.600E-10	7.840E-10	7.181E-10	6.827E-10	6.797E-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	2000	4500	5100	5450	6200	8850	11500
N	2.767E-07	7.644E-08	6.382E-08	5.780E-08	4.766E-08	2.818E-08	1.951E-08
NNW	4.738E-07	1.363E-07	1.139E-07	1.034E-07	8.561E-08	5.094E-08	3.559E-08
NW	7.811E-07	2.326E-07	1.950E-07	1.773E-07	1.474E-07	8.828E-08	6.218E-08
WNW	5.828E-07	1.753E-07	1.472E-07	1.339E-07	1.114E-07	6.693E-08	4.733E-08
W	2.768E-07	7.924E-08	6.629E-08	6.020E-08	4.988E-08	2.975E-08	2.085E-08
WSW	2.178E-07	6.268E-08	5.252E-08	4.771E-08	3.956E-08	2.362E-08	1.653E-08
SW	2.323E-07	6.713E-08	5.620E-08	5.103E-08	4.229E-08	2.519E-08	1.760E-08
SSW	1.768E-07	5.081E-08	4.253E-08	3.861E-08	3.197E-08	1.904E-08	1.326E-08
S	8.567E-08	2.227E-08	1.852E-08	1.672E-08	1.370E-08	8.024E-09	5.509E-09
SSE	8.643E-08	2.289E-08	1.911E-08	1.729E-08	1.423E-08	8.410E-09	5.822E-09
SE	7.559E-08	1.989E-08	1.670E-08	1.513E-08	1.249E-08	7.453E-09	5.187E-09
ESE	8.044E-08	2.118E-08	1.776E-08	1.608E-08	1.325E-08	7.854E-09	5.442E-09
E	1.156E-07	3.111E-08	2.619E-08	2.377E-08	1.969E-08	1.180E-08	8.257E-09
ENE	1.417E-07	3.710E-08	3.107E-08	2.812E-08	2.318E-08	1.377E-08	9.504E-09
NE	1.394E-07	3.542E-08	2.970E-08	2.686E-08	2.210E-08	1.311E-08	9.036E-09
NNE	1.558E-07	3.974E-08	3.310E-08	2.987E-08	2.448E-08	1.435E-08	9.815E-09

Distance (meters)

Dir	13000	16000	32500	48500	51750	56250	61500
N	1.655E-08	1.251E-08	4.775E-09	2.791E-09	2.543E-09	2.238E-09	1.913E-09
NNW	3.039E-08	2.323E-08	9.149E-09	5.426E-09	4.956E-09	4.373E-09	3.728E-09
NW	5.338E-08	4.116E-08	1.658E-08	9.940E-09	9.095E-09	8.038E-09	6.825E-09
WNW	4.074E-08	3.154E-08	1.283E-08	7.729E-09	7.073E-09	6.249E-09	5.289E-09
W	1.783E-08	1.368E-08	5.470E-09	3.269E-09	2.993E-09	2.652E-09	2.285E-09
WSW	1.413E-08	1.081E-08	4.271E-09	2.538E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.503E-08	1.149E-08	4.494E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.130E-08	8.599E-09	3.327E-09	1.956E-09	1.784E-09	1.570E-09	1.326E-09
S	4.652E-09	3.492E-09	1.331E-09	7.896E-10	7.232E-10	6.432E-10	5.585E-10
SSE	4.937E-09	3.734E-09	1.451E-09	8.611E-10	7.886E-10	7.008E-10	6.108E-10
SE	4.407E-09	3.342E-09	1.303E-09	7.716E-10	7.061E-10	6.269E-10	5.450E-10
ESE	4.615E-09	3.488E-09	1.341E-09	7.865E-10	7.178E-10	6.342E-10	5.488E-10
E	7.039E-09	5.371E-09	2.135E-09	1.277E-09	1.171E-09	1.042E-09	9.089E-10
ENE	8.028E-09	6.033E-09	2.297E-09	1.345E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.178E-09	1.279E-09	1.171E-09	1.043E-09	9.169E-10
NNE	8.257E-09	6.161E-09	2.312E-09	1.355E-09	1.240E-09	1.103E-09	9.699E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.519E-09	3.311E-09	3.017E-09	2.759E-09	2.618E-09	2.605E-09
NW	6.449E-09	6.076E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.000E-09	4.712E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.699E-09	1.598E-09	1.454E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.251E-09	1.175E-09	1.069E-09	9.760E-10	9.249E-10	9.205E-10
S	5.273E-10	4.965E-10	4.534E-10	4.158E-10	3.954E-10	3.937E-10
SSE	5.767E-10	5.429E-10	4.955E-10	4.541E-10	4.317E-10	4.298E-10
SE	5.142E-10	4.837E-10	4.410E-10	4.037E-10	3.835E-10	3.817E-10
ESE	5.172E-10	4.858E-10	4.419E-10	4.035E-10	3.826E-10	3.808E-10
E	8.587E-10	8.090E-10	7.392E-10	6.783E-10	6.452E-10	6.424E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.695E-10
NE	8.647E-10	8.131E-10	7.412E-10	6.789E-10	6.454E-10	6.426E-10
NNE	9.146E-10	8.601E-10	7.840E-10	7.182E-10	6.827E-10	6.797E-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	2000	4500	5100	5450	6200	8850	11500
N	2.768E-07	7.647E-08	6.384E-08	5.782E-08	4.767E-08	2.819E-08	1.951E-08
NNW	4.737E-07	1.363E-07	1.139E-07	1.034E-07	8.561E-08	5.094E-08	3.559E-08
NW	7.808E-07	2.326E-07	1.950E-07	1.773E-07	1.473E-07	8.828E-08	6.218E-08
WNW	5.825E-07	1.753E-07	1.471E-07	1.339E-07	1.114E-07	6.692E-08	4.733E-08
W	2.766E-07	7.922E-08	6.628E-08	6.019E-08	4.987E-08	2.975E-08	2.085E-08
WSW	2.177E-07	6.267E-08	5.252E-08	4.771E-08	3.956E-08	2.362E-08	1.653E-08
SW	2.323E-07	6.712E-08	5.619E-08	5.103E-08	4.229E-08	2.519E-08	1.760E-08
SSW	1.768E-07	5.080E-08	4.253E-08	3.861E-08	3.197E-08	1.904E-08	1.326E-08
S	8.568E-08	2.227E-08	1.852E-08	1.672E-08	1.370E-08	8.024E-09	5.509E-09
SSE	8.641E-08	2.289E-08	1.911E-08	1.729E-08	1.423E-08	8.410E-09	5.822E-09
SE	7.558E-08	1.989E-08	1.670E-08	1.513E-08	1.249E-08	7.453E-09	5.187E-09
ESE	8.044E-08	2.118E-08	1.776E-08	1.608E-08	1.326E-08	7.854E-09	5.442E-09
E	1.156E-07	3.110E-08	2.618E-08	2.377E-08	1.969E-08	1.180E-08	8.257E-09
ENE	1.416E-07	3.711E-08	3.107E-08	2.813E-08	2.318E-08	1.377E-08	9.506E-09
NE	1.394E-07	3.542E-08	2.970E-08	2.686E-08	2.210E-08	1.311E-08	9.036E-09
NNE	1.558E-07	3.974E-08	3.310E-08	2.987E-08	2.448E-08	1.435E-08	9.815E-09

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.655E-08	1.251E-08	4.775E-09	2.791E-09	2.543E-09	2.238E-09	1.913E-09
NNW	3.039E-08	2.323E-08	9.150E-09	5.426E-09	4.957E-09	4.374E-09	3.728E-09
NW	5.338E-08	4.115E-08	1.658E-08	9.940E-09	9.095E-09	8.038E-09	6.825E-09
WNW	4.074E-08	3.154E-08	1.283E-08	7.729E-09	7.073E-09	6.249E-09	5.289E-09
W	1.783E-08	1.368E-08	5.470E-09	3.269E-09	2.993E-09	2.652E-09	2.285E-09
WSW	1.413E-08	1.081E-08	4.271E-09	2.538E-09	2.320E-09	2.050E-09	1.747E-09
SW	1.503E-08	1.149E-08	4.495E-09	2.654E-09	2.421E-09	2.131E-09	1.802E-09
SSW	1.130E-08	8.599E-09	3.327E-09	1.956E-09	1.784E-09	1.570E-09	1.326E-09
S	4.652E-09	3.492E-09	1.331E-09	7.896E-10	7.233E-10	6.433E-10	5.585E-10
SSE	4.937E-09	3.734E-09	1.451E-09	8.611E-10	7.886E-10	7.009E-10	6.109E-10
SE	4.407E-09	3.342E-09	1.303E-09	7.716E-10	7.061E-10	6.269E-10	5.450E-10
ESE	4.615E-09	3.488E-09	1.341E-09	7.865E-10	7.178E-10	6.342E-10	5.488E-10
E	7.039E-09	5.371E-09	2.135E-09	1.277E-09	1.171E-09	1.042E-09	9.089E-10
ENE	8.030E-09	6.034E-09	2.297E-09	1.345E-09	1.230E-09	1.093E-09	9.576E-10
NE	7.626E-09	5.721E-09	2.178E-09	1.279E-09	1.171E-09	1.043E-09	9.169E-10
NNE	8.257E-09	6.161E-09	2.312E-09	1.355E-09	1.240E-09	1.103E-09	9.699E-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	64250	67250	72000	76750	79600	79850
N	1.802E-09	1.693E-09	1.539E-09	1.404E-09	1.330E-09	1.324E-09
NNW	3.519E-09	3.311E-09	3.017E-09	2.759E-09	2.618E-09	2.605E-09
NW	6.449E-09	6.076E-09	5.548E-09	5.082E-09	4.825E-09	4.803E-09
WNW	5.000E-09	4.712E-09	4.304E-09	3.943E-09	3.743E-09	3.726E-09
W	2.159E-09	2.033E-09	1.857E-09	1.702E-09	1.617E-09	1.609E-09
WSW	1.649E-09	1.552E-09	1.415E-09	1.295E-09	1.229E-09	1.223E-09
SW	1.700E-09	1.598E-09	1.454E-09	1.328E-09	1.259E-09	1.253E-09
SSW	1.251E-09	1.175E-09	1.069E-09	9.760E-10	9.249E-10	9.205E-10
S	5.273E-10	4.965E-10	4.534E-10	4.158E-10	3.954E-10	3.937E-10
SSE	5.767E-10	5.429E-10	4.955E-10	4.541E-10	4.317E-10	4.298E-10
SE	5.142E-10	4.837E-10	4.410E-10	4.037E-10	3.835E-10	3.817E-10
ESE	5.172E-10	4.858E-10	4.419E-10	4.035E-10	3.826E-10	3.808E-10
E	8.587E-10	8.090E-10	7.392E-10	6.783E-10	6.452E-10	6.424E-10
ENE	9.028E-10	8.487E-10	7.732E-10	7.078E-10	6.725E-10	6.695E-10
NE	8.647E-10	8.131E-10	7.412E-10	6.789E-10	6.454E-10	6.426E-10
NNE	9.146E-10	8.601E-10	7.840E-10	7.182E-10	6.827E-10	6.798E-10

Periodic Confirmatory Measurement Compliance Report for Calendar Year 2023

DOE/WIPP-24-3638
Revision 0

United States Department of Energy
Carlsbad Field Office

June 2024

Change History Summary

Revision Number	Description of Changes
0	Initial issue.

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Summary

The United States (U.S.) Department of Energy (DOE) Carlsbad Field Office (CBFO) has oversight and stewardship duties associated with the Waste Isolation Pilot Plant (WIPP). Facility operations include radiological operations that potentially emit low levels of radioactive materials.

This report documents compliance with regulations documented in the *Memorandum of Understanding Between the U.S. Environmental Protection Agency and the U.S. Department of Energy concerning the Clean Air Act Emission Standards for Radionuclides 40 CFR Part 61 Including Subparts H, I, Q & T,* dated May 16, 1995 (DOE, 1995) and Title 40, Protection of the Environment, of the 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." Compliance is determined by comparing the calculated effective dose equivalent (EDE) for the maximally exposed individual (MEI) member of the public to the regulatory limit of 0.1 millirems per year (mrem/yr) U.S. Environmental Protection Agency (EPA) standard for periodic confirmatory monitoring (DOE, 1995).

The EDE to the WIPP MEI due to routine operations in 2023 was 6.30E-05 mrem. This MEI is a temporary workspace at the Safety Significant Confinement Ventilation System (SSCVS) project. For continuity, since this workspace is temporary, the DOE has provided the EDE to the historical maximally exposed off-site individual (MEOSI). The EDE to the MEOSI due to routine operations in 2023 was 1.98E-06 mrem. No non-routine emissions occurred in 2023.

For further information concerning this report, please contact Zachary Lepchitz, U.S. Department of Energy, Carlsbad Field Office, by telephone at (575) 266-6644 or by email at Zachary.Lepchitz@cbfo.doe.govmailto:.

Certification of DOE/WIPP-24-3638

Waste Isolation Pilot Plant
Carlsbad Field Office
Periodic Confirmatory Measurement Compliance Report
Calendar Year 2023

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. [verbatim from 40 CFR 61, Subpart H, 61.94(b)(9)].

/Signature on file/	6/27/2024
Mark Bollinger, Manager U.S. Department of Energy Carlsbad Field Office	Date

Acronyms and Abbreviations

AIRDOS-PC	Atmospheric Dispersion of Radionuclides – Personal Computer
AIS	Air Intake Shaft
°C	degrees Celsius
CAP88-PC	Clean Air Act Assessment Package – 1988 Personal Computer
CBFO	Carlsbad Field Office
CFR	Code of Federal Regulations
Ci/yr	curies per year
cm/yr	centimeters per year
CY	Calendar Year
DOE	Department of Energy
EDE	effective dose equivalent
EPA	Environmental Protection Agency
FAS	Fixed Air Sampler
g/m^3	grams per cubic meter
HEPA	high-efficiency particulate air
ICRP	International Commission on Radiological Protection
km	kilometer
µm	micrometer
m	meter
MEI	maximally exposed individual
MEOSI	maximally exposed off-site individual
mrem/yr	millirem per year
PAS	Portable Air Sampler
PIC	Potential Impact Category
SDD	System Design Description
SHS	Salt Handling Shaft
SSCVS	Safety Significant Confinement Ventilation System
SVS	Supplemental Ventilation System
TRU	transuranic
U.S.	United States
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant

13.0 INTRODUCTION

This report satisfies the reporting requirements established by the Memorandum of Understanding between the EPA and the DOE dated May 16, 1995 (DOE, 1995). The Memorandum of Understanding applies to the provisions of CFR Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities" for radionuclides at the WIPP. In addition, this report demonstrates DOE compliance with the standards provided in 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage." Emission monitoring and compliance procedures for DOE facilities (40 CFR §61.93[a]) require the use of Clean Air Act Assessment Package - 1988 Personal Computer (CAP88-PC), Atmospheric Dispersion of Radionuclides – Personal Computer (AIRDOS-PC) computer models, or other approved procedures, to calculate effective dose equivalent values to members of the public. The CAP88-PC computer model is a set of computer programs, databases, and associated utility programs used to estimate the dose and risk from radionuclide emissions into the air (Trinity, 2019). The CAP88-PC, Version 4.1.1.0, dose assessment computer model was used to calculate the doses reported in this document. The CAP88-PC output data is provided in Addendum A.

14.0 COMPLIANCE

Calculations made using the above-referenced code indicate that the EDE to the MEI resulting from normal operations at this facility is 6.30E-05 mrem/yr. For calendar year (CY) 2023, the MEI is a non-resident, non-WIPP worker at the SSCVS construction site. This location is the SSCVS construction office trailer, the nearest occupied point on this construction site. This point is 0.21 miles (330 meters [m]) east-southeast of the Station B stack. The EDE is below the 10 mrem/yr emission standard stated in 40 CFR §61.92. This individual's maximum dose to the critical organ (bone surface) is calculated to be 1.75E-03 mrem/yr. Both the EDE and maximum dose to the critical organ for this individual are below the 25 mrem/yr and 75 mrem/yr limit for the whole body and critical organ, respectively, as stated in 40 CFR §191.03(b).

To provide reference point continuity, since the workspace mentioned above is temporary, the DOE is providing the EDE to the historical MEOSI (i.e., before 2019). This individual is a resident living 5.5 miles (8.85 kilometers [km]) west-northwest of the Station B stack. The EDE to this resident, resulting from normal operations at this facility, is calculated to be 1.98E-06 mrem/yr. The maximum dose to this resident's critical organ (bone surface) is calculated to be 5.25E-05 mrem/yr. In addition, the EDE and maximum dose to the critical organ are below the 25 mrem/yr and 75 mrem/yr limit for the whole body and critical organ, respectively, as stated in 40 CFR §191.03(b). The dose to this resident, however, is not the maximum exposure to a member of the public.

The EDE to a hypothetical member of the public resulting from normal operations conducted at this facility at the maximum point of exposure, 0.51 miles (822 m) northwest at the Exclusive Use Area fence line, is calculated to be 9.44E-05 mrem/yr. This hypothetical individual's maximum dose to the critical organ (bone surface) is calculated to be 2.61E-03 mrem/yr. The EDE and maximum dose to the critical organ are below the 25 mrem/yr and 75 mrem/yr limit for the whole body and critical organ, respectively, as stated in 40 CFR §191.03(b). Since this is a

hypothetical individual, referencing compliance with 40 CFR §191.03(b), this dose estimate does not meet the specified directive to calculate a realistic dose to an actual member of the public, as required by 40 CFR Part 61, Subpart H.

15.0 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

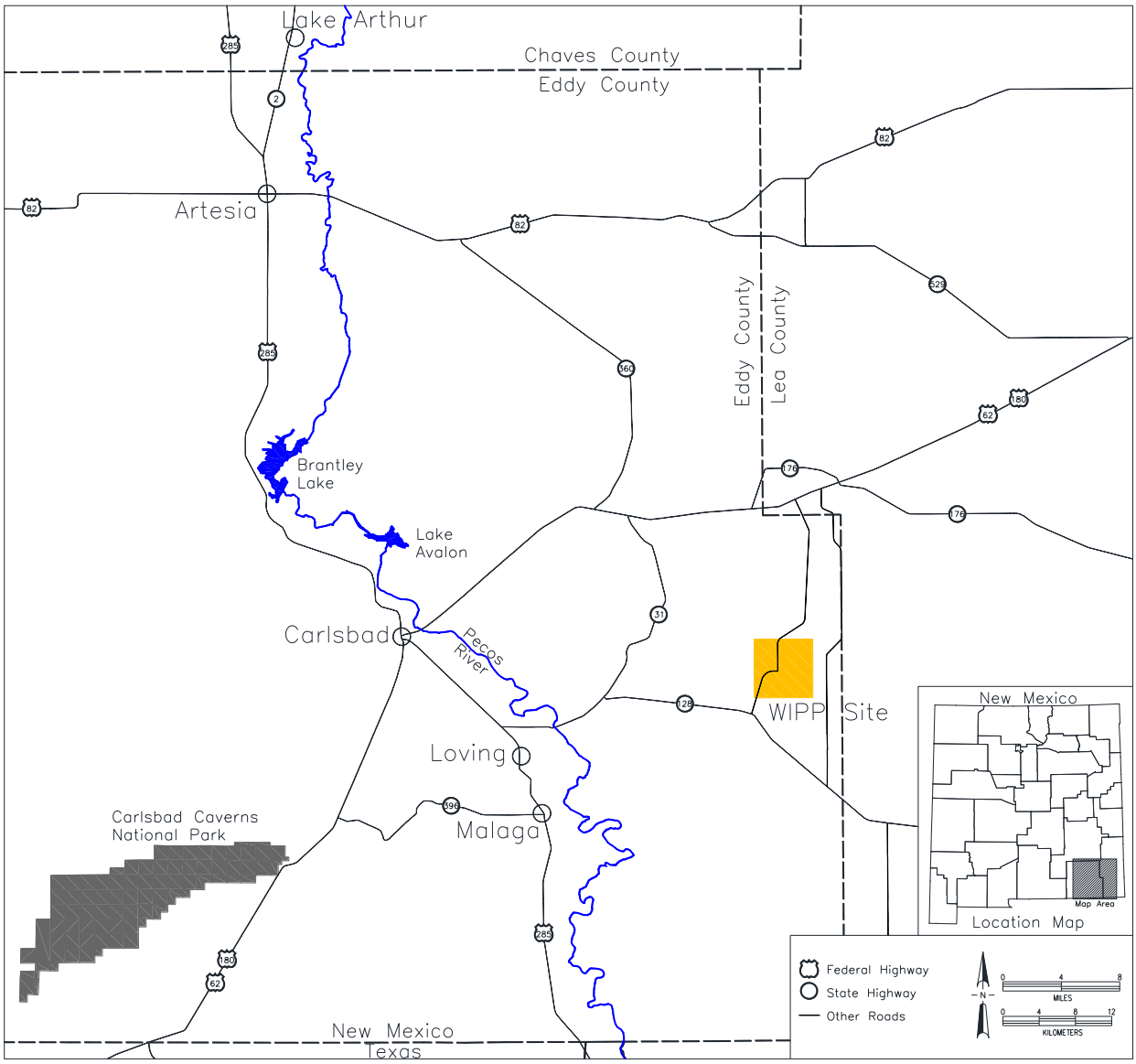

Figure 1. Waste Isolation Pilot Plant in Southeast New Mexico

16.0 RADIOACTIVE MATERIALS USED

Transuranic (TRU) and TRU mixed waste is managed, stored, and disposed of at the WIPP. The 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 do not involve handling loose radioactive material. Waste containers, including installed filtered gas-relief vents, are sealed at the waste-generating facilities and remain sealed during disposal. 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, 2022). It therefore does 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 waste managed at the WIPP.

Small quantities (i.e., activities) of radioactive materials (mostly sealed sources) are used at the WIPP 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.

Tables 1 through 3 show a summary of CY 2023 radiological air emission source term quantities, in curies per year (Ci/yr) by radionuclide and emission point, for the underground repository and the Waste Handling Building (WHB), respectively.

17.0 SUMMARY OF THE SOURCE TERM FROM WIPP OPERATIONS

Table 1. CY 2023 Summary of Radionuclide Effluents from Underground Areas During Unfiltered Ventilation

Station	Radionuclide	Activity Release (Ci/yr)[1]	Particle Size (µm)[2]	Class (F, M, S)[3]
H	^{238}Pu	2.15E-07	1	M
H	$^{239/240}$Pu	5.63E-08	1	M
H	^{241}Am	3.80E-07	1	M
H	^{90}Sr	2.44E-07	1	M
H	^{137}Cs	6.87E-07	1	F
H	$^{233/234}$U	4.03E-08	1	M
H	^{238}U	1.60E-08	1	M

1 Transmission factors have been applied in accordance with the System Design Description (SDD) for Station H (Blunt Consulting, 2022). The factors are applied to the data to account for depositional losses based on the system's design.

2 The default particle size of one micrometer (µm) is used for inhaled particles.

3 Absorption Type: These 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), and Federal Guidance Report No. 13 (EPA, 1999). Default values are used unless specific documented information supports the use of another type.

Table 2. CY 2023 Summary of Radionuclide Effluents from Underground Areas During Filtered Ventilation

Station	Radionuclide	Activity Release (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
B	^{238}Pu	6.05E-09	1	M
B	$^{239/240}$Pu	3.64E-08	1	M
B	^{241}Am	1.76E-07	1	M
B	^{90}Sr	4.20E-07	1	M
B	^{137}Cs	1.24E-06	1	F
B	$^{233/234}$U	2.00E-08	1	M
B	^{238}U	1.42E-08	1	M

1 The default particle size of one micrometer is used for inhaled particles.
2 Absorption Type: These 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 ICRP Publication 66 (ICRP, 1994), and Federal Guidance Report No. 13 (EPA, 1999). Default values are used unless specific documented information supports the use of another type.

Table 3. CY 2023 Summary of Radionuclide Effluents from the Waste Handling Building

Station	Radionuclide	Activity Release (Ci/yr)	Particle Size (µm)[1]	Class (F, M, S)[2]
C	^{238}Pu	3.10E-09	1	M
C	$^{239/240}$Pu	3.08E-09	1	M
C	^{241}Am	5.05E-09	1	M
C	^{90}Sr	2.89E-07	1	M
C	^{137}Cs	8.13E-07	1	F
C	$^{233/234}$U	1.11E-08	1	M
C	^{238}U	1.13E-08	1	M

1 The default particle size of one micrometer is used for inhaled particles.
2 Absorption Type: These 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 ICRP Publication 66 (ICRP, 1994), and Federal Guidance Report No. 13 (EPA, 1999). Default values are used unless specific documented information supports the use of another type.

18.0 DESCRIPTION OF OPERATIONS

The WIPP is a TRU/TRU-mixed hazardous waste disposal facility owned by the DOE and operated by Salado Isolation Mining Contractors LLC. The principal operation of the WIPP involves the receipt, storage, and permanent disposal of TRU/TRU-mixed hazardous waste. Only waste that conforms to DOE/WIPP-02-3122 is accepted for placement in the WIPP (DOE, 2022). Administrative controls prohibit the waste containers from being opened once shipped to the WIPP.

19.0 EMISSION POINTS

In CY 2023, the WIPP had three emission points: unfiltered and filtered air released from the Exhaust Shaft and filtered air from the WHB. Station A sampled the unfiltered air at the surface from the underground Exhaust Shaft. Station H, constructed in CY 2020 for 700-C fan operation and testing, sampled the unfiltered air released from the Exhaust Shaft and the ductwork between Station A and the 700-C fan exit. Station A and Station H data are compared and the more conservative value is used. For this reporting period, Station H data was used to calculate the dose to the MEI. Station B sampled filtered air from the Exhaust Shaft that has passed through a

bank of high-efficiency particulate air (HEPA) filters. Station C sampled filtered air from the WHB that has passed through a bank of HEPA filters. Stations H, B, and C monitor emission points that are categorized as Potential Impact Category (PIC) 3 sources. Such sources require periodic confirmatory sampling and off-line analysis to confirm air emissions to be at or less than a 0.01 potential fraction of the allowable dose limit, in accordance with American National Standards Institute/Health Physics Society (ANSI/HPS N13.1-1999) concerning radiological air emissions sampling and monitoring. These sampling locations are depicted in Figure 2.

During this reporting period, the WIPP operated the Supplemental Ventilation System (SVS). The SVS consists of an auxiliary fan installed in the S-90 drift in the underground repository to provide additional ventilation air to the underground. The use of the SVS minimizes dust particulate loading on the underground ventilation system's HEPA filtration units since the airflow directed to the construction (active mining) areas comes from the additional clean surface air. A portion of the salt-dust-laden air from the underground is exhausted up the Salt Handling Shaft (SHS). Ventilation air that moves through the disposal area exits through the Exhaust Shaft. The SHS exhaust point is a PIC 4 emission point. This emission point requires an annual administrative review of facility uses to confirm the absence of radioactive materials in forms and quantities not conforming to prescribed specifications and limits, confirming air emissions to be at or less than a 0.0001 potential fraction of the allowable dose limit, in accordance with ANSI/HPS N13.1-1999.

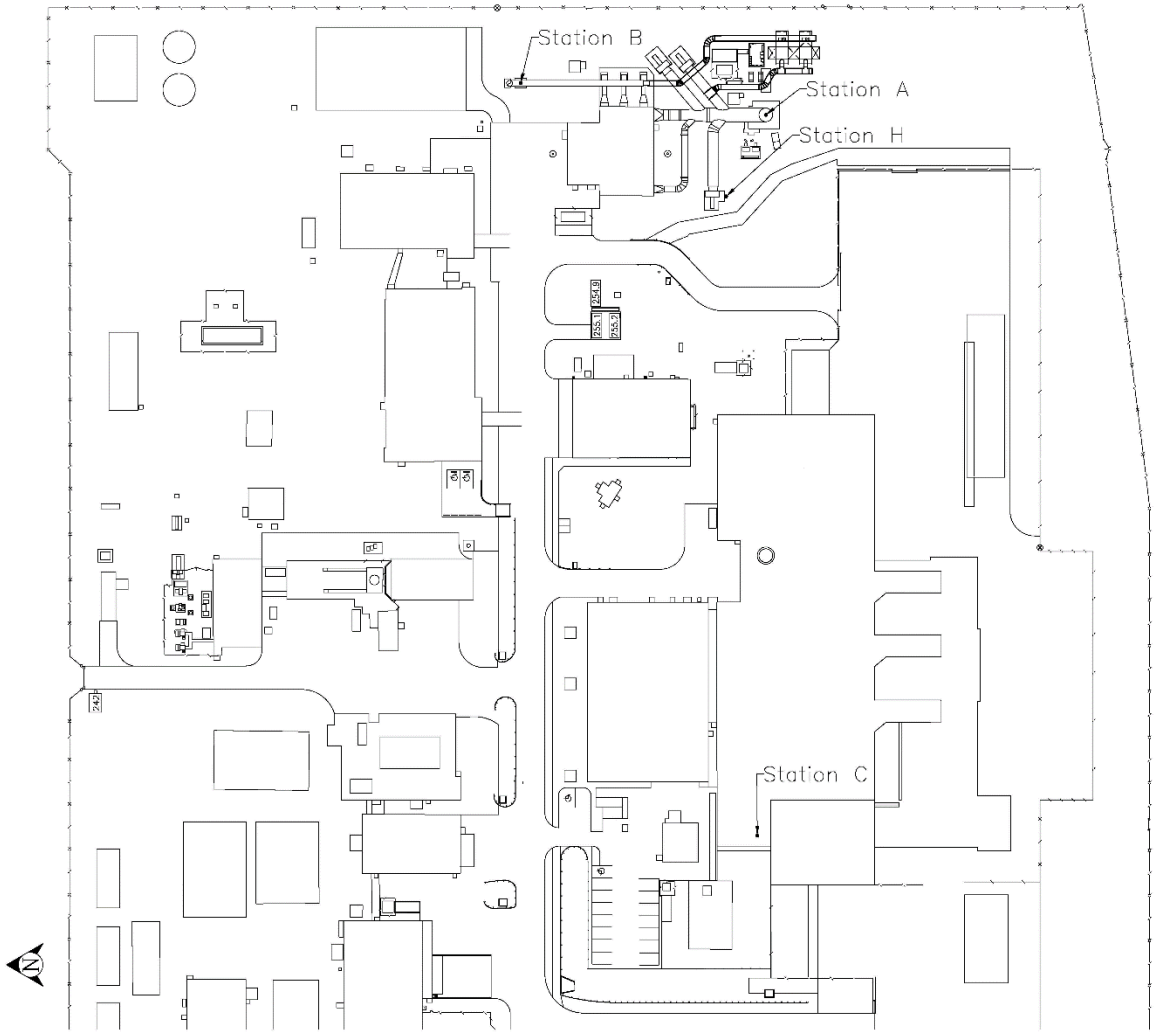

Figure 2. WIPP Radionuclide Air Emissions Monitoring Locations

20.0 EFFLUENT CONTROLS

Filtered gas-relief vents control radionuclide emissions from waste containers accepted at the WIPP (EPA, 2003). Each filter must exhibit efficiencies greater than 99.95 percent with 0.3-to-0.5-micron particles of dioctyl phthalate smoke (DOE, 1999).

Air monitors are maintained at strategic locations in the WHB and in the underground repository to monitor the real-time airborne radioactivity levels. Sampling equipment is monitored by an operator in the Central Monitoring Room. During HEPA-filtered operating conditions, the underground disposal area exhaust air passes through HEPA filtration units before being released to the atmosphere at Station B. During unfiltered operating conditions; the underground disposal area exhaust air does not pass through HEPA filtration units before being released to the atmosphere at the 700-C fan and is monitored by Station A and H. The WHB exhaust air, which ventilates above-ground waste-handling operations in the WHB, is subject to continuous HEPA filtration before being released to the atmosphere at Station C. Stations B and C HEPA filtration units are tested annually in accordance with WIPP procedures (SIMCO, 2023a; SIMCO, 2023b; and SIMCO, 2023c).

The WHB ventilation system maintains a negative pressure differential between the outside and waste-handling environments. This configuration provides a secondary confinement barrier against releasing radionuclides into 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 influx of outside air, which precludes a potential release of airborne contamination from inside the WHB to the environment. The underground ventilation system is composed of four circuits. Dividing of the air supply inhibits the spread of contamination if radioactive material becomes airborne. Separation of the subsystem airflows is maintained by the use of airlocks and bulkhead flow controls until the flows recombine at the Exhaust Shaft. During SVS operation, a portion of salt-dust-laden air from the North and Construction Circuits is exhausted out of the SHS. The North Circuit supplies air to the non-nuclear experimental areas of the underground (generally north of the SHS): the non-nuclear construction area is north of and adjacent to the active waste disposal panel on the west side of the repository (between S-1600 and S-1950 and west of W-170) and moves as needed to access the next mining area. 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).

20.1 Air Sampling and Analysis

Stations A, B, and C each consist of skid-mounted fixed air samplers (FASs) used to collect representative samples of airborne particulates (ANSI/HPS N13.1–1999). Each emission point FAS has two independent vacuum pumps: one vacuum pump supplies the vacuum, and the other functions as a backup. In 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. Station H uses portable air samplers (PASs) to collect representative airborne particulates samples (Blunt Consulting, 2022). Each PAS has a vacuum pump. Backup PASs

are available if a Station H PAS encounters operational problems. Permanent site power is available for the Station H sampling equipment.

Approved and controlled operating procedures are utilized at the WIPP to ensure uniform methods are used to collect, package, and transport FAS filters. Using such procedures provides a means for demonstrating quality assurance of air emission data. Station A and B FAS filters are collected daily, more often as needed or as ventilation system configurations are changed, to define suspected underground effluent events. Station H PAS filters are collected daily during 700-C fan operation. 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, 2004).

An annual administrative review of the SVS operation was performed to confirm the absence of radioactive materials in form and quantities not conforming to prescribed specifications and limits per the graded approach to sampling and monitoring in ANSI/HPS N13.1-1999.

21.0 DISTANCES TO NEAREST RECEPTORS FROM RELEASE POINTS

The WIPP is in a sparsely populated area that has less than 30 permanent residents living within a nominal 10-mile (16.1-km) radius (DOE, 2023). The area surrounding the WIPP is used primarily for livestock grazing and the development of potash, oil, and gas resources. Land within the WIPP site boundary up to the Exclusive Use Area is leased for grazing, the only significant agricultural activity in the vicinity of the WIPP. The development of natural resources results in a transient (nonpermanent) population primarily comprised of personnel working at two potash mines and numerous oil and gas wells located within 10 miles (16.1 km) of the WIPP.

In compliance with 40 CFR Part 61, Subpart H, which requires descriptions of the locations of population and food sources around the WIPP, the nearest permanent residence or school is identified as the newer James (Mills) Ranch residence located 3.3 miles (5.3 km) from the WIPP in the south-southwest sector. The original Mills Ranch residence, also in the south-southwest sector, is 3.4 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, Crawford Ranch (formerly Smith Ranch) was selected as the receptor location for the maximally exposed resident. This receptor is 5.5 miles (8.9 km) west-northwest of the WIPP site.

A non-WIPP business workspace (i.e., a construction office trailer at the nearest occupied point of the SSCVS project) was added in CY 2019. This workspace is located 0.21 miles (330 m) from the WIPP primary facility emission point in the east-southeast direction. This location is inside the Exclusive Use Area fence line. The occupant of this temporary office space was the MEI during this reporting period.

The previous non-WIPP business workspace identified in CY 2022 (i.e., a construction office trailer at the nearest occupied point of the Utility Shaft [i.e., Shaft #5] project) was considered in dose calculations for CY 2023. However, based on the default parameters in the CAP88-PC

model for agricultural activities and the prevailing wind direction, the SSCVS construction office was selected as the receptor location. The dose for the Utility Shaft workspace was less than that for the SSCVS workspace and, thus, is not the maximum receptor.

The nearest farm producing vegetables is approximately 14 miles (23 km) from the WIPP site in the southwest sector of the facility; milk produced commercially is approximately 45 miles (72 km) from the WIPP site in the northeast sector; and beef cattle are raised immediately outside the WIPP Exclusive Use Area.

22.0 INPUT DATA FOR CAP88-PC DOSE ASSESSMENT COMPUTER MODEL

Radionuclides from Station H: See Table 1 CY 2023 Summary of Radionuclide Effluents from Underground Areas During Unfiltered Ventilation
Radionuclides from Station B: See Table 2 CY 2023 Summary of Radionuclide Effluents from Underground Areas During Filtered Ventilation
Radionuclides from Station C: See Table 3 CY 2023 Summary of Radionuclide Effluents from the Waste Handling Building
Emission Point Data: See Table 4 CY 2023 Characteristics of WIPP Emission Points
Meteorological Data File: WIPP_023.wnd (CY 2023)
Population Data File: WIPP_023.pop (Population data for WIPP region)
Annual Precipitation: 21.92 centimeters per year (cm/yr) (CY 2023)
Annual Ambient Temperature: 18.95 °C (CY 2023)
Lid (Mixing) Height: 1,000 m (default)
Agricultural Scenario: Local (default)
Absolute Humidity: 8 grams per cubic meter (g/m^3) (default)

Table 4. CY 2023 Characteristics of WIPP Emission Points

Characteristics	Unfiltered Air from Exhaust Shaft	Filtered Air from Exhaust Shaft	Filtered Air from WHB
Effective Station Height (m)	7.27	7.5	15.1
Effective Station Diameter (m)	4.66	1.8	2.3
Station Area (m^2)	17.0	2.5	4.5
Flow Rate (ft^3/min)	2.8×10^5 (max)	11.4×10^4 (max)	4.7×10^4 (max)
Flow Rate (m^3/min)	7.9×10^3 (max)	3.2×10^3 (max)	1.3×10^3 (max)
Exit Velocity (m/s)	7.8 (max)	21.1 (max)	5.3
Effective Exit Velocity (m/s)	5.49 (max)	21.1 (max)	5.3
Orientation	45° Angle	Vertical	Vertical
Shape	Rectangle	Round	Square
HEPA Filtered	No	Yes	Yes
Sampling Location	Stations A and H	Station B	Station C

23.0 DESCRIPTION OF CONSTRUCTION AND MODIFICATIONS COMPLETED DURING REPORT PERIOD

Construction of the SSCVS continued during this reporting period. Plans for the SSCVS include six exhaust fans with 22 HEPA filter banks and associated ductwork. The SSCVS will replace the existing underground ventilation system and is estimated to supply up to 540,000 cubic feet per minute of air to the WIPP underground in filtration mode. A new stack sampling system has been designed and will be constructed to monitor emissions from this system. Construction of this system is expected to be completed as early as CY 2025. Confirmatory sampler compliance qualification testing will be completed. Construction of the Air Intake Shaft (AIS) stack was completed in CY 2022; however, it is not planned to be used until the startup of the SSCVS and completion of construction of the Utility Shaft. The AIS stack was constructed as part of the Utility Shaft project. The AIS stack emissions will minimize dust particulate loading on the SSCVS's HEPA-filtration units since the construction split will take clean air from the surface

and will exhaust salt dust-laden air out of the AIS. There were no modifications to the sampling equipment or sample filter flow rates. During this reporting period there were no modifications to sampling equipment.

24.0 REFERENCES

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40 CFR 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," *Code of Federal Regulations*. U.S. Government Printing Office, Washington, D.C.

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SIMCO, 2023c. *In-Place Testing of Underground Exhaust Filter Units*. PM041155. February 2, 2023. Carlsbad, NM.

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Addendum A
CAP88-PC Version 4.1.1.0 Output Data

SSCVS Construction Office
(0.21 miles [330 meters] ESE)

SSCVS Construction Office
(0.21 miles [330 meters] ESE)
Synopsis Report

C A P 8 8 - P C

Version 4.1

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 Apr 15 06:54:29 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Effective Dose Equivalent
(mrem)

6.30E-05

At This Location: 330 Meters East Southeast
Dataset Name: N_Ind23sscvs.DAT
Dataset Date: Apr 15, 2024 06:54 AM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 330 Meters East Southeast
Lifetime Fatal Cancer Risk: 1.71E-11

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

Organ	Dose Equivalent (mrem)
Adrenals	1.60E-05
UB_Wall	1.67E-05
Bone_Sur	1.75E-03
Brain	1.52E-05
Breasts	1.57E-05
St_Wall	1.61E-05
SI_Wall	1.63E-05
ULI_Wall	1.73E-05
LLI_Wall	2.08E-05
Kidneys	2.18E-05
Liver	2.01E-04
Muscle	1.65E-05
Ovaries	4.29E-05
Pancreas	1.61E-05
R_Marrow	1.01E-04
Skin	7.84E-05
Spleen	1.61E-05
Testes	4.29E-05
Thymus	1.59E-05
Thyroid	1.65E-05
GB_Wall	1.60E-05
Ht_Wall	1.62E-05
Uterus	1.64E-05
ET_Reg	2.12E-05
Lung	4.57E-05
Effectiv	6.30E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 2023

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	2.2E-07	6.1E-09	3.1E-09	2.2E-07
Pu-239	M	1.000	5.6E-08	3.6E-08	3.1E-09	9.6E-08
Am-241	M	1.000	3.8E-07	1.8E-07	5.0E-09	5.6E-07
Sr-90	M	1.000	2.4E-07	4.2E-07	2.9E-07	9.5E-07
Cs-137	F	1.000	6.9E-07	1.2E-06	8.1E-07	2.7E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2023

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
U-233	M	1.000	4.0E-08	2.0E-08	1.1E-08	7.1E-08
U-238	M	1.000	1.6E-08	1.4E-08	1.1E-08	4.1E-08

SITE INFORMATION

Temperature:	18.950	degrees C
Precipitation:	21.920	cm/y
Humidity:	8.000	g/cu m
Mixing Height:	1000.0	m

User specified location of max exposed individual.
(ILOC, JLOC): ESE, 330 meters

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.27	7.50	15.10
Diameter (m):	4.66	1.80	2.30
Plume Rise Momentum (m/s): (Exit Velocity)	5.49	21.10	5.30

ADJUSTED 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

330	490	539	592	652	707	812
822	860	945	5100	5250	5400	7500
8850	11520	15610	16670	47000	70000	

SSCVS Construction Office
(0.21 miles [330 meters] ESE)
General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Mon Apr 15 06:54:29 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23sscvs.DAT
Dataset Date: Apr 15, 2024 06:54 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

Mon Apr 15 06:54:29 2024 GENERAL
Page 1

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	2.19E-06	1.80E-03
Pu-239	M	1.000	2.19E-06	1.80E-03
Am-241	M	1.000	2.19E-06	1.80E-03
Sr-90	M	1.000	2.19E-06	1.80E-03
Cs-137	F	1.000	2.19E-06	1.80E-03
U-233	M	1.000	2.19E-06	1.80E-03
U-238	M	1.000	2.19E-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	1.00E-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
ENTERED 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

SSCVS Construction Office
(0.21 miles [330 meters] ESE)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Mon Apr 15 06:54:29 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23sscvs.DAT
Dataset Date: Apr 15, 2024 06:54 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.040	3.140	3.260	3.290	2.850	2.210	0.000	0.073
NNW	2.110	3.020	3.340	4.300	4.150	3.320	0.000	0.131
NW	2.120	3.100	3.340	4.120	4.100	3.470	0.000	0.167
WNW	1.890	2.500	2.680	3.610	4.190	3.750	0.000	0.104
W	1.590	2.610	2.630	4.410	4.530	3.390	0.000	0.064
WSW	1.550	1.920	2.620	3.790	3.910	2.830	0.000	0.043
SW	1.620	2.220	2.430	3.400	3.070	3.410	0.000	0.048
SSW	1.850	2.090	2.620	3.960	3.480	3.550	0.000	0.038
S	1.830	3.100	3.310	3.120	3.490	3.880	0.000	0.026
SSE	1.970	2.930	3.900	4.050	3.370	1.860	0.000	0.029
SE	1.870	2.460	2.680	2.790	2.960	2.220	0.000	0.027
ESE	1.710	2.080	2.160	3.770	3.540	2.980	0.000	0.033
E	1.830	2.650	3.700	5.580	4.960	1.450	0.000	0.059
ENE	1.880	2.660	3.450	5.220	3.720	2.570	0.000	0.057
NE	1.860	2.660	2.850	4.130	1.880	0.000	0.000	0.050
NNE	1.900	2.420	3.000	3.170	2.180	1.190	0.000	0.049

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	2.970	4.090	4.480	4.460	3.460	3.110	0.000
NNW	3.070	4.280	4.820	5.560	4.820	3.660	0.000
NW	3.100	4.310	4.820	5.370	4.750	3.810	0.000
WNW	2.840	3.720	4.070	5.070	4.850	4.000	0.000
W	2.470	3.530	3.900	5.820	5.440	3.740	0.000
WSW	2.390	3.120	3.670	5.690	5.190	3.370	0.000
SW	2.540	3.370	4.010	5.360	3.960	3.770	0.000
SSW	2.800	3.130	3.990	5.670	4.430	3.780	0.000
S	2.910	4.500	4.560	4.000	3.960	4.050	0.000
SSE	2.810	4.350	4.870	4.960	3.870	2.570	0.000
SE	2.760	3.390	3.620	4.000	3.620	3.090	0.000
ESE	2.550	3.090	3.500	5.460	4.410	3.170	0.000
E	2.740	4.120	5.200	7.660	6.030	2.350	0.000
ENE	2.790	3.930	5.180	6.960	5.120	2.570	0.000
NE	2.780	3.810	4.440	5.760	2.970	0.000	0.000
NNE	2.710	3.560	4.170	4.300	2.890	1.670	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2310	0.1230	0.2189	0.2802	0.1387	0.0082	0.0000
NNW	0.1047	0.0737	0.1447	0.3507	0.3065	0.0196	0.0000
NW	0.0777	0.0394	0.0867	0.2984	0.4416	0.0563	0.0000
WNW	0.0802	0.0473	0.0829	0.2682	0.4537	0.0677	0.0000
W	0.1159	0.0471	0.0866	0.3499	0.3658	0.0346	0.0000
WSW	0.1307	0.0642	0.0958	0.3838	0.2815	0.0440	0.0000
SW	0.1342	0.0502	0.1211	0.3448	0.2574	0.0924	0.0000
SSW	0.1518	0.0609	0.1362	0.3552	0.2337	0.0622	0.0000
S	0.2641	0.1518	0.3674	0.1643	0.0398	0.0125	0.0000
SSE	0.2852	0.1393	0.2260	0.2667	0.0777	0.0051	0.0000
SE	0.2693	0.1126	0.1853	0.2674	0.1500	0.0154	0.0000
ESE	0.2453	0.0864	0.1493	0.3116	0.2047	0.0027	0.0000
E	0.1618	0.0940	0.1400	0.4206	0.1795	0.0041	0.0000
ENE	0.2173	0.1163	0.1855	0.4157	0.0647	0.0005	0.0000
NE	0.2605	0.1278	0.2174	0.3688	0.0256	0.0000	0.0000
NNE	0.2839	0.1511	0.2560	0.2633	0.0432	0.0024	0.0000
TOTAL	0.1570	0.0807	0.1474	0.3230	0.2599	0.0319	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 19.0 degrees C
292.11 K
Precipitation: 21.9 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: 4.576 m/s

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

SSCVS Construction Office
(0.21 miles [330 meters] ESE)
Dose and Risk Summaries

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 Apr 15 06:54:29 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23sscvs.DAT
Dataset Date: Apr 15, 2024 06:54 AM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

Mon Apr 15 06:54:29 2024 SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenals	1.60E-05
UB_Wall	1.67E-05
Bone_Sur	1.75E-03
Brain	1.52E-05
Breasts	1.57E-05
St_Wall	1.61E-05
SI_Wall	1.63E-05
ULI_Wall	1.73E-05
LLI_Wall	2.08E-05
Kidneys	2.18E-05
Liver	2.01E-04
Muscle	1.65E-05
Ovaries	4.29E-05
Pancreas	1.61E-05
R_Marrow	1.01E-04
Skin	7.84E-05
Spleen	1.61E-05
Testes	4.29E-05
Thymus	1.59E-05
Thyroid	1.65E-05
GB_Wall	1.60E-05
Ht_Wall	1.62E-05
Uterus	1.64E-05
ET_Reg	2.12E-05
Lung	4.57E-05
Effectiv	6.30E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.15E-05
INHALATION	4.42E-05
AIR IMMERSION	2.02E-10
GROUND SURFACE	7.25E-06
INTERNAL	5.57E-05
EXTERNAL	7.25E-06
TOTAL	6.30E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	1.27E-05
U-234	1.20E-13
Th-230	3.41E-17
Ra-226	3.45E-18
Rn-222	1.92E-19
Po-218	3.43E-24
Pb-214	1.25E-16
At-218	1.29E-23
Bi-214	7.33E-16
Rn-218	7.48E-26
Po-214	4.06E-20
Tl-210	2.86E-19
Pb-210	4.31E-19
Bi-210	6.96E-18
Hg-206	4.81E-25
Po-210	1.78E-21
Tl-206	1.63E-23
Pu-239	5.44E-06
U-235m	3.62E-18
U-235	4.30E-15
Th-231	4.39E-16
Pa-231	5.76E-19
Ac-227	1.70E-21
Th-227	8.13E-19
Fr-223	7.67E-21
Ra-223	9.08E-19
Rn-219	3.93E-19
At-219	0.00E+00
Bi-215	1.72E-24
Po-215	1.20E-21
Pb-211	7.72E-19
Bi-211	3.18E-19
Tl-207	4.00E-19
Po-211	1.53E-22
Am-241	2.70E-05
Np-237	1.32E-12
Pa-233	1.09E-11
U-233	2.55E-07
Th-229	1.60E-10
Ra-225	2.26E-11
Ac-225	2.71E-11
Fr-221	5.52E-11
At-217	4.66E-13
Bi-213	3.37E-10
Po-213	7.18E-14
Tl-209	8.67E-11
Pb-209	6.55E-12
Sr-90	3.33E-06
Y-90	4.53E-07
Cs-137	6.99E-06

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Ba-137m	6.60E-06
U-238	1.16E-07
Th-234	2.92E-09
Pa-234m	3.99E-08
Pa-234	7.86E-10
TOTAL	6.30E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	1.57E-13
Stomach	5.60E-13
Colon	1.75E-12
Liver	2.14E-12
LUNG	5.38E-12
Bone	1.02E-12
Skin	7.63E-14
Breast	5.80E-13
Ovary	4.33E-13
Bladder	3.88E-13
Kidneys	1.07E-13
Thyroid	4.35E-14
Leukemia	2.42E-12
Residual	2.04E-12
Total	1.71E-11
TOTAL	1.71E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	5.62E-12
INHALATION	7.79E-12
AIR IMMERSION	1.09E-16
GROUND SURFACE	3.69E-12
INTERNAL	1.34E-11
EXTERNAL	3.69E-12
TOTAL	1.71E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	2.29E-12
U-234	4.13E-20
Th-230	1.45E-23
Ra-226	1.88E-24
Rn-222	1.05E-25
Po-218	1.53E-30
Pb-214	6.71E-23
At-218	1.59E-30
Bi-214	3.87E-22
Rn-218	4.09E-32
Po-214	2.23E-26
Tl-210	1.53E-25
Pb-210	1.93E-25
Bi-210	7.72E-25
Hg-206	2.13E-31
Po-210	9.77E-28
Tl-206	1.83E-30
Pu-239	8.89E-13
U-235m	2.63E-24
U-235	2.33E-21
Th-231	2.00E-22
Pa-231	3.00E-25
Ac-227	6.37E-28
Th-227	4.40E-25
Fr-223	2.86E-27
Ra-223	4.91E-25
Rn-219	2.15E-25
At-219	0.00E+00
Bi-215	7.68E-31
Po-215	6.59E-28
Pb-211	2.76E-25
Bi-211	1.74E-25
Tl-207	5.14E-26
Po-211	8.39E-29
Am-241	4.44E-12
Np-237	6.51E-19
Pa-233	5.90E-18
U-233	2.51E-13
Th-229	8.45E-17
Ra-225	1.02E-17
Ac-225	1.43E-17
Fr-221	3.00E-17
At-217	2.55E-19
Bi-213	1.46E-16
Po-213	3.92E-20
Tl-209	4.64E-17
Pb-209	8.63E-19
Sr-90	1.95E-12
Y-90	5.40E-14
Cs-137	3.53E-12

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Ba-137m	3.57E-12
U-238	1.13E-13
Th-234	1.51E-15
Pa-234m	6.98E-15
Pa-234	4.27E-16
TOTAL	1.71E-11

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

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	1.2E-04	7.6E-05	6.7E-05	5.9E-05	5.1E-05	4.6E-05	3.7E-05
NNW	2.0E-04	1.4E-04	1.2E-04	1.1E-04	9.4E-05	8.4E-05	6.9E-05
NW	2.3E-04	1.7E-04	1.6E-04	1.4E-04	1.3E-04	1.1E-04	9.6E-05
WNW	1.5E-04	1.1E-04	1.0E-04	9.3E-05	8.3E-05	7.5E-05	6.3E-05
W	1.0E-04	6.9E-05	6.1E-05	5.4E-05	4.8E-05	4.3E-05	3.5E-05
WSW	7.7E-05	5.1E-05	4.5E-05	4.0E-05	3.5E-05	3.2E-05	2.6E-05
SW	8.2E-05	5.7E-05	5.1E-05	4.6E-05	4.1E-05	3.7E-05	3.1E-05
SSW	6.4E-05	4.2E-05	3.8E-05	3.3E-05	2.9E-05	2.6E-05	2.2E-05
S	4.6E-05	2.6E-05	2.2E-05	1.9E-05	1.6E-05	1.4E-05	1.1E-05
SSE	4.6E-05	2.7E-05	2.3E-05	2.0E-05	1.7E-05	1.5E-05	1.2E-05
SE	4.9E-05	3.1E-05	2.7E-05	2.4E-05	2.1E-05	1.9E-05	1.5E-05
ESE	6.3E-05	3.9E-05	3.5E-05	3.0E-05	2.6E-05	2.3E-05	1.9E-05
E	9.3E-05	5.5E-05	4.8E-05	4.2E-05	3.6E-05	3.2E-05	2.5E-05
ENE	9.7E-05	5.5E-05	4.7E-05	4.1E-05	3.5E-05	3.1E-05	2.4E-05
NE	9.4E-05	5.3E-05	4.6E-05	4.0E-05	3.4E-05	3.0E-05	2.4E-05
NNE	9.0E-05	5.2E-05	4.5E-05	3.9E-05	3.4E-05	3.0E-05	2.4E-05

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	3.7E-05	3.4E-05	2.9E-05	2.1E-06	2.1E-06	2.0E-06	1.2E-06
NNW	6.8E-05	6.3E-05	5.5E-05	4.2E-06	4.0E-06	3.9E-06	2.4E-06
NW	9.4E-05	8.9E-05	7.8E-05	6.6E-06	6.4E-06	6.1E-06	3.8E-06
WNW	6.2E-05	5.8E-05	5.1E-05	4.3E-06	4.1E-06	4.0E-06	2.5E-06
W	3.4E-05	3.2E-05	2.8E-05	2.2E-06	2.1E-06	2.0E-06	1.3E-06
WSW	2.5E-05	2.4E-05	2.1E-05	1.6E-06	1.6E-06	1.5E-06	9.4E-07
SW	3.0E-05	2.8E-05	2.5E-05	2.1E-06	2.0E-06	2.0E-06	1.2E-06
SSW	2.1E-05	2.0E-05	1.7E-05	1.4E-06	1.3E-06	1.3E-06	8.1E-07
S	1.1E-05	1.0E-05	8.7E-06	5.5E-07	5.2E-07	5.0E-07	3.1E-07
SSE	1.2E-05	1.1E-05	9.5E-06	6.4E-07	6.1E-07	5.9E-07	3.7E-07
SE	1.5E-05	1.4E-05	1.2E-05	9.0E-07	8.6E-07	8.3E-07	5.2E-07
ESE	1.8E-05	1.7E-05	1.5E-05	1.0E-06	9.9E-07	9.5E-07	5.9E-07
E	2.5E-05	2.3E-05	2.0E-05	1.4E-06	1.3E-06	1.3E-06	7.9E-07
ENE	2.4E-05	2.2E-05	1.9E-05	1.2E-06	1.2E-06	1.1E-06	6.9E-07
NE	2.3E-05	2.1E-05	1.8E-05	1.2E-06	1.1E-06	1.1E-06	6.6E-07
NNE	2.3E-05	2.2E-05	1.9E-05	1.2E-06	1.2E-06	1.1E-06	6.9E-07

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	9.7E-07	6.8E-07	4.6E-07	4.2E-07	1.1E-07	6.3E-08
NNW	1.9E-06	1.3E-06	9.1E-07	8.4E-07	2.2E-07	1.3E-07
NW	3.0E-06	2.1E-06	1.5E-06	1.4E-06	3.7E-07	2.1E-07
WNW	2.0E-06	1.4E-06	9.6E-07	8.9E-07	2.4E-07	1.4E-07
W	1.0E-06	7.1E-07	4.9E-07	4.5E-07	1.2E-07	6.9E-08
WSW	7.5E-07	5.3E-07	3.6E-07	3.3E-07	8.7E-08	4.8E-08
SW	9.8E-07	6.9E-07	4.7E-07	4.3E-07	1.1E-07	6.2E-08
SSW	6.4E-07	4.5E-07	3.1E-07	2.8E-07	7.5E-08	4.2E-08
S	2.5E-07	1.7E-07	1.2E-07	1.1E-07	3.0E-08	1.8E-08
SSE	2.9E-07	2.1E-07	1.4E-07	1.3E-07	3.5E-08	2.0E-08
SE	4.1E-07	2.9E-07	1.9E-07	1.8E-07	4.7E-08	2.6E-08
ESE	4.7E-07	3.3E-07	2.2E-07	2.1E-07	5.5E-08	3.2E-08
E	6.3E-07	4.4E-07	3.0E-07	2.7E-07	7.3E-08	4.2E-08
ENE	5.5E-07	3.8E-07	2.6E-07	2.3E-07	6.2E-08	3.6E-08
NE	5.2E-07	3.6E-07	2.4E-07	2.2E-07	5.7E-08	3.4E-08
NNE	5.5E-07	3.8E-07	2.6E-07	2.4E-07	6.2E-08	3.6E-08

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

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	3.3E-11	2.1E-11	1.8E-11	1.6E-11	1.4E-11	1.3E-11	1.0E-11
NNW	5.4E-11	3.7E-11	3.3E-11	2.9E-11	2.6E-11	2.3E-11	1.9E-11
NW	6.2E-11	4.7E-11	4.3E-11	3.9E-11	3.5E-11	3.1E-11	2.6E-11
WNW	4.1E-11	3.1E-11	2.8E-11	2.5E-11	2.3E-11	2.1E-11	1.7E-11
W	2.7E-11	1.9E-11	1.7E-11	1.5E-11	1.3E-11	1.2E-11	9.7E-12
WSW	2.1E-11	1.4E-11	1.2E-11	1.1E-11	9.7E-12	8.7E-12	7.1E-12
SW	2.2E-11	1.5E-11	1.4E-11	1.2E-11	1.1E-11	1.0E-11	8.5E-12
SSW	1.7E-11	1.2E-11	1.0E-11	9.1E-12	8.1E-12	7.3E-12	6.0E-12
S	1.3E-11	7.1E-12	6.1E-12	5.3E-12	4.5E-12	4.0E-12	3.2E-12
SSE	1.3E-11	7.4E-12	6.4E-12	5.6E-12	4.8E-12	4.2E-12	3.4E-12
SE	1.3E-11	8.5E-12	7.6E-12	6.7E-12	5.9E-12	5.2E-12	4.3E-12
ESE	1.7E-11	1.1E-11	9.5E-12	8.4E-12	7.3E-12	6.5E-12	5.2E-12
E	2.5E-11	1.5E-11	1.3E-11	1.2E-11	1.0E-11	8.8E-12	7.0E-12
ENE	2.6E-11	1.5E-11	1.3E-11	1.1E-11	9.7E-12	8.5E-12	6.8E-12
NE	2.6E-11	1.5E-11	1.3E-11	1.1E-11	9.4E-12	8.3E-12	6.6E-12
NNE	2.5E-11	1.4E-11	1.3E-11	1.1E-11	9.4E-12	8.3E-12	6.7E-12

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	1.0E-11	9.5E-12	8.2E-12	6.2E-13	6.0E-13	5.7E-13	3.6E-13
NNW	1.9E-11	1.7E-11	1.5E-11	1.2E-12	1.2E-12	1.1E-12	7.0E-13
NW	2.6E-11	2.4E-11	2.1E-11	1.9E-12	1.8E-12	1.7E-12	1.1E-12
WNW	1.7E-11	1.6E-11	1.4E-11	1.2E-12	1.2E-12	1.1E-12	7.1E-13
W	9.5E-12	8.9E-12	7.7E-12	6.3E-13	6.1E-13	5.8E-13	3.7E-13
WSW	7.0E-12	6.6E-12	5.7E-12	4.7E-13	4.5E-13	4.3E-13	2.7E-13
SW	8.3E-12	7.8E-12	6.9E-12	6.1E-13	5.8E-13	5.6E-13	3.5E-13
SSW	5.9E-12	5.5E-12	4.8E-12	4.0E-13	3.9E-13	3.7E-13	2.3E-13
S	3.1E-12	2.9E-12	2.4E-12	1.6E-13	1.6E-13	1.5E-13	9.4E-14
SSE	3.3E-12	3.1E-12	2.7E-12	1.9E-13	1.8E-13	1.7E-13	1.1E-13
SE	4.2E-12	3.9E-12	3.4E-12	2.6E-13	2.5E-13	2.4E-13	1.5E-13
ESE	5.1E-12	4.8E-12	4.1E-12	3.0E-13	2.9E-13	2.8E-13	1.7E-13
E	6.9E-12	6.4E-12	5.5E-12	4.0E-13	3.8E-13	3.7E-13	2.3E-13
ENE	6.6E-12	6.1E-12	5.2E-12	3.6E-13	3.4E-13	3.3E-13	2.0E-13
NE	6.4E-12	6.0E-12	5.1E-12	3.4E-13	3.3E-13	3.2E-13	2.0E-13
NNE	6.5E-12	6.1E-12	5.2E-12	3.6E-13	3.5E-13	3.3E-13	2.1E-13

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	2.9E-13	2.0E-13	1.4E-13	1.3E-13	3.4E-14	1.9E-14
NNW	5.5E-13	3.9E-13	2.7E-13	2.4E-13	6.6E-14	3.8E-14
NW	8.7E-13	6.1E-13	4.2E-13	3.9E-13	1.1E-13	6.0E-14
WNW	5.6E-13	4.0E-13	2.8E-13	2.6E-13	7.0E-14	4.0E-14
W	2.9E-13	2.1E-13	1.4E-13	1.3E-13	3.6E-14	2.1E-14
WSW	2.2E-13	1.5E-13	1.0E-13	9.6E-14	2.6E-14	1.4E-14
SW	2.8E-13	2.0E-13	1.4E-13	1.2E-13	3.3E-14	1.8E-14
SSW	1.9E-13	1.3E-13	8.9E-14	8.2E-14	2.2E-14	1.2E-14
S	7.5E-14	5.3E-14	3.6E-14	3.3E-14	9.4E-15	5.7E-15
SSE	8.8E-14	6.2E-14	4.3E-14	3.9E-14	1.1E-14	6.4E-15
SE	1.2E-13	8.5E-14	5.8E-14	5.3E-14	1.4E-14	8.1E-15
ESE	1.4E-13	9.8E-14	6.7E-14	6.2E-14	1.7E-14	9.9E-15
E	1.8E-13	1.3E-13	8.9E-14	8.2E-14	2.2E-14	1.3E-14
ENE	1.6E-13	1.2E-13	7.8E-14	7.1E-14	1.9E-14	1.2E-14
NE	1.6E-13	1.1E-13	7.4E-14	6.8E-14	1.8E-14	1.1E-14
NNE	1.7E-13	1.2E-13	7.9E-14	7.3E-14	2.0E-14	1.2E-14

SSCVS Construction Office
(0.21 miles [330 meters] ESE)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Mon Apr 15 06:54:29 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23sscvs.DAT
Dataset Date: Apr 15, 2024 06:54 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

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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	330	490	539	592	652	707	812
N	3.836E-06	2.361E-06	2.073E-06	1.816E-06	1.577E-06	1.397E-06	1.127E-06
NNW	6.553E-06	4.283E-06	3.790E-06	3.341E-06	2.917E-06	2.593E-06	2.104E-06
NW	7.770E-06	5.583E-06	5.030E-06	4.507E-06	3.997E-06	3.598E-06	2.976E-06
WNW	5.133E-06	3.662E-06	3.297E-06	2.952E-06	2.617E-06	2.354E-06	1.947E-06
W	3.320E-06	2.175E-06	1.926E-06	1.698E-06	1.484E-06	1.321E-06	1.074E-06
WSW	2.514E-06	1.609E-06	1.419E-06	1.249E-06	1.090E-06	9.695E-07	7.890E-07
SW	2.677E-06	1.797E-06	1.609E-06	1.436E-06	1.272E-06	1.145E-06	9.497E-07
SSW	2.070E-06	1.329E-06	1.177E-06	1.040E-06	9.119E-07	8.140E-07	6.661E-07
S	1.421E-06	7.772E-07	6.661E-07	5.707E-07	4.856E-07	4.234E-07	3.337E-07
SSE	1.448E-06	8.203E-07	7.079E-07	6.104E-07	5.223E-07	4.574E-07	3.629E-07
SE	1.556E-06	9.698E-07	8.529E-07	7.480E-07	6.505E-07	5.767E-07	4.665E-07
ESE	2.013E-06	1.226E-06	1.071E-06	9.325E-07	8.049E-07	7.090E-07	5.672E-07
E	2.955E-06	1.710E-06	1.478E-06	1.276E-06	1.093E-06	9.576E-07	7.603E-07
ENE	3.023E-06	1.676E-06	1.438E-06	1.233E-06	1.049E-06	9.145E-07	7.201E-07
NE	2.923E-06	1.619E-06	1.390E-06	1.194E-06	1.017E-06	8.873E-07	7.000E-07
NNE	2.826E-06	1.604E-06	1.385E-06	1.195E-06	1.023E-06	8.954E-07	7.102E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.106E-06	1.029E-06	8.840E-07	6.006E-08	5.752E-08	5.515E-08	3.375E-08
NNW	2.065E-06	1.925E-06	1.658E-06	1.209E-07	1.158E-07	1.111E-07	6.847E-08
NW	2.925E-06	2.743E-06	2.389E-06	1.931E-07	1.852E-07	1.779E-07	1.106E-07
WNW	1.913E-06	1.794E-06	1.562E-06	1.253E-07	1.202E-07	1.155E-07	7.178E-08
W	1.054E-06	9.837E-07	8.489E-07	6.361E-08	6.100E-08	5.856E-08	3.633E-08
WSW	7.745E-07	7.230E-07	6.249E-07	4.700E-08	4.507E-08	4.326E-08	2.676E-08
SW	9.337E-07	8.765E-07	7.656E-07	6.160E-08	5.908E-08	5.672E-08	3.518E-08
SSW	6.542E-07	6.116E-07	5.301E-07	4.022E-08	3.855E-08	3.701E-08	2.288E-08
S	3.267E-07	3.020E-07	2.560E-07	1.472E-08	1.408E-08	1.348E-08	8.132E-09
SSE	3.555E-07	3.293E-07	2.803E-07	1.747E-08	1.674E-08	1.605E-08	9.840E-09
SE	4.577E-07	4.263E-07	3.668E-07	2.524E-08	2.418E-08	2.319E-08	1.423E-08
ESE	5.559E-07	5.159E-07	4.406E-07	2.881E-08	2.759E-08	2.646E-08	1.625E-08
E	7.448E-07	6.901E-07	5.876E-07	3.880E-08	3.717E-08	3.565E-08	2.190E-08
ENE	7.049E-07	6.514E-07	5.518E-07	3.318E-08	3.175E-08	3.043E-08	1.854E-08
NE	6.853E-07	6.336E-07	5.372E-07	3.172E-08	3.035E-08	2.907E-08	1.761E-08
NNE	6.957E-07	6.442E-07	5.480E-07	3.325E-08	3.181E-08	3.047E-08	1.848E-08

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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	8850	11520	15610	16670	47000	70000
N	2.657E-08	1.841E-08	1.231E-08	1.128E-08	2.858E-09	1.595E-09
NNW	5.386E-08	3.755E-08	2.541E-08	2.334E-08	6.101E-09	3.441E-09
NW	8.720E-08	6.133E-08	4.206E-08	3.873E-08	1.035E-08	5.750E-09
WNW	5.659E-08	3.981E-08	2.731E-08	2.516E-08	6.742E-09	3.757E-09
W	2.864E-08	2.007E-08	1.367E-08	1.258E-08	3.336E-09	1.881E-09
WSW	2.110E-08	1.473E-08	9.962E-09	9.149E-09	2.352E-09	1.294E-09
SW	2.771E-08	1.937E-08	1.315E-08	1.208E-08	3.103E-09	1.669E-09
SSW	1.803E-08	1.259E-08	8.526E-09	7.832E-09	2.030E-09	1.117E-09
S	6.408E-09	4.423E-09	2.941E-09	2.693E-09	7.140E-10	4.223E-10
SSE	7.797E-09	5.423E-09	3.631E-09	3.328E-09	8.648E-10	4.986E-10
SE	1.121E-08	7.784E-09	5.213E-09	4.778E-09	1.209E-09	6.699E-10
ESE	1.281E-08	8.921E-09	6.005E-09	5.510E-09	1.438E-09	8.218E-10
E	1.729E-08	1.201E-08	8.047E-09	7.377E-09	1.899E-09	1.089E-09
ENE	1.464E-08	1.009E-08	6.665E-09	6.094E-09	1.535E-09	8.912E-10
NE	1.387E-08	9.511E-09	6.236E-09	5.691E-09	1.402E-09	8.054E-10
NNE	1.459E-08	1.006E-08	6.646E-09	6.075E-09	1.521E-09	8.668E-10

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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	330	490	539	592	652	707	812
N	3.518E-06	2.210E-06	1.951E-06	1.718E-06	1.500E-06	1.334E-06	1.084E-06
NNW	5.901E-06	3.990E-06	3.558E-06	3.157E-06	2.773E-06	2.477E-06	2.025E-06
NW	6.801E-06	5.101E-06	4.637E-06	4.187E-06	3.741E-06	3.385E-06	2.825E-06
WNW	4.495E-06	3.349E-06	3.041E-06	2.743E-06	2.449E-06	2.216E-06	1.848E-06
W	2.984E-06	2.030E-06	1.811E-06	1.607E-06	1.412E-06	1.262E-06	1.033E-06
WSW	2.273E-06	1.507E-06	1.338E-06	1.184E-06	1.038E-06	9.270E-07	7.584E-07
SW	2.404E-06	1.656E-06	1.491E-06	1.338E-06	1.191E-06	1.076E-06	8.983E-07
SSW	1.877E-06	1.240E-06	1.104E-06	9.805E-07	8.635E-07	7.736E-07	6.367E-07
S	1.341E-06	7.473E-07	6.428E-07	5.526E-07	4.717E-07	4.122E-07	3.261E-07
SSE	1.358E-06	7.839E-07	6.794E-07	5.881E-07	5.052E-07	4.437E-07	3.536E-07
SE	1.415E-06	9.041E-07	8.001E-07	7.057E-07	6.172E-07	5.496E-07	4.476E-07
ESE	1.845E-06	1.155E-06	1.016E-06	8.896E-07	7.721E-07	6.831E-07	5.500E-07
E	2.768E-06	1.641E-06	1.426E-06	1.236E-06	1.063E-06	9.340E-07	7.447E-07
ENE	2.860E-06	1.619E-06	1.395E-06	1.201E-06	1.025E-06	8.959E-07	7.082E-07
NE	2.758E-06	1.559E-06	1.344E-06	1.158E-06	9.896E-07	8.657E-07	6.857E-07
NNE	2.640E-06	1.529E-06	1.326E-06	1.148E-06	9.867E-07	8.667E-07	6.909E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.064E-06	9.920E-07	8.555E-07	5.972E-08	5.720E-08	5.486E-08	3.363E-08
NNW	1.988E-06	1.857E-06	1.606E-06	1.202E-07	1.152E-07	1.106E-07	6.823E-08
NW	2.778E-06	2.611E-06	2.286E-06	1.915E-07	1.837E-07	1.765E-07	1.100E-07
WNW	1.817E-06	1.708E-06	1.495E-06	1.243E-07	1.193E-07	1.146E-07	7.138E-08
W	1.015E-06	9.485E-07	8.216E-07	6.322E-08	6.063E-08	5.822E-08	3.618E-08
WSW	7.448E-07	6.963E-07	6.037E-07	4.664E-08	4.473E-08	4.294E-08	2.662E-08
SW	8.836E-07	8.312E-07	7.293E-07	6.097E-08	5.849E-08	5.618E-08	3.493E-08
SSW	6.256E-07	5.859E-07	5.098E-07	3.988E-08	3.825E-08	3.672E-08	2.275E-08
S	3.194E-07	2.956E-07	2.511E-07	1.467E-08	1.403E-08	1.344E-08	8.114E-09
SSE	3.465E-07	3.214E-07	2.742E-07	1.739E-08	1.666E-08	1.598E-08	9.809E-09
SE	4.394E-07	4.101E-07	3.542E-07	2.507E-08	2.402E-08	2.305E-08	1.417E-08
ESE	5.394E-07	5.016E-07	4.299E-07	2.871E-08	2.750E-08	2.638E-08	1.621E-08
E	7.297E-07	6.768E-07	5.776E-07	3.864E-08	3.702E-08	3.551E-08	2.185E-08
ENE	6.935E-07	6.415E-07	5.445E-07	3.313E-08	3.171E-08	3.038E-08	1.852E-08
NE	6.716E-07	6.217E-07	5.283E-07	3.166E-08	3.029E-08	2.902E-08	1.759E-08
NNE	6.771E-07	6.279E-07	5.356E-07	3.308E-08	3.165E-08	3.032E-08	1.841E-08

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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	8850	11520	15610	16670	47000	70000
N	2.649E-08	1.837E-08	1.229E-08	1.126E-08	2.857E-09	1.596E-09
NNW	5.370E-08	3.746E-08	2.535E-08	2.329E-08	6.095E-09	3.441E-09
NW	8.679E-08	6.109E-08	4.191E-08	3.860E-08	1.033E-08	5.749E-09
WNW	5.634E-08	3.966E-08	2.722E-08	2.508E-08	6.730E-09	3.756E-09
W	2.854E-08	2.001E-08	1.364E-08	1.254E-08	3.332E-09	1.881E-09
WSW	2.101E-08	1.468E-08	9.931E-09	9.120E-09	2.349E-09	1.295E-09
SW	2.755E-08	1.927E-08	1.309E-08	1.203E-08	3.096E-09	1.670E-09
SSW	1.795E-08	1.254E-08	8.496E-09	7.805E-09	2.026E-09	1.117E-09
S	6.397E-09	4.418E-09	2.938E-09	2.690E-09	7.138E-10	4.225E-10
SSE	7.778E-09	5.413E-09	3.625E-09	3.323E-09	8.645E-10	4.989E-10
SE	1.118E-08	7.763E-09	5.202E-09	4.768E-09	1.208E-09	6.705E-10
ESE	1.279E-08	8.910E-09	5.999E-09	5.505E-09	1.438E-09	8.220E-10
E	1.725E-08	1.199E-08	8.035E-09	7.367E-09	1.899E-09	1.090E-09
ENE	1.463E-08	1.008E-08	6.663E-09	6.092E-09	1.536E-09	8.915E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.690E-09	1.402E-09	8.060E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.680E-10

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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	330	490	539	592	652	707	812
N	3.589E-06	2.243E-06	1.978E-06	1.739E-06	1.517E-06	1.347E-06	1.093E-06
NNW	6.058E-06	4.061E-06	3.613E-06	3.201E-06	2.808E-06	2.505E-06	2.043E-06
NW	7.032E-06	5.215E-06	4.730E-06	4.262E-06	3.801E-06	3.435E-06	2.860E-06
WNW	4.646E-06	3.423E-06	3.101E-06	2.792E-06	2.489E-06	2.248E-06	1.871E-06
W	3.067E-06	2.066E-06	1.839E-06	1.629E-06	1.430E-06	1.277E-06	1.043E-06
WSW	2.332E-06	1.532E-06	1.358E-06	1.200E-06	1.051E-06	9.371E-07	7.656E-07
SW	2.467E-06	1.688E-06	1.518E-06	1.360E-06	1.209E-06	1.092E-06	9.097E-07
SSW	1.923E-06	1.261E-06	1.121E-06	9.945E-07	8.747E-07	7.829E-07	6.435E-07
S	1.359E-06	7.539E-07	6.479E-07	5.566E-07	4.748E-07	4.147E-07	3.278E-07
SSE	1.379E-06	7.922E-07	6.859E-07	5.932E-07	5.091E-07	4.468E-07	3.557E-07
SE	1.445E-06	9.183E-07	8.114E-07	7.148E-07	6.243E-07	5.554E-07	4.516E-07
ESE	1.884E-06	1.172E-06	1.028E-06	8.995E-07	7.797E-07	6.891E-07	5.540E-07
E	2.817E-06	1.659E-06	1.440E-06	1.247E-06	1.071E-06	9.403E-07	7.488E-07
ENE	2.902E-06	1.634E-06	1.406E-06	1.209E-06	1.031E-06	9.007E-07	7.113E-07
NE	2.798E-06	1.573E-06	1.355E-06	1.166E-06	9.959E-07	8.707E-07	6.890E-07
NNE	2.681E-06	1.545E-06	1.339E-06	1.158E-06	9.944E-07	8.728E-07	6.950E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.073E-06	9.999E-07	8.616E-07	5.979E-08	5.727E-08	5.492E-08	3.366E-08
NNW	2.006E-06	1.873E-06	1.618E-06	1.204E-07	1.154E-07	1.107E-07	6.828E-08
NW	2.812E-06	2.642E-06	2.310E-06	1.918E-07	1.841E-07	1.768E-07	1.102E-07
WNW	1.840E-06	1.728E-06	1.510E-06	1.246E-07	1.195E-07	1.148E-07	7.147E-08
W	1.024E-06	9.570E-07	8.282E-07	6.331E-08	6.072E-08	5.830E-08	3.622E-08
WSW	7.518E-07	7.026E-07	6.086E-07	4.672E-08	4.480E-08	4.301E-08	2.665E-08
SW	8.948E-07	8.413E-07	7.374E-07	6.111E-08	5.862E-08	5.629E-08	3.498E-08
SSW	6.322E-07	5.918E-07	5.144E-07	3.996E-08	3.831E-08	3.678E-08	2.278E-08
S	3.210E-07	2.970E-07	2.522E-07	1.468E-08	1.404E-08	1.344E-08	8.118E-09
SSE	3.485E-07	3.232E-07	2.756E-07	1.741E-08	1.667E-08	1.599E-08	9.816E-09
SE	4.433E-07	4.135E-07	3.569E-07	2.511E-08	2.406E-08	2.307E-08	1.418E-08
ESE	5.432E-07	5.049E-07	4.324E-07	2.873E-08	2.752E-08	2.640E-08	1.622E-08
E	7.337E-07	6.803E-07	5.802E-07	3.868E-08	3.705E-08	3.554E-08	2.186E-08
ENE	6.964E-07	6.441E-07	5.464E-07	3.314E-08	3.172E-08	3.040E-08	1.852E-08
NE	6.747E-07	6.244E-07	5.303E-07	3.167E-08	3.030E-08	2.903E-08	1.760E-08
NNE	6.810E-07	6.313E-07	5.382E-07	3.311E-08	3.168E-08	3.035E-08	1.843E-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	8850	11520	15610	16670	47000	70000
N	2.651E-08	1.838E-08	1.229E-08	1.126E-08	2.857E-09	1.596E-09
NNW	5.374E-08	3.748E-08	2.536E-08	2.330E-08	6.096E-09	3.441E-09
NW	8.688E-08	6.114E-08	4.194E-08	3.863E-08	1.033E-08	5.749E-09
WNW	5.639E-08	3.970E-08	2.724E-08	2.509E-08	6.733E-09	3.757E-09
W	2.856E-08	2.003E-08	1.364E-08	1.255E-08	3.333E-09	1.881E-09
WSW	2.103E-08	1.469E-08	9.937E-09	9.126E-09	2.350E-09	1.294E-09
SW	2.758E-08	1.929E-08	1.310E-08	1.204E-08	3.098E-09	1.670E-09
SSW	1.796E-08	1.255E-08	8.503E-09	7.811E-09	2.027E-09	1.117E-09
S	6.400E-09	4.419E-09	2.939E-09	2.691E-09	7.138E-10	4.224E-10
SSE	7.782E-09	5.415E-09	3.626E-09	3.324E-09	8.645E-10	4.988E-10
SE	1.118E-08	7.767E-09	5.204E-09	4.770E-09	1.208E-09	6.704E-10
ESE	1.280E-08	8.913E-09	6.000E-09	5.506E-09	1.438E-09	8.220E-10
E	1.726E-08	1.200E-08	8.037E-09	7.369E-09	1.899E-09	1.090E-09
ENE	1.463E-08	1.009E-08	6.664E-09	6.093E-09	1.536E-09	8.914E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.690E-09	1.402E-09	8.059E-10
NNE	1.456E-08	1.004E-08	6.637E-09	6.067E-09	1.521E-09	8.678E-10

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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	330	490	539	592	652	707	812
N	3.309E-06	2.120E-06	1.880E-06	1.662E-06	1.457E-06	1.299E-06	1.061E-06
NNW	5.316E-06	3.734E-06	3.355E-06	2.997E-06	2.651E-06	2.379E-06	1.959E-06
NW	5.966E-06	4.697E-06	4.310E-06	3.925E-06	3.533E-06	3.216E-06	2.707E-06
WNW	3.960E-06	3.088E-06	2.829E-06	2.573E-06	2.314E-06	2.105E-06	1.770E-06
W	2.664E-06	1.889E-06	1.699E-06	1.519E-06	1.344E-06	1.207E-06	9.959E-07
WSW	2.055E-06	1.413E-06	1.264E-06	1.126E-06	9.930E-07	8.903E-07	7.331E-07
SW	2.194E-06	1.556E-06	1.409E-06	1.270E-06	1.136E-06	1.030E-06	8.650E-07
SSW	1.716E-06	1.168E-06	1.046E-06	9.336E-07	8.262E-07	7.429E-07	6.151E-07
S	1.290E-06	7.286E-07	6.284E-07	5.414E-07	4.631E-07	4.054E-07	3.215E-07
SSE	1.289E-06	7.574E-07	6.590E-07	5.724E-07	4.933E-07	4.343E-07	3.475E-07
SE	1.335E-06	8.685E-07	7.717E-07	6.834E-07	5.998E-07	5.355E-07	4.380E-07
ESE	1.718E-06	1.101E-06	9.733E-07	8.568E-07	7.472E-07	6.634E-07	5.371E-07
E	2.541E-06	1.555E-06	1.360E-06	1.186E-06	1.026E-06	9.048E-07	7.258E-07
ENE	2.679E-06	1.555E-06	1.347E-06	1.164E-06	9.979E-07	8.747E-07	6.946E-07
NE	2.615E-06	1.510E-06	1.307E-06	1.130E-06	9.687E-07	8.495E-07	6.753E-07
NNE	2.526E-06	1.487E-06	1.294E-06	1.124E-06	9.683E-07	8.523E-07	6.816E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.041E-06	9.723E-07	8.407E-07	5.958E-08	5.707E-08	5.474E-08	3.358E-08
NNW	1.924E-06	1.801E-06	1.564E-06	1.198E-07	1.148E-07	1.102E-07	6.806E-08
NW	2.664E-06	2.510E-06	2.209E-06	1.905E-07	1.828E-07	1.756E-07	1.096E-07
WNW	1.742E-06	1.641E-06	1.444E-06	1.236E-07	1.186E-07	1.140E-07	7.112E-08
W	9.787E-07	9.168E-07	7.975E-07	6.293E-08	6.037E-08	5.797E-08	3.608E-08
WSW	7.204E-07	6.748E-07	5.871E-07	4.644E-08	4.454E-08	4.276E-08	2.654E-08
SW	8.513E-07	8.023E-07	7.065E-07	6.064E-08	5.818E-08	5.588E-08	3.480E-08
SSW	6.046E-07	5.673E-07	4.953E-07	3.969E-08	3.806E-08	3.654E-08	2.268E-08
S	3.149E-07	2.916E-07	2.481E-07	1.464E-08	1.400E-08	1.341E-08	8.104E-09
SSE	3.406E-07	3.162E-07	2.704E-07	1.736E-08	1.663E-08	1.595E-08	9.798E-09
SE	4.301E-07	4.019E-07	3.480E-07	2.501E-08	2.396E-08	2.299E-08	1.415E-08
ESE	5.269E-07	4.907E-07	4.219E-07	2.864E-08	2.744E-08	2.632E-08	1.619E-08
E	7.116E-07	6.611E-07	5.660E-07	3.854E-08	3.693E-08	3.542E-08	2.181E-08
ENE	6.804E-07	6.302E-07	5.362E-07	3.307E-08	3.165E-08	3.034E-08	1.850E-08
NE	6.615E-07	6.130E-07	5.219E-07	3.163E-08	3.026E-08	2.899E-08	1.758E-08
NNE	6.681E-07	6.202E-07	5.300E-07	3.305E-08	3.162E-08	3.030E-08	1.841E-08

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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	8850	11520	15610	16670	47000	70000
N	2.646E-08	1.835E-08	1.228E-08	1.125E-08	2.857E-09	1.597E-09
NNW	5.360E-08	3.741E-08	2.532E-08	2.326E-08	6.091E-09	3.441E-09
NW	8.654E-08	6.095E-08	4.182E-08	3.852E-08	1.032E-08	5.748E-09
WNW	5.616E-08	3.957E-08	2.716E-08	2.502E-08	6.723E-09	3.755E-09
W	2.847E-08	1.998E-08	1.361E-08	1.252E-08	3.329E-09	1.881E-09
WSW	2.096E-08	1.465E-08	9.915E-09	9.107E-09	2.348E-09	1.295E-09
SW	2.746E-08	1.923E-08	1.306E-08	1.200E-08	3.093E-09	1.670E-09
SSW	1.790E-08	1.251E-08	8.480E-09	7.791E-09	2.024E-09	1.117E-09
S	6.391E-09	4.414E-09	2.936E-09	2.689E-09	7.137E-10	4.226E-10
SSE	7.771E-09	5.410E-09	3.623E-09	3.322E-09	8.645E-10	4.990E-10
SE	1.116E-08	7.756E-09	5.198E-09	4.764E-09	1.208E-09	6.709E-10
ESE	1.278E-08	8.904E-09	5.995E-09	5.502E-09	1.438E-09	8.222E-10
E	1.723E-08	1.198E-08	8.029E-09	7.362E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.091E-09	1.536E-09	8.918E-10
NE	1.386E-08	9.507E-09	6.235E-09	5.691E-09	1.403E-09	8.064E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.683E-10

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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	330	490	539	592	652	707	812
N	3.303E-06	2.117E-06	1.878E-06	1.660E-06	1.455E-06	1.298E-06	1.059E-06
NNW	5.307E-06	3.729E-06	3.351E-06	2.995E-06	2.648E-06	2.377E-06	1.957E-06
NW	5.951E-06	4.689E-06	4.304E-06	3.920E-06	3.529E-06	3.212E-06	2.704E-06
WNW	3.950E-06	3.083E-06	2.825E-06	2.569E-06	2.311E-06	2.102E-06	1.768E-06
W	2.660E-06	1.888E-06	1.698E-06	1.518E-06	1.343E-06	1.207E-06	9.954E-07
WSW	2.052E-06	1.412E-06	1.263E-06	1.125E-06	9.922E-07	8.896E-07	7.327E-07
SW	2.189E-06	1.553E-06	1.406E-06	1.268E-06	1.134E-06	1.029E-06	8.639E-07
SSW	1.713E-06	1.166E-06	1.045E-06	9.326E-07	8.253E-07	7.422E-07	6.145E-07
S	1.288E-06	7.280E-07	6.279E-07	5.410E-07	4.628E-07	4.051E-07	3.213E-07
SSE	1.287E-06	7.567E-07	6.584E-07	5.720E-07	4.930E-07	4.340E-07	3.473E-07
SE	1.331E-06	8.670E-07	7.705E-07	6.823E-07	5.990E-07	5.349E-07	4.375E-07
ESE	1.715E-06	1.100E-06	9.723E-07	8.560E-07	7.466E-07	6.630E-07	5.368E-07
E	2.540E-06	1.555E-06	1.360E-06	1.186E-06	1.026E-06	9.047E-07	7.257E-07
ENE	2.678E-06	1.555E-06	1.346E-06	1.164E-06	9.977E-07	8.745E-07	6.945E-07
NE	2.613E-06	1.509E-06	1.306E-06	1.129E-06	9.682E-07	8.491E-07	6.750E-07
NNE	2.522E-06	1.485E-06	1.292E-06	1.123E-06	9.674E-07	8.516E-07	6.812E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.040E-06	9.715E-07	8.400E-07	5.957E-08	5.706E-08	5.473E-08	3.358E-08
NNW	1.923E-06	1.800E-06	1.563E-06	1.198E-07	1.148E-07	1.102E-07	6.806E-08
NW	2.662E-06	2.508E-06	2.207E-06	1.904E-07	1.828E-07	1.756E-07	1.096E-07
WNW	1.741E-06	1.640E-06	1.442E-06	1.236E-07	1.186E-07	1.140E-07	7.111E-08
W	9.781E-07	9.163E-07	7.971E-07	6.293E-08	6.036E-08	5.797E-08	3.607E-08
WSW	7.199E-07	6.743E-07	5.868E-07	4.643E-08	4.453E-08	4.275E-08	2.654E-08
SW	8.503E-07	8.013E-07	7.057E-07	6.062E-08	5.817E-08	5.587E-08	3.480E-08
SSW	6.041E-07	5.668E-07	4.949E-07	3.968E-08	3.806E-08	3.654E-08	2.267E-08
S	3.148E-07	2.915E-07	2.480E-07	1.464E-08	1.400E-08	1.341E-08	8.104E-09
SSE	3.404E-07	3.161E-07	2.703E-07	1.736E-08	1.662E-08	1.594E-08	9.797E-09
SE	4.296E-07	4.015E-07	3.477E-07	2.500E-08	2.396E-08	2.298E-08	1.414E-08
ESE	5.266E-07	4.905E-07	4.217E-07	2.864E-08	2.744E-08	2.632E-08	1.619E-08
E	7.115E-07	6.610E-07	5.659E-07	3.854E-08	3.692E-08	3.542E-08	2.181E-08
ENE	6.803E-07	6.301E-07	5.362E-07	3.307E-08	3.165E-08	3.034E-08	1.850E-08
NE	6.613E-07	6.128E-07	5.218E-07	3.162E-08	3.026E-08	2.898E-08	1.758E-08
NNE	6.676E-07	6.198E-07	5.297E-07	3.304E-08	3.162E-08	3.029E-08	1.840E-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	8850	11520	15610	16670	47000	70000
N	2.646E-08	1.835E-08	1.228E-08	1.125E-08	2.857E-09	1.597E-09
NNW	5.359E-08	3.740E-08	2.532E-08	2.326E-08	6.091E-09	3.441E-09
NW	8.653E-08	6.094E-08	4.182E-08	3.852E-08	1.032E-08	5.748E-09
WNW	5.616E-08	3.956E-08	2.716E-08	2.502E-08	6.723E-09	3.755E-09
W	2.847E-08	1.997E-08	1.361E-08	1.252E-08	3.329E-09	1.881E-09
WSW	2.096E-08	1.465E-08	9.914E-09	9.106E-09	2.348E-09	1.295E-09
SW	2.746E-08	1.923E-08	1.306E-08	1.200E-08	3.093E-09	1.670E-09
SSW	1.789E-08	1.251E-08	8.479E-09	7.790E-09	2.024E-09	1.117E-09
S	6.391E-09	4.414E-09	2.936E-09	2.688E-09	7.137E-10	4.226E-10
SSE	7.771E-09	5.409E-09	3.623E-09	3.322E-09	8.645E-10	4.990E-10
SE	1.116E-08	7.756E-09	5.198E-09	4.764E-09	1.208E-09	6.709E-10
ESE	1.278E-08	8.903E-09	5.995E-09	5.502E-09	1.438E-09	8.222E-10
E	1.723E-08	1.198E-08	8.028E-09	7.362E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.091E-09	1.536E-09	8.918E-10
NE	1.386E-08	9.507E-09	6.235E-09	5.691E-09	1.403E-09	8.064E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.684E-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	330	490	539	592	652	707	812
N	3.534E-06	2.222E-06	1.962E-06	1.727E-06	1.507E-06	1.340E-06	1.088E-06
NNW	5.859E-06	3.974E-06	3.546E-06	3.148E-06	2.767E-06	2.472E-06	2.022E-06
NW	6.755E-06	5.083E-06	4.624E-06	4.178E-06	3.735E-06	3.382E-06	2.824E-06
WNW	4.472E-06	3.338E-06	3.033E-06	2.738E-06	2.446E-06	2.213E-06	1.847E-06
W	2.954E-06	2.016E-06	1.799E-06	1.598E-06	1.406E-06	1.257E-06	1.030E-06
WSW	2.257E-06	1.499E-06	1.332E-06	1.180E-06	1.035E-06	9.249E-07	7.575E-07
SW	2.403E-06	1.660E-06	1.495E-06	1.341E-06	1.194E-06	1.079E-06	9.011E-07
SSW	1.870E-06	1.238E-06	1.103E-06	9.799E-07	8.633E-07	7.736E-07	6.371E-07
S	1.346E-06	7.493E-07	6.444E-07	5.539E-07	4.727E-07	4.130E-07	3.267E-07
SSE	1.358E-06	7.845E-07	6.800E-07	5.887E-07	5.058E-07	4.442E-07	3.541E-07
SE	1.428E-06	9.111E-07	8.058E-07	7.104E-07	6.210E-07	5.528E-07	4.499E-07
ESE	1.846E-06	1.155E-06	1.015E-06	8.895E-07	7.721E-07	6.831E-07	5.501E-07
E	2.727E-06	1.625E-06	1.414E-06	1.227E-06	1.056E-06	9.286E-07	7.414E-07
ENE	2.833E-06	1.609E-06	1.388E-06	1.195E-06	1.021E-06	8.925E-07	7.060E-07
NE	2.750E-06	1.557E-06	1.343E-06	1.157E-06	9.895E-07	8.658E-07	6.859E-07
NNE	2.653E-06	1.536E-06	1.332E-06	1.153E-06	9.910E-07	8.703E-07	6.935E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.068E-06	9.961E-07	8.588E-07	5.977E-08	5.726E-08	5.491E-08	3.365E-08
NNW	1.985E-06	1.855E-06	1.605E-06	1.202E-07	1.152E-07	1.106E-07	6.824E-08
NW	2.777E-06	2.611E-06	2.287E-06	1.916E-07	1.838E-07	1.766E-07	1.101E-07
WNW	1.816E-06	1.707E-06	1.495E-06	1.244E-07	1.193E-07	1.146E-07	7.140E-08
W	1.012E-06	9.462E-07	8.200E-07	6.322E-08	6.064E-08	5.823E-08	3.619E-08
WSW	7.440E-07	6.957E-07	6.035E-07	4.668E-08	4.476E-08	4.297E-08	2.663E-08
SW	8.865E-07	8.339E-07	7.316E-07	6.104E-08	5.856E-08	5.624E-08	3.496E-08
SSW	6.260E-07	5.864E-07	5.102E-07	3.991E-08	3.827E-08	3.674E-08	2.276E-08
S	3.199E-07	2.960E-07	2.515E-07	1.468E-08	1.404E-08	1.344E-08	8.116E-09
SSE	3.470E-07	3.218E-07	2.746E-07	1.741E-08	1.667E-08	1.599E-08	9.815E-09
SE	4.416E-07	4.121E-07	3.558E-07	2.510E-08	2.405E-08	2.307E-08	1.418E-08
ESE	5.394E-07	5.016E-07	4.300E-07	2.871E-08	2.751E-08	2.638E-08	1.622E-08
E	7.265E-07	6.741E-07	5.757E-07	3.865E-08	3.703E-08	3.552E-08	2.185E-08
ENE	6.914E-07	6.397E-07	5.432E-07	3.312E-08	3.170E-08	3.038E-08	1.852E-08
NE	6.718E-07	6.219E-07	5.285E-07	3.167E-08	3.030E-08	2.902E-08	1.760E-08
NNE	6.796E-07	6.302E-07	5.374E-07	3.312E-08	3.170E-08	3.037E-08	1.843E-08

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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	8850	11520	15610	16670	47000	70000
N	2.650E-08	1.838E-08	1.229E-08	1.126E-08	2.858E-09	1.596E-09
NNW	5.371E-08	3.747E-08	2.536E-08	2.329E-08	6.095E-09	3.441E-09
NW	8.682E-08	6.111E-08	4.192E-08	3.861E-08	1.033E-08	5.749E-09
WNW	5.635E-08	3.967E-08	2.723E-08	2.508E-08	6.731E-09	3.756E-09
W	2.854E-08	2.002E-08	1.364E-08	1.255E-08	3.332E-09	1.881E-09
WSW	2.102E-08	1.468E-08	9.935E-09	9.124E-09	2.350E-09	1.295E-09
SW	2.757E-08	1.929E-08	1.310E-08	1.203E-08	3.097E-09	1.670E-09
SSW	1.795E-08	1.254E-08	8.499E-09	7.808E-09	2.027E-09	1.117E-09
S	6.398E-09	4.418E-09	2.938E-09	2.690E-09	7.138E-10	4.225E-10
SSE	7.782E-09	5.415E-09	3.626E-09	3.324E-09	8.646E-10	4.988E-10
SE	1.118E-08	7.767E-09	5.204E-09	4.770E-09	1.208E-09	6.705E-10
ESE	1.279E-08	8.911E-09	5.999E-09	5.506E-09	1.438E-09	8.220E-10
E	1.726E-08	1.199E-08	8.036E-09	7.368E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.663E-09	6.092E-09	1.536E-09	8.915E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.691E-09	1.402E-09	8.060E-10
NNE	1.456E-08	1.004E-08	6.639E-09	6.069E-09	1.521E-09	8.677E-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	330	490	539	592	652	707	812
N	3.413E-06	2.169E-06	1.919E-06	1.693E-06	1.481E-06	1.319E-06	1.074E-06
NNW	5.544E-06	3.835E-06	3.436E-06	3.061E-06	2.700E-06	2.419E-06	1.986E-06
NW	6.301E-06	4.862E-06	4.445E-06	4.034E-06	3.621E-06	3.288E-06	2.758E-06
WNW	4.179E-06	3.196E-06	2.917E-06	2.644E-06	2.371E-06	2.152E-06	1.804E-06
W	2.783E-06	1.941E-06	1.740E-06	1.551E-06	1.370E-06	1.228E-06	1.010E-06
WSW	2.139E-06	1.449E-06	1.293E-06	1.148E-06	1.011E-06	9.050E-07	7.436E-07
SW	2.286E-06	1.603E-06	1.448E-06	1.303E-06	1.163E-06	1.053E-06	8.817E-07
SSW	1.782E-06	1.198E-06	1.071E-06	9.538E-07	8.425E-07	7.565E-07	6.249E-07
S	1.316E-06	7.383E-07	6.359E-07	5.473E-07	4.676E-07	4.090E-07	3.239E-07
SSE	1.319E-06	7.695E-07	6.684E-07	5.798E-07	4.989E-07	4.388E-07	3.505E-07
SE	1.380E-06	8.892E-07	7.883E-07	6.966E-07	6.102E-07	5.440E-07	4.439E-07
ESE	1.774E-06	1.125E-06	9.918E-07	8.712E-07	7.582E-07	6.721E-07	5.428E-07
E	2.612E-06	1.582E-06	1.381E-06	1.202E-06	1.037E-06	9.138E-07	7.317E-07
ENE	2.740E-06	1.576E-06	1.363E-06	1.176E-06	1.007E-06	8.816E-07	6.990E-07
NE	2.672E-06	1.530E-06	1.323E-06	1.142E-06	9.779E-07	8.567E-07	6.800E-07
NNE	2.586E-06	1.511E-06	1.312E-06	1.138E-06	9.795E-07	8.612E-07	6.876E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.054E-06	9.840E-07	8.496E-07	5.968E-08	5.717E-08	5.483E-08	3.362E-08
NNW	1.951E-06	1.824E-06	1.582E-06	1.200E-07	1.150E-07	1.104E-07	6.814E-08
NW	2.714E-06	2.555E-06	2.243E-06	1.910E-07	1.833E-07	1.761E-07	1.098E-07
WNW	1.775E-06	1.670E-06	1.466E-06	1.240E-07	1.190E-07	1.143E-07	7.125E-08
W	9.925E-07	9.291E-07	8.070E-07	6.306E-08	6.049E-08	5.809E-08	3.613E-08
WSW	7.305E-07	6.838E-07	5.943E-07	4.655E-08	4.464E-08	4.286E-08	2.659E-08
SW	8.676E-07	8.169E-07	7.182E-07	6.083E-08	5.836E-08	5.605E-08	3.488E-08
SSW	6.142E-07	5.758E-07	5.020E-07	3.979E-08	3.816E-08	3.664E-08	2.272E-08
S	3.173E-07	2.937E-07	2.497E-07	1.466E-08	1.402E-08	1.342E-08	8.110E-09
SSE	3.435E-07	3.188E-07	2.724E-07	1.738E-08	1.665E-08	1.597E-08	9.807E-09
SE	4.358E-07	4.070E-07	3.519E-07	2.506E-08	2.401E-08	2.303E-08	1.416E-08
ESE	5.325E-07	4.956E-07	4.255E-07	2.868E-08	2.747E-08	2.635E-08	1.620E-08
E	7.173E-07	6.661E-07	5.697E-07	3.859E-08	3.698E-08	3.547E-08	2.183E-08
ENE	6.847E-07	6.339E-07	5.389E-07	3.309E-08	3.167E-08	3.035E-08	1.851E-08
NE	6.661E-07	6.169E-07	5.249E-07	3.164E-08	3.028E-08	2.900E-08	1.759E-08
NNE	6.739E-07	6.252E-07	5.338E-07	3.309E-08	3.167E-08	3.034E-08	1.842E-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	8850	11520	15610	16670	47000	70000
N	2.648E-08	1.837E-08	1.229E-08	1.126E-08	2.857E-09	1.597E-09
NNW	5.365E-08	3.743E-08	2.534E-08	2.327E-08	6.093E-09	3.441E-09
NW	8.667E-08	6.102E-08	4.187E-08	3.857E-08	1.032E-08	5.748E-09
WNW	5.625E-08	3.961E-08	2.719E-08	2.505E-08	6.727E-09	3.756E-09
W	2.851E-08	1.999E-08	1.362E-08	1.253E-08	3.330E-09	1.881E-09
WSW	2.099E-08	1.467E-08	9.925E-09	9.115E-09	2.349E-09	1.295E-09
SW	2.751E-08	1.926E-08	1.308E-08	1.202E-08	3.095E-09	1.670E-09
SSW	1.792E-08	1.253E-08	8.489E-09	7.799E-09	2.026E-09	1.117E-09
S	6.394E-09	4.416E-09	2.937E-09	2.689E-09	7.138E-10	4.225E-10
SSE	7.777E-09	5.413E-09	3.625E-09	3.323E-09	8.646E-10	4.989E-10
SE	1.117E-08	7.762E-09	5.202E-09	4.767E-09	1.208E-09	6.707E-10
ESE	1.279E-08	8.907E-09	5.997E-09	5.504E-09	1.438E-09	8.221E-10
E	1.724E-08	1.199E-08	8.032E-09	7.365E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.092E-09	1.536E-09	8.917E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.691E-09	1.403E-09	8.062E-10
NNE	1.456E-08	1.004E-08	6.638E-09	6.068E-09	1.521E-09	8.680E-10

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)
Synopsis Report

C A P 8 8 - P C

Version 4.1

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 May 7 15:01:47 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Effective Dose Equivalent (mrem)
9.44E-05

At This Location: 822 Meters Northwest
Dataset Name: N_Ind23f.DAT
Dataset Date: May 7, 2024 03:01 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 822 Meters Northwest
Lifetime Fatal Cancer Risk: 2.59E-11

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

Organ	Dose Equivalent (mrem)
Adrenals	2.45E-05
UB_Wall	2.56E-05
Bone_Sur	2.61E-03
Brain	2.32E-05
Breasts	2.40E-05
St_Wall	2.46E-05
SI_Wall	2.49E-05
ULI_Wall	2.65E-05
LLI_Wall	3.18E-05
Kidneys	3.31E-05
Liver	2.98E-04
Muscle	2.53E-05
Ovaries	6.46E-05
Pancreas	2.46E-05
R_Marrow	1.51E-04
Skin	1.20E-04
Spleen	2.47E-05
Testes	6.46E-05
Thymus	2.43E-05
Thyroid	2.53E-05
GB_Wall	2.44E-05
Ht_Wall	2.48E-05
Uterus	2.51E-05
ET_Reg	3.21E-05
Lung	6.86E-05
Effectiv	9.44E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 2023

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	2.2E-07	6.1E-09	3.1E-09	2.2E-07
Pu-239	M	1.000	5.6E-08	3.6E-08	3.1E-09	9.6E-08
Am-241	M	1.000	3.8E-07	1.8E-07	5.0E-09	5.6E-07
Sr-90	M	1.000	2.4E-07	4.2E-07	2.9E-07	9.5E-07
Cs-137	F	1.000	6.9E-07	1.2E-06	8.1E-07	2.7E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2023

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
U-233	M	1.000	4.0E-08	2.0E-08	1.1E-08	7.1E-08
U-238	M	1.000	1.6E-08	1.4E-08	1.1E-08	4.1E-08

SITE INFORMATION

Temperature:	18.950	degrees C
Precipitation:	21.920	cm/y
Humidity:	8.000	g/cu m
Mixing Height:	1000.0	m

User specified location of max exposed individual.
(ILOC, JLOC): NW , 822 meters

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.27	7.50	15.10
Diameter (m):	4.66	1.80	2.30
Plume Rise Momentum (m/s): (Exit Velocity)	5.49	21.10	5.30

ADJUSTED 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

330	490	539	592	652	707	812
822	860	945	5100	5250	5400	7500
8850	11520	15610	16670	47000	70000	

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)
General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Tue May 7 15:01:47 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name:
N_Ind23f.DAT
Dataset Date: May 7, 2024 03:01 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind
Files\WIPP_023.wnd

Tue May 7 15:01:47 2024 GENERAL
Page 1

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	2.19E-06	1.80E-03
Pu-239	M	1.000	2.19E-06	1.80E-03
Am-241	M	1.000	2.19E-06	1.80E-03
Sr-90	M	1.000	2.19E-06	1.80E-03
Cs-137	F	1.000	2.19E-06	1.80E-03
U-233	M	1.000	2.19E-06	1.80E-03
U-238	M	1.000	2.19E-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	1.00E-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
ENTERED 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

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Tue May 7 15:01:47 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23f.DAT
Dataset Date: May 7, 2024 03:01 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

Tue May 7 15:01:47 2024 WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.040	3.140	3.260	3.290	2.850	2.210	0.000	0.073
NNW	2.110	3.020	3.340	4.300	4.150	3.320	0.000	0.131
NW	2.120	3.100	3.340	4.120	4.100	3.470	0.000	0.167
WNW	1.890	2.500	2.680	3.610	4.190	3.750	0.000	0.104
W	1.590	2.610	2.630	4.410	4.530	3.390	0.000	0.064
WSW	1.550	1.920	2.620	3.790	3.910	2.830	0.000	0.043
SW	1.620	2.220	2.430	3.400	3.070	3.410	0.000	0.048
SSW	1.850	2.090	2.620	3.960	3.480	3.550	0.000	0.038
S	1.830	3.100	3.310	3.120	3.490	3.880	0.000	0.026
SSE	1.970	2.930	3.900	4.050	3.370	1.860	0.000	0.029
SE	1.870	2.460	2.680	2.790	2.960	2.220	0.000	0.027
ESE	1.710	2.080	2.160	3.770	3.540	2.980	0.000	0.033
E	1.830	2.650	3.700	5.580	4.960	1.450	0.000	0.059
ENE	1.880	2.660	3.450	5.220	3.720	2.570	0.000	0.057
NE	1.860	2.660	2.850	4.130	1.880	0.000	0.000	0.050
NNE	1.900	2.420	3.000	3.170	2.180	1.190	0.000	0.049

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	2.970	4.090	4.480	4.460	3.460	3.110	0.000
NNW	3.070	4.280	4.820	5.560	4.820	3.660	0.000
NW	3.100	4.310	4.820	5.370	4.750	3.810	0.000
WNW	2.840	3.720	4.070	5.070	4.850	4.000	0.000
W	2.470	3.530	3.900	5.820	5.440	3.740	0.000
WSW	2.390	3.120	3.670	5.690	5.190	3.370	0.000
SW	2.540	3.370	4.010	5.360	3.960	3.770	0.000
SSW	2.800	3.130	3.990	5.670	4.430	3.780	0.000
S	2.910	4.500	4.560	4.000	3.960	4.050	0.000
SSE	2.810	4.350	4.870	4.960	3.870	2.570	0.000
SE	2.760	3.390	3.620	4.000	3.620	3.090	0.000
ESE	2.550	3.090	3.500	5.460	4.410	3.170	0.000
E	2.740	4.120	5.200	7.660	6.030	2.350	0.000
ENE	2.790	3.930	5.180	6.960	5.120	2.570	0.000
NE	2.780	3.810	4.440	5.760	2.970	0.000	0.000
NNE	2.710	3.560	4.170	4.300	2.890	1.670	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2310	0.1230	0.2189	0.2802	0.1387	0.0082	0.0000
NNW	0.1047	0.0737	0.1447	0.3507	0.3065	0.0196	0.0000
NW	0.0777	0.0394	0.0867	0.2984	0.4416	0.0563	0.0000
WNW	0.0802	0.0473	0.0829	0.2682	0.4537	0.0677	0.0000
W	0.1159	0.0471	0.0866	0.3499	0.3658	0.0346	0.0000
WSW	0.1307	0.0642	0.0958	0.3838	0.2815	0.0440	0.0000
SW	0.1342	0.0502	0.1211	0.3448	0.2574	0.0924	0.0000
SSW	0.1518	0.0609	0.1362	0.3552	0.2337	0.0622	0.0000
S	0.2641	0.1518	0.3674	0.1643	0.0398	0.0125	0.0000
SSE	0.2852	0.1393	0.2260	0.2667	0.0777	0.0051	0.0000
SE	0.2693	0.1126	0.1853	0.2674	0.1500	0.0154	0.0000
ESE	0.2453	0.0864	0.1493	0.3116	0.2047	0.0027	0.0000
E	0.1618	0.0940	0.1400	0.4206	0.1795	0.0041	0.0000
ENE	0.2173	0.1163	0.1855	0.4157	0.0647	0.0005	0.0000
NE	0.2605	0.1278	0.2174	0.3688	0.0256	0.0000	0.0000
NNE	0.2839	0.1511	0.2560	0.2633	0.0432	0.0024	0.0000
TOTAL	0.1570	0.0807	0.1474	0.3230	0.2599	0.0319	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 19.0 degrees C
292.11 K
Precipitation: 21.9 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: 4.576 m/s

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

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)
Dose and Risk Summaries

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 May 7 15:01:47 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23f.DAT
Dataset Date: May 7, 2024 03:01 PM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenals	2.45E-05
UB_Wall	2.56E-05
Bone_Sur	2.61E-03
Brain	2.32E-05
Breasts	2.40E-05
St_Wall	2.46E-05
SI_Wall	2.49E-05
ULI_Wall	2.65E-05
LLI_Wall	3.18E-05
Kidneys	3.31E-05
Liver	2.98E-04
Muscle	2.53E-05
Ovaries	6.46E-05
Pancreas	2.46E-05
R_Marrow	1.51E-04
Skin	1.20E-04
Spleen	2.47E-05
Testes	6.46E-05
Thymus	2.43E-05
Thyroid	2.53E-05
GB_Wall	2.44E-05
Ht_Wall	2.48E-05
Uterus	2.51E-05
ET_Reg	3.21E-05
Lung	6.86E-05
Effectiv	9.44E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.76E-05
INHALATION	6.56E-05
AIR IMMERSION	4.27E-10
GROUND SURFACE	1.12E-05
INTERNAL	8.32E-05
EXTERNAL	1.12E-05
TOTAL	9.44E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	1.85E-05
U-234	1.75E-13
Th-230	4.98E-17
Ra-226	5.04E-18
Rn-222	2.80E-19
Po-218	5.01E-24
Pb-214	1.83E-16
At-218	1.88E-23
Bi-214	1.07E-15
Rn-218	1.09E-25
Po-214	5.93E-20
Tl-210	4.18E-19
Pb-210	6.29E-19
Bi-210	1.02E-17
Hg-206	7.73E-25
Po-210	2.60E-21
Tl-206	2.37E-23
Pu-239	8.20E-06
U-235m	8.58E-18
U-235	6.44E-15
Th-231	6.57E-16
Pa-231	8.63E-19
Ac-227	2.55E-21
Th-227	1.22E-18
Fr-223	1.15E-20
Ra-223	1.36E-18
Rn-219	5.89E-19
At-219	0.00E+00
Bi-215	2.64E-24
Po-215	1.80E-21
Pb-211	1.16E-18
Bi-211	4.77E-19
Tl-207	5.99E-19
Po-211	2.29E-22
Am-241	4.03E-05
Np-237	1.97E-12
Pa-233	1.62E-11
U-233	3.83E-07
Th-229	2.39E-10
Ra-225	3.39E-11
Ac-225	4.06E-11
Fr-221	8.27E-11
At-217	6.98E-13
Bi-213	5.04E-10
Po-213	1.07E-13
Tl-209	1.30E-10
Pb-209	9.81E-12
Sr-90	5.13E-06
Y-90	6.98E-07
Cs-137	1.08E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Ba-137m	1.02E-05
U-238	1.77E-07
Th-234	4.43E-09
Pa-234m	6.06E-08
Pa-234	1.19E-09
TOTAL	9.44E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	2.41E-13
Stomach	8.59E-13
Colon	2.69E-12
Liver	3.18E-12
LUNG	8.06E-12
Bone	1.52E-12
Skin	1.17E-13
Breast	8.91E-13
Ovary	6.54E-13
Bladder	5.95E-13
Kidneys	1.63E-13
Thyroid	6.67E-14
Leukemia	3.72E-12
Residual	3.13E-12
Total	2.59E-11
TOTAL	2.59E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	8.64E-12
INHALATION	1.16E-11
AIR IMMERSION	2.32E-16
GROUND SURFACE	5.68E-12
INTERNAL	2.02E-11
EXTERNAL	5.68E-12
TOTAL	2.59E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	3.33E-12
U-234	6.03E-20
Th-230	2.11E-23
Ra-226	2.74E-24
Rn-222	1.53E-25
Po-218	2.24E-30
Pb-214	9.80E-23
At-218	2.32E-30
Bi-214	5.65E-22
Rn-218	5.97E-32
Po-214	3.26E-26
Tl-210	2.23E-25
Pb-210	2.82E-25
Bi-210	1.13E-24
Hg-206	3.43E-31
Po-210	1.43E-27
Tl-206	2.67E-30
Pu-239	1.34E-12
U-235m	6.23E-24
U-235	3.49E-21
Th-231	3.00E-22
Pa-231	4.50E-25
Ac-227	9.54E-28
Th-227	6.59E-25
Fr-223	4.28E-27
Ra-223	7.35E-25
Rn-219	3.22E-25
At-219	0.00E+00
Bi-215	1.18E-30
Po-215	9.86E-28
Pb-211	4.13E-25
Bi-211	2.60E-25
Tl-207	7.70E-26
Po-211	1.26E-28
Am-241	6.63E-12
Np-237	9.67E-19
Pa-233	8.76E-18
U-233	3.77E-13
Th-229	1.26E-16
Ra-225	1.53E-17
Ac-225	2.14E-17
Fr-221	4.49E-17
At-217	3.81E-19
Bi-213	2.18E-16
Po-213	5.87E-20
Tl-209	6.94E-17
Pb-209	1.29E-18
Sr-90	3.00E-12
Y-90	8.31E-14
Cs-137	5.43E-12

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Ba-137m	5.50E-12
U-238	1.73E-13
Th-234	2.29E-15
Pa-234m	1.06E-14
Pa-234	6.49E-16
TOTAL	2.59E-11

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

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	1.2E-04	7.6E-05	6.7E-05	5.9E-05	5.1E-05	4.6E-05	3.7E-05
NNW	2.0E-04	1.4E-04	1.2E-04	1.1E-04	9.4E-05	8.4E-05	6.9E-05
NW	2.3E-04	1.7E-04	1.6E-04	1.4E-04	1.3E-04	1.1E-04	9.6E-05
WNW	1.5E-04	1.1E-04	1.0E-04	9.3E-05	8.3E-05	7.5E-05	6.3E-05
W	1.0E-04	6.9E-05	6.1E-05	5.4E-05	4.8E-05	4.3E-05	3.5E-05
WSW	7.7E-05	5.1E-05	4.5E-05	4.0E-05	3.5E-05	3.2E-05	2.6E-05
SW	8.2E-05	5.7E-05	5.1E-05	4.6E-05	4.1E-05	3.7E-05	3.1E-05
SSW	6.4E-05	4.2E-05	3.8E-05	3.3E-05	2.9E-05	2.6E-05	2.2E-05
S	4.6E-05	2.6E-05	2.2E-05	1.9E-05	1.6E-05	1.4E-05	1.1E-05
SSE	4.6E-05	2.7E-05	2.3E-05	2.0E-05	1.7E-05	1.5E-05	1.2E-05
SE	4.9E-05	3.1E-05	2.7E-05	2.4E-05	2.1E-05	1.9E-05	1.5E-05
ESE	6.3E-05	3.9E-05	3.5E-05	3.0E-05	2.6E-05	2.3E-05	1.9E-05
E	9.3E-05	5.5E-05	4.8E-05	4.2E-05	3.6E-05	3.2E-05	2.5E-05
ENE	9.7E-05	5.5E-05	4.7E-05	4.1E-05	3.5E-05	3.1E-05	2.4E-05
NE	9.4E-05	5.3E-05	4.6E-05	4.0E-05	3.4E-05	3.0E-05	2.4E-05
NNE	9.0E-05	5.2E-05	4.5E-05	3.9E-05	3.4E-05	3.0E-05	2.4E-05

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	3.7E-05	3.4E-05	2.9E-05	2.1E-06	2.1E-06	2.0E-06	1.2E-06
NNW	6.8E-05	6.3E-05	5.5E-05	4.2E-06	4.0E-06	3.9E-06	2.4E-06
NW	9.4E-05	8.9E-05	7.8E-05	6.6E-06	6.4E-06	6.1E-06	3.8E-06
WNW	6.2E-05	5.8E-05	5.1E-05	4.3E-06	4.1E-06	4.0E-06	2.5E-06
W	3.4E-05	3.2E-05	2.8E-05	2.2E-06	2.1E-06	2.0E-06	1.3E-06
WSW	2.5E-05	2.4E-05	2.1E-05	1.6E-06	1.6E-06	1.5E-06	9.4E-07
SW	3.0E-05	2.8E-05	2.5E-05	2.1E-06	2.0E-06	2.0E-06	1.2E-06
SSW	2.1E-05	2.0E-05	1.7E-05	1.4E-06	1.3E-06	1.3E-06	8.1E-07
S	1.1E-05	1.0E-05	8.7E-06	5.5E-07	5.2E-07	5.0E-07	3.1E-07
SSE	1.2E-05	1.1E-05	9.5E-06	6.4E-07	6.1E-07	5.9E-07	3.7E-07
SE	1.5E-05	1.4E-05	1.2E-05	9.0E-07	8.6E-07	8.3E-07	5.2E-07
ESE	1.8E-05	1.7E-05	1.5E-05	1.0E-06	9.9E-07	9.5E-07	5.9E-07
E	2.5E-05	2.3E-05	2.0E-05	1.4E-06	1.3E-06	1.3E-06	7.9E-07
ENE	2.4E-05	2.2E-05	1.9E-05	1.2E-06	1.2E-06	1.1E-06	6.9E-07
NE	2.3E-05	2.1E-05	1.8E-05	1.2E-06	1.1E-06	1.1E-06	6.6E-07
NNE	2.3E-05	2.2E-05	1.9E-05	1.2E-06	1.2E-06	1.1E-06	6.9E-07

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	9.7E-07	6.8E-07	4.6E-07	4.2E-07	1.1E-07	6.3E-08
NNW	1.9E-06	1.3E-06	9.1E-07	8.4E-07	2.2E-07	1.3E-07
NW	3.0E-06	2.1E-06	1.5E-06	1.4E-06	3.7E-07	2.1E-07
WNW	2.0E-06	1.4E-06	9.6E-07	8.9E-07	2.4E-07	1.4E-07
W	1.0E-06	7.1E-07	4.9E-07	4.5E-07	1.2E-07	6.9E-08
WSW	7.5E-07	5.3E-07	3.6E-07	3.3E-07	8.7E-08	4.8E-08
SW	9.8E-07	6.9E-07	4.7E-07	4.3E-07	1.1E-07	6.2E-08
SSW	6.4E-07	4.5E-07	3.1E-07	2.8E-07	7.5E-08	4.2E-08
S	2.5E-07	1.7E-07	1.2E-07	1.1E-07	3.0E-08	1.8E-08
SSE	2.9E-07	2.1E-07	1.4E-07	1.3E-07	3.5E-08	2.0E-08
SE	4.1E-07	2.9E-07	1.9E-07	1.8E-07	4.7E-08	2.6E-08
ESE	4.7E-07	3.3E-07	2.2E-07	2.1E-07	5.5E-08	3.2E-08
E	6.3E-07	4.4E-07	3.0E-07	2.7E-07	7.3E-08	4.2E-08
ENE	5.5E-07	3.8E-07	2.6E-07	2.3E-07	6.2E-08	3.6E-08
NE	5.2E-07	3.6E-07	2.4E-07	2.2E-07	5.7E-08	3.4E-08
NNE	5.5E-07	3.8E-07	2.6E-07	2.4E-07	6.2E-08	3.6E-08

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

	Distance (m)						
Direction	330	490	539	592	652	707	812
N	3.3E-11	2.1E-11	1.8E-11	1.6E-11	1.4E-11	1.3E-11	1.0E-11
NNW	5.4E-11	3.7E-11	3.3E-11	2.9E-11	2.6E-11	2.3E-11	1.9E-11
NW	6.2E-11	4.7E-11	4.3E-11	3.9E-11	3.5E-11	3.1E-11	2.6E-11
WNW	4.1E-11	3.1E-11	2.8E-11	2.5E-11	2.3E-11	2.1E-11	1.7E-11
W	2.7E-11	1.9E-11	1.7E-11	1.5E-11	1.3E-11	1.2E-11	9.7E-12
WSW	2.1E-11	1.4E-11	1.2E-11	1.1E-11	9.7E-12	8.7E-12	7.1E-12
SW	2.2E-11	1.5E-11	1.4E-11	1.2E-11	1.1E-11	1.0E-11	8.5E-12
SSW	1.7E-11	1.2E-11	1.0E-11	9.1E-12	8.1E-12	7.3E-12	6.0E-12
S	1.3E-11	7.1E-12	6.1E-12	5.3E-12	4.5E-12	4.0E-12	3.2E-12
SSE	1.3E-11	7.4E-12	6.4E-12	5.6E-12	4.8E-12	4.2E-12	3.4E-12
SE	1.3E-11	8.5E-12	7.6E-12	6.7E-12	5.9E-12	5.2E-12	4.3E-12
ESE	1.7E-11	1.1E-11	9.5E-12	8.4E-12	7.3E-12	6.5E-12	5.2E-12
E	2.5E-11	1.5E-11	1.3E-11	1.2E-11	1.0E-11	8.8E-12	7.0E-12
ENE	2.6E-11	1.5E-11	1.3E-11	1.1E-11	9.7E-12	8.5E-12	6.8E-12
NE	2.6E-11	1.5E-11	1.3E-11	1.1E-11	9.4E-12	8.3E-12	6.6E-12
NNE	2.5E-11	1.4E-11	1.3E-11	1.1E-11	9.4E-12	8.3E-12	6.7E-12

	Distance (m)						
Direction	822	860	945	5100	5250	5400	7500
N	1.0E-11	9.5E-12	8.2E-12	6.2E-13	6.0E-13	5.7E-13	3.6E-13
NNW	1.9E-11	1.7E-11	1.5E-11	1.2E-12	1.2E-12	1.1E-12	7.0E-13
NW	2.6E-11	2.4E-11	2.1E-11	1.9E-12	1.8E-12	1.7E-12	1.1E-12
WNW	1.7E-11	1.6E-11	1.4E-11	1.2E-12	1.2E-12	1.1E-12	7.1E-13
W	9.5E-12	8.9E-12	7.7E-12	6.3E-13	6.1E-13	5.8E-13	3.7E-13
WSW	7.0E-12	6.6E-12	5.7E-12	4.7E-13	4.5E-13	4.3E-13	2.7E-13
SW	8.3E-12	7.8E-12	6.9E-12	6.1E-13	5.8E-13	5.6E-13	3.5E-13
SSW	5.9E-12	5.5E-12	4.8E-12	4.0E-13	3.9E-13	3.7E-13	2.3E-13
S	3.1E-12	2.9E-12	2.4E-12	1.6E-13	1.6E-13	1.5E-13	9.4E-14
SSE	3.3E-12	3.1E-12	2.7E-12	1.9E-13	1.8E-13	1.7E-13	1.1E-13
SE	4.2E-12	3.9E-12	3.4E-12	2.6E-13	2.5E-13	2.4E-13	1.5E-13
ESE	5.1E-12	4.8E-12	4.1E-12	3.0E-13	2.9E-13	2.8E-13	1.7E-13
E	6.9E-12	6.4E-12	5.5E-12	4.0E-13	3.8E-13	3.7E-13	2.3E-13
ENE	6.6E-12	6.1E-12	5.2E-12	3.6E-13	3.4E-13	3.3E-13	2.0E-13
NE	6.4E-12	6.0E-12	5.1E-12	3.4E-13	3.3E-13	3.2E-13	2.0E-13
NNE	6.5E-12	6.1E-12	5.2E-12	3.6E-13	3.5E-13	3.3E-13	2.1E-13

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

	Distance (m)					
Direction	8850	11520	15610	16670	47000	70000
N	2.9E-13	2.0E-13	1.4E-13	1.3E-13	3.4E-14	1.9E-14
NNW	5.5E-13	3.9E-13	2.7E-13	2.4E-13	6.6E-14	3.8E-14
NW	8.7E-13	6.1E-13	4.2E-13	3.9E-13	1.1E-13	6.0E-14
WNW	5.6E-13	4.0E-13	2.8E-13	2.6E-13	7.0E-14	4.0E-14
W	2.9E-13	2.1E-13	1.4E-13	1.3E-13	3.6E-14	2.1E-14
WSW	2.2E-13	1.5E-13	1.0E-13	9.6E-14	2.6E-14	1.4E-14
SW	2.8E-13	2.0E-13	1.4E-13	1.2E-13	3.3E-14	1.8E-14
SSW	1.9E-13	1.3E-13	8.9E-14	8.2E-14	2.2E-14	1.2E-14
S	7.5E-14	5.3E-14	3.6E-14	3.3E-14	9.4E-15	5.7E-15
SSE	8.8E-14	6.2E-14	4.3E-14	3.9E-14	1.1E-14	6.4E-15
SE	1.2E-13	8.5E-14	5.8E-14	5.3E-14	1.4E-14	8.1E-15
ESE	1.4E-13	9.8E-14	6.7E-14	6.2E-14	1.7E-14	9.9E-15
E	1.8E-13	1.3E-13	8.9E-14	8.2E-14	2.2E-14	1.3E-14
ENE	1.6E-13	1.2E-13	7.8E-14	7.1E-14	1.9E-14	1.2E-14
NE	1.6E-13	1.1E-13	7.4E-14	6.8E-14	1.8E-14	1.1E-14
NNE	1.7E-13	1.2E-13	7.9E-14	7.3E-14	2.0E-14	1.2E-14

Exclusive Use Area Fence Line
(0.51 miles [822 meters] NW)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Tue May 7 15:01:47 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Ind23f.DAT
Dataset Date: May 7, 2024 03:01 PM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd

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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	330	490	539	592	652	707	812
N	3.836E-06	2.361E-06	2.073E-06	1.816E-06	1.577E-06	1.397E-06	1.127E-06
NNW	6.553E-06	4.283E-06	3.790E-06	3.341E-06	2.917E-06	2.593E-06	2.104E-06
NW	7.770E-06	5.583E-06	5.030E-06	4.507E-06	3.997E-06	3.598E-06	2.976E-06
WNW	5.133E-06	3.662E-06	3.297E-06	2.952E-06	2.617E-06	2.354E-06	1.947E-06
W	3.320E-06	2.175E-06	1.926E-06	1.698E-06	1.484E-06	1.321E-06	1.074E-06
WSW	2.514E-06	1.609E-06	1.419E-06	1.249E-06	1.090E-06	9.695E-07	7.890E-07
SW	2.677E-06	1.797E-06	1.609E-06	1.436E-06	1.272E-06	1.145E-06	9.497E-07
SSW	2.070E-06	1.329E-06	1.177E-06	1.040E-06	9.119E-07	8.140E-07	6.661E-07
S	1.421E-06	7.772E-07	6.661E-07	5.707E-07	4.856E-07	4.234E-07	3.337E-07
SSE	1.448E-06	8.203E-07	7.079E-07	6.104E-07	5.223E-07	4.574E-07	3.629E-07
SE	1.556E-06	9.698E-07	8.529E-07	7.480E-07	6.505E-07	5.767E-07	4.665E-07
ESE	2.013E-06	1.226E-06	1.071E-06	9.325E-07	8.049E-07	7.090E-07	5.672E-07
E	2.955E-06	1.710E-06	1.478E-06	1.276E-06	1.093E-06	9.576E-07	7.603E-07
ENE	3.023E-06	1.676E-06	1.438E-06	1.233E-06	1.049E-06	9.145E-07	7.201E-07
NE	2.923E-06	1.619E-06	1.390E-06	1.194E-06	1.017E-06	8.873E-07	7.000E-07
NNE	2.826E-06	1.604E-06	1.385E-06	1.195E-06	1.023E-06	8.954E-07	7.102E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.106E-06	1.029E-06	8.840E-07	6.006E-08	5.752E-08	5.515E-08	3.375E-08
NNW	2.065E-06	1.925E-06	1.658E-06	1.209E-07	1.158E-07	1.111E-07	6.847E-08
NW	2.925E-06	2.743E-06	2.389E-06	1.931E-07	1.852E-07	1.779E-07	1.106E-07
WNW	1.913E-06	1.794E-06	1.562E-06	1.253E-07	1.202E-07	1.155E-07	7.178E-08
W	1.054E-06	9.837E-07	8.489E-07	6.361E-08	6.100E-08	5.856E-08	3.633E-08
WSW	7.745E-07	7.230E-07	6.249E-07	4.700E-08	4.507E-08	4.326E-08	2.676E-08
SW	9.337E-07	8.765E-07	7.656E-07	6.160E-08	5.908E-08	5.672E-08	3.518E-08
SSW	6.542E-07	6.116E-07	5.301E-07	4.022E-08	3.855E-08	3.701E-08	2.288E-08
S	3.267E-07	3.020E-07	2.560E-07	1.472E-08	1.408E-08	1.348E-08	8.132E-09
SSE	3.555E-07	3.293E-07	2.803E-07	1.747E-08	1.674E-08	1.605E-08	9.840E-09
SE	4.577E-07	4.263E-07	3.668E-07	2.524E-08	2.418E-08	2.319E-08	1.423E-08
ESE	5.559E-07	5.159E-07	4.406E-07	2.881E-08	2.759E-08	2.646E-08	1.625E-08
E	7.448E-07	6.901E-07	5.876E-07	3.880E-08	3.717E-08	3.565E-08	2.190E-08
ENE	7.049E-07	6.514E-07	5.518E-07	3.318E-08	3.175E-08	3.043E-08	1.854E-08
NE	6.853E-07	6.336E-07	5.372E-07	3.172E-08	3.035E-08	2.907E-08	1.761E-08
NNE	6.957E-07	6.442E-07	5.480E-07	3.325E-08	3.181E-08	3.047E-08	1.848E-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	8850	11520	15610	16670	47000	70000
N	2.657E-08	1.841E-08	1.231E-08	1.128E-08	2.858E-09	1.595E-09
NNW	5.386E-08	3.755E-08	2.541E-08	2.334E-08	6.101E-09	3.441E-09
NW	8.720E-08	6.133E-08	4.206E-08	3.873E-08	1.035E-08	5.750E-09
WNW	5.659E-08	3.981E-08	2.731E-08	2.516E-08	6.742E-09	3.757E-09
W	2.864E-08	2.007E-08	1.367E-08	1.258E-08	3.336E-09	1.881E-09
WSW	2.110E-08	1.473E-08	9.962E-09	9.149E-09	2.352E-09	1.294E-09
SW	2.771E-08	1.937E-08	1.315E-08	1.208E-08	3.103E-09	1.669E-09
SSW	1.803E-08	1.259E-08	8.526E-09	7.832E-09	2.030E-09	1.117E-09
S	6.408E-09	4.423E-09	2.941E-09	2.693E-09	7.140E-10	4.223E-10
SSE	7.797E-09	5.423E-09	3.631E-09	3.328E-09	8.648E-10	4.986E-10
SE	1.121E-08	7.784E-09	5.213E-09	4.778E-09	1.209E-09	6.699E-10
ESE	1.281E-08	8.921E-09	6.005E-09	5.510E-09	1.438E-09	8.218E-10
E	1.729E-08	1.201E-08	8.047E-09	7.377E-09	1.899E-09	1.089E-09
ENE	1.464E-08	1.009E-08	6.665E-09	6.094E-09	1.535E-09	8.912E-10
NE	1.387E-08	9.511E-09	6.236E-09	5.691E-09	1.402E-09	8.054E-10
NNE	1.459E-08	1.006E-08	6.646E-09	6.075E-09	1.521E-09	8.668E-10

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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	330	490	539	592	652	707	812
N	3.518E-06	2.210E-06	1.951E-06	1.718E-06	1.500E-06	1.334E-06	1.084E-06
NNW	5.901E-06	3.990E-06	3.558E-06	3.157E-06	2.773E-06	2.477E-06	2.025E-06
NW	6.801E-06	5.101E-06	4.637E-06	4.187E-06	3.741E-06	3.385E-06	2.825E-06
WNW	4.495E-06	3.349E-06	3.041E-06	2.743E-06	2.449E-06	2.216E-06	1.848E-06
W	2.984E-06	2.030E-06	1.811E-06	1.607E-06	1.412E-06	1.262E-06	1.033E-06
WSW	2.273E-06	1.507E-06	1.338E-06	1.184E-06	1.038E-06	9.270E-07	7.584E-07
SW	2.404E-06	1.656E-06	1.491E-06	1.338E-06	1.191E-06	1.076E-06	8.983E-07
SSW	1.877E-06	1.240E-06	1.104E-06	9.805E-07	8.635E-07	7.736E-07	6.367E-07
S	1.341E-06	7.473E-07	6.428E-07	5.526E-07	4.717E-07	4.122E-07	3.261E-07
SSE	1.358E-06	7.839E-07	6.794E-07	5.881E-07	5.052E-07	4.437E-07	3.536E-07
SE	1.415E-06	9.041E-07	8.001E-07	7.057E-07	6.172E-07	5.496E-07	4.476E-07
ESE	1.845E-06	1.155E-06	1.016E-06	8.896E-07	7.721E-07	6.831E-07	5.500E-07
E	2.768E-06	1.641E-06	1.426E-06	1.236E-06	1.063E-06	9.340E-07	7.447E-07
ENE	2.860E-06	1.619E-06	1.395E-06	1.201E-06	1.025E-06	8.959E-07	7.082E-07
NE	2.758E-06	1.559E-06	1.344E-06	1.158E-06	9.896E-07	8.657E-07	6.857E-07
NNE	2.640E-06	1.529E-06	1.326E-06	1.148E-06	9.867E-07	8.667E-07	6.909E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.064E-06	9.920E-07	8.555E-07	5.972E-08	5.720E-08	5.486E-08	3.363E-08
NNW	1.988E-06	1.857E-06	1.606E-06	1.202E-07	1.152E-07	1.106E-07	6.823E-08
NW	2.778E-06	2.611E-06	2.286E-06	1.915E-07	1.837E-07	1.765E-07	1.100E-07
WNW	1.817E-06	1.708E-06	1.495E-06	1.243E-07	1.193E-07	1.146E-07	7.138E-08
W	1.015E-06	9.485E-07	8.216E-07	6.322E-08	6.063E-08	5.822E-08	3.618E-08
WSW	7.448E-07	6.963E-07	6.037E-07	4.664E-08	4.473E-08	4.294E-08	2.662E-08
SW	8.836E-07	8.312E-07	7.293E-07	6.097E-08	5.849E-08	5.618E-08	3.493E-08
SSW	6.256E-07	5.859E-07	5.098E-07	3.988E-08	3.825E-08	3.672E-08	2.275E-08
S	3.194E-07	2.956E-07	2.511E-07	1.467E-08	1.403E-08	1.344E-08	8.114E-09
SSE	3.465E-07	3.214E-07	2.742E-07	1.739E-08	1.666E-08	1.598E-08	9.809E-09
SE	4.394E-07	4.101E-07	3.542E-07	2.507E-08	2.402E-08	2.305E-08	1.417E-08
ESE	5.394E-07	5.016E-07	4.299E-07	2.871E-08	2.750E-08	2.638E-08	1.621E-08
E	7.297E-07	6.768E-07	5.776E-07	3.864E-08	3.702E-08	3.551E-08	2.185E-08
ENE	6.935E-07	6.415E-07	5.445E-07	3.313E-08	3.171E-08	3.038E-08	1.852E-08
NE	6.716E-07	6.217E-07	5.283E-07	3.166E-08	3.029E-08	2.902E-08	1.759E-08
NNE	6.771E-07	6.279E-07	5.356E-07	3.308E-08	3.165E-08	3.032E-08	1.841E-08

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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	8850	11520	15610	16670	47000	70000
N	2.649E-08	1.837E-08	1.229E-08	1.126E-08	2.857E-09	1.596E-09
NNW	5.370E-08	3.746E-08	2.535E-08	2.329E-08	6.095E-09	3.441E-09
NW	8.679E-08	6.109E-08	4.191E-08	3.860E-08	1.033E-08	5.749E-09
WNW	5.634E-08	3.966E-08	2.722E-08	2.508E-08	6.730E-09	3.756E-09
W	2.854E-08	2.001E-08	1.364E-08	1.254E-08	3.332E-09	1.881E-09
WSW	2.101E-08	1.468E-08	9.931E-09	9.120E-09	2.349E-09	1.295E-09
SW	2.755E-08	1.927E-08	1.309E-08	1.203E-08	3.096E-09	1.670E-09
SSW	1.795E-08	1.254E-08	8.496E-09	7.805E-09	2.026E-09	1.117E-09
S	6.397E-09	4.418E-09	2.938E-09	2.690E-09	7.138E-10	4.225E-10
SSE	7.778E-09	5.413E-09	3.625E-09	3.323E-09	8.645E-10	4.989E-10
SE	1.118E-08	7.763E-09	5.202E-09	4.768E-09	1.208E-09	6.705E-10
ESE	1.279E-08	8.910E-09	5.999E-09	5.505E-09	1.438E-09	8.220E-10
E	1.725E-08	1.199E-08	8.035E-09	7.367E-09	1.899E-09	1.090E-09
ENE	1.463E-08	1.008E-08	6.663E-09	6.092E-09	1.536E-09	8.915E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.690E-09	1.402E-09	8.060E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.680E-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	330	490	539	592	652	707	812
N	3.589E-06	2.243E-06	1.978E-06	1.739E-06	1.517E-06	1.347E-06	1.093E-06
NNW	6.058E-06	4.061E-06	3.613E-06	3.201E-06	2.808E-06	2.505E-06	2.043E-06
NW	7.032E-06	5.215E-06	4.730E-06	4.262E-06	3.801E-06	3.435E-06	2.860E-06
WNW	4.646E-06	3.423E-06	3.101E-06	2.792E-06	2.489E-06	2.248E-06	1.871E-06
W	3.067E-06	2.066E-06	1.839E-06	1.629E-06	1.430E-06	1.277E-06	1.043E-06
WSW	2.332E-06	1.532E-06	1.358E-06	1.200E-06	1.051E-06	9.371E-07	7.656E-07
SW	2.467E-06	1.688E-06	1.518E-06	1.360E-06	1.209E-06	1.092E-06	9.097E-07
SSW	1.923E-06	1.261E-06	1.121E-06	9.945E-07	8.747E-07	7.829E-07	6.435E-07
S	1.359E-06	7.539E-07	6.479E-07	5.566E-07	4.748E-07	4.147E-07	3.278E-07
SSE	1.379E-06	7.922E-07	6.859E-07	5.932E-07	5.091E-07	4.468E-07	3.557E-07
SE	1.445E-06	9.183E-07	8.114E-07	7.148E-07	6.243E-07	5.554E-07	4.516E-07
ESE	1.884E-06	1.172E-06	1.028E-06	8.995E-07	7.797E-07	6.891E-07	5.540E-07
E	2.817E-06	1.659E-06	1.440E-06	1.247E-06	1.071E-06	9.403E-07	7.488E-07
ENE	2.902E-06	1.634E-06	1.406E-06	1.209E-06	1.031E-06	9.007E-07	7.113E-07
NE	2.798E-06	1.573E-06	1.355E-06	1.166E-06	9.959E-07	8.707E-07	6.890E-07
NNE	2.681E-06	1.545E-06	1.339E-06	1.158E-06	9.944E-07	8.728E-07	6.950E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.073E-06	9.999E-07	8.616E-07	5.979E-08	5.727E-08	5.492E-08	3.366E-08
NNW	2.006E-06	1.873E-06	1.618E-06	1.204E-07	1.154E-07	1.107E-07	6.828E-08
NW	2.812E-06	2.642E-06	2.310E-06	1.918E-07	1.841E-07	1.768E-07	1.102E-07
WNW	1.840E-06	1.728E-06	1.510E-06	1.246E-07	1.195E-07	1.148E-07	7.147E-08
W	1.024E-06	9.570E-07	8.282E-07	6.331E-08	6.072E-08	5.830E-08	3.622E-08
WSW	7.518E-07	7.026E-07	6.086E-07	4.672E-08	4.480E-08	4.301E-08	2.665E-08
SW	8.948E-07	8.413E-07	7.374E-07	6.111E-08	5.862E-08	5.629E-08	3.498E-08
SSW	6.322E-07	5.918E-07	5.144E-07	3.996E-08	3.831E-08	3.678E-08	2.278E-08
S	3.210E-07	2.970E-07	2.522E-07	1.468E-08	1.404E-08	1.344E-08	8.118E-09
SSE	3.485E-07	3.232E-07	2.756E-07	1.741E-08	1.667E-08	1.599E-08	9.816E-09
SE	4.433E-07	4.135E-07	3.569E-07	2.511E-08	2.406E-08	2.307E-08	1.418E-08
ESE	5.432E-07	5.049E-07	4.324E-07	2.873E-08	2.752E-08	2.640E-08	1.622E-08
E	7.337E-07	6.803E-07	5.802E-07	3.868E-08	3.705E-08	3.554E-08	2.186E-08
ENE	6.964E-07	6.441E-07	5.464E-07	3.314E-08	3.172E-08	3.040E-08	1.852E-08
NE	6.747E-07	6.244E-07	5.303E-07	3.167E-08	3.030E-08	2.903E-08	1.760E-08
NNE	6.810E-07	6.313E-07	5.382E-07	3.311E-08	3.168E-08	3.035E-08	1.843E-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	8850	11520	15610	16670	47000	70000
N	2.651E-08	1.838E-08	1.229E-08	1.126E-08	2.857E-09	1.596E-09
NNW	5.374E-08	3.748E-08	2.536E-08	2.330E-08	6.096E-09	3.441E-09
NW	8.688E-08	6.114E-08	4.194E-08	3.863E-08	1.033E-08	5.749E-09
WNW	5.639E-08	3.970E-08	2.724E-08	2.509E-08	6.733E-09	3.757E-09
W	2.856E-08	2.003E-08	1.364E-08	1.255E-08	3.333E-09	1.881E-09
WSW	2.103E-08	1.469E-08	9.937E-09	9.126E-09	2.350E-09	1.294E-09
SW	2.758E-08	1.929E-08	1.310E-08	1.204E-08	3.098E-09	1.670E-09
SSW	1.796E-08	1.255E-08	8.503E-09	7.811E-09	2.027E-09	1.117E-09
S	6.400E-09	4.419E-09	2.939E-09	2.691E-09	7.138E-10	4.224E-10
SSE	7.782E-09	5.415E-09	3.626E-09	3.324E-09	8.645E-10	4.988E-10
SE	1.118E-08	7.767E-09	5.204E-09	4.770E-09	1.208E-09	6.704E-10
ESE	1.280E-08	8.913E-09	6.000E-09	5.506E-09	1.438E-09	8.220E-10
E	1.726E-08	1.200E-08	8.037E-09	7.369E-09	1.899E-09	1.090E-09
ENE	1.463E-08	1.009E-08	6.664E-09	6.093E-09	1.536E-09	8.914E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.690E-09	1.402E-09	8.059E-10
NNE	1.456E-08	1.004E-08	6.637E-09	6.067E-09	1.521E-09	8.678E-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	330	490	539	592	652	707	812
N	3.309E-06	2.120E-06	1.880E-06	1.662E-06	1.457E-06	1.299E-06	1.061E-06
NNW	5.316E-06	3.734E-06	3.355E-06	2.997E-06	2.651E-06	2.379E-06	1.959E-06
NW	5.966E-06	4.697E-06	4.310E-06	3.925E-06	3.533E-06	3.216E-06	2.707E-06
WNW	3.960E-06	3.088E-06	2.829E-06	2.573E-06	2.314E-06	2.105E-06	1.770E-06
W	2.664E-06	1.889E-06	1.699E-06	1.519E-06	1.344E-06	1.207E-06	9.959E-07
WSW	2.055E-06	1.413E-06	1.264E-06	1.126E-06	9.930E-07	8.903E-07	7.331E-07
SW	2.194E-06	1.556E-06	1.409E-06	1.270E-06	1.136E-06	1.030E-06	8.650E-07
SSW	1.716E-06	1.168E-06	1.046E-06	9.336E-07	8.262E-07	7.429E-07	6.151E-07
S	1.290E-06	7.286E-07	6.284E-07	5.414E-07	4.631E-07	4.054E-07	3.215E-07
SSE	1.289E-06	7.574E-07	6.590E-07	5.724E-07	4.933E-07	4.343E-07	3.475E-07
SE	1.335E-06	8.685E-07	7.717E-07	6.834E-07	5.998E-07	5.355E-07	4.380E-07
ESE	1.718E-06	1.101E-06	9.733E-07	8.568E-07	7.472E-07	6.634E-07	5.371E-07
E	2.541E-06	1.555E-06	1.360E-06	1.186E-06	1.026E-06	9.048E-07	7.258E-07
ENE	2.679E-06	1.555E-06	1.347E-06	1.164E-06	9.979E-07	8.747E-07	6.946E-07
NE	2.615E-06	1.510E-06	1.307E-06	1.130E-06	9.687E-07	8.495E-07	6.753E-07
NNE	2.526E-06	1.487E-06	1.294E-06	1.124E-06	9.683E-07	8.523E-07	6.816E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.041E-06	9.723E-07	8.407E-07	5.958E-08	5.707E-08	5.474E-08	3.358E-08
NNW	1.924E-06	1.801E-06	1.564E-06	1.198E-07	1.148E-07	1.102E-07	6.806E-08
NW	2.664E-06	2.510E-06	2.209E-06	1.905E-07	1.828E-07	1.756E-07	1.096E-07
WNW	1.742E-06	1.641E-06	1.444E-06	1.236E-07	1.186E-07	1.140E-07	7.112E-08
W	9.787E-07	9.168E-07	7.975E-07	6.293E-08	6.037E-08	5.797E-08	3.608E-08
WSW	7.204E-07	6.748E-07	5.871E-07	4.644E-08	4.454E-08	4.276E-08	2.654E-08
SW	8.513E-07	8.023E-07	7.065E-07	6.064E-08	5.818E-08	5.588E-08	3.480E-08
SSW	6.046E-07	5.673E-07	4.953E-07	3.969E-08	3.806E-08	3.654E-08	2.268E-08
S	3.149E-07	2.916E-07	2.481E-07	1.464E-08	1.400E-08	1.341E-08	8.104E-09
SSE	3.406E-07	3.162E-07	2.704E-07	1.736E-08	1.663E-08	1.595E-08	9.798E-09
SE	4.301E-07	4.019E-07	3.480E-07	2.501E-08	2.396E-08	2.299E-08	1.415E-08
ESE	5.269E-07	4.907E-07	4.219E-07	2.864E-08	2.744E-08	2.632E-08	1.619E-08
E	7.116E-07	6.611E-07	5.660E-07	3.854E-08	3.693E-08	3.542E-08	2.181E-08
ENE	6.804E-07	6.302E-07	5.362E-07	3.307E-08	3.165E-08	3.034E-08	1.850E-08
NE	6.615E-07	6.130E-07	5.219E-07	3.163E-08	3.026E-08	2.899E-08	1.758E-08
NNE	6.681E-07	6.202E-07	5.300E-07	3.305E-08	3.162E-08	3.030E-08	1.841E-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	8850	11520	15610	16670	47000	70000
N	2.646E-08	1.835E-08	1.228E-08	1.125E-08	2.857E-09	1.597E-09
NNW	5.360E-08	3.741E-08	2.532E-08	2.326E-08	6.091E-09	3.441E-09
NW	8.654E-08	6.095E-08	4.182E-08	3.852E-08	1.032E-08	5.748E-09
WNW	5.616E-08	3.957E-08	2.716E-08	2.502E-08	6.723E-09	3.755E-09
W	2.847E-08	1.998E-08	1.361E-08	1.252E-08	3.329E-09	1.881E-09
WSW	2.096E-08	1.465E-08	9.915E-09	9.107E-09	2.348E-09	1.295E-09
SW	2.746E-08	1.923E-08	1.306E-08	1.200E-08	3.093E-09	1.670E-09
SSW	1.790E-08	1.251E-08	8.480E-09	7.791E-09	2.024E-09	1.117E-09
S	6.391E-09	4.414E-09	2.936E-09	2.689E-09	7.137E-10	4.226E-10
SSE	7.771E-09	5.410E-09	3.623E-09	3.322E-09	8.645E-10	4.990E-10
SE	1.116E-08	7.756E-09	5.198E-09	4.764E-09	1.208E-09	6.709E-10
ESE	1.278E-08	8.904E-09	5.995E-09	5.502E-09	1.438E-09	8.222E-10
E	1.723E-08	1.198E-08	8.029E-09	7.362E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.091E-09	1.536E-09	8.918E-10
NE	1.386E-08	9.507E-09	6.235E-09	5.691E-09	1.403E-09	8.064E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.683E-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	330	490	539	592	652	707	812
N	3.303E-06	2.117E-06	1.878E-06	1.660E-06	1.455E-06	1.298E-06	1.059E-06
NNW	5.307E-06	3.729E-06	3.351E-06	2.995E-06	2.648E-06	2.377E-06	1.957E-06
NW	5.951E-06	4.689E-06	4.304E-06	3.920E-06	3.529E-06	3.212E-06	2.704E-06
WNW	3.950E-06	3.083E-06	2.825E-06	2.569E-06	2.311E-06	2.102E-06	1.768E-06
W	2.660E-06	1.888E-06	1.698E-06	1.518E-06	1.343E-06	1.207E-06	9.954E-07
WSW	2.052E-06	1.412E-06	1.263E-06	1.125E-06	9.922E-07	8.896E-07	7.327E-07
SW	2.189E-06	1.553E-06	1.406E-06	1.268E-06	1.134E-06	1.029E-06	8.639E-07
SSW	1.713E-06	1.166E-06	1.045E-06	9.326E-07	8.253E-07	7.422E-07	6.145E-07
S	1.288E-06	7.280E-07	6.279E-07	5.410E-07	4.628E-07	4.051E-07	3.213E-07
SSE	1.287E-06	7.567E-07	6.584E-07	5.720E-07	4.930E-07	4.340E-07	3.473E-07
SE	1.331E-06	8.670E-07	7.705E-07	6.823E-07	5.990E-07	5.349E-07	4.375E-07
ESE	1.715E-06	1.100E-06	9.723E-07	8.560E-07	7.466E-07	6.630E-07	5.368E-07
E	2.540E-06	1.555E-06	1.360E-06	1.186E-06	1.026E-06	9.047E-07	7.257E-07
ENE	2.678E-06	1.555E-06	1.346E-06	1.164E-06	9.977E-07	8.745E-07	6.945E-07
NE	2.613E-06	1.509E-06	1.306E-06	1.129E-06	9.682E-07	8.491E-07	6.750E-07
NNE	2.522E-06	1.485E-06	1.292E-06	1.123E-06	9.674E-07	8.516E-07	6.812E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.040E-06	9.715E-07	8.400E-07	5.957E-08	5.706E-08	5.473E-08	3.358E-08
NNW	1.923E-06	1.800E-06	1.563E-06	1.198E-07	1.148E-07	1.102E-07	6.806E-08
NW	2.662E-06	2.508E-06	2.207E-06	1.904E-07	1.828E-07	1.756E-07	1.096E-07
WNW	1.741E-06	1.640E-06	1.442E-06	1.236E-07	1.186E-07	1.140E-07	7.111E-08
W	9.781E-07	9.163E-07	7.971E-07	6.293E-08	6.036E-08	5.797E-08	3.607E-08
WSW	7.199E-07	6.743E-07	5.868E-07	4.643E-08	4.453E-08	4.275E-08	2.654E-08
SW	8.503E-07	8.013E-07	7.057E-07	6.062E-08	5.817E-08	5.587E-08	3.480E-08
SSW	6.041E-07	5.668E-07	4.949E-07	3.968E-08	3.806E-08	3.654E-08	2.267E-08
S	3.148E-07	2.915E-07	2.480E-07	1.464E-08	1.400E-08	1.341E-08	8.104E-09
SSE	3.404E-07	3.161E-07	2.703E-07	1.736E-08	1.662E-08	1.594E-08	9.797E-09
SE	4.296E-07	4.015E-07	3.477E-07	2.500E-08	2.396E-08	2.298E-08	1.414E-08
ESE	5.266E-07	4.905E-07	4.217E-07	2.864E-08	2.744E-08	2.632E-08	1.619E-08
E	7.115E-07	6.610E-07	5.659E-07	3.854E-08	3.692E-08	3.542E-08	2.181E-08
ENE	6.803E-07	6.301E-07	5.362E-07	3.307E-08	3.165E-08	3.034E-08	1.850E-08
NE	6.613E-07	6.128E-07	5.218E-07	3.162E-08	3.026E-08	2.898E-08	1.758E-08
NNE	6.676E-07	6.198E-07	5.297E-07	3.304E-08	3.162E-08	3.029E-08	1.840E-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	8850	11520	15610	16670	47000	70000
N	2.646E-08	1.835E-08	1.228E-08	1.125E-08	2.857E-09	1.597E-09
NNW	5.359E-08	3.740E-08	2.532E-08	2.326E-08	6.091E-09	3.441E-09
NW	8.653E-08	6.094E-08	4.182E-08	3.852E-08	1.032E-08	5.748E-09
WNW	5.616E-08	3.956E-08	2.716E-08	2.502E-08	6.723E-09	3.755E-09
W	2.847E-08	1.997E-08	1.361E-08	1.252E-08	3.329E-09	1.881E-09
WSW	2.096E-08	1.465E-08	9.914E-09	9.106E-09	2.348E-09	1.295E-09
SW	2.746E-08	1.923E-08	1.306E-08	1.200E-08	3.093E-09	1.670E-09
SSW	1.789E-08	1.251E-08	8.479E-09	7.790E-09	2.024E-09	1.117E-09
S	6.391E-09	4.414E-09	2.936E-09	2.688E-09	7.137E-10	4.226E-10
SSE	7.771E-09	5.409E-09	3.623E-09	3.322E-09	8.645E-10	4.990E-10
SE	1.116E-08	7.756E-09	5.198E-09	4.764E-09	1.208E-09	6.709E-10
ESE	1.278E-08	8.903E-09	5.995E-09	5.502E-09	1.438E-09	8.222E-10
E	1.723E-08	1.198E-08	8.028E-09	7.362E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.091E-09	1.536E-09	8.918E-10
NE	1.386E-08	9.507E-09	6.235E-09	5.691E-09	1.403E-09	8.064E-10
NNE	1.455E-08	1.003E-08	6.635E-09	6.065E-09	1.521E-09	8.684E-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	330	490	539	592	652	707	812
N	3.534E-06	2.222E-06	1.962E-06	1.727E-06	1.507E-06	1.340E-06	1.088E-06
NNW	5.859E-06	3.974E-06	3.546E-06	3.148E-06	2.767E-06	2.472E-06	2.022E-06
NW	6.755E-06	5.083E-06	4.624E-06	4.178E-06	3.735E-06	3.382E-06	2.824E-06
WNW	4.472E-06	3.338E-06	3.033E-06	2.738E-06	2.446E-06	2.213E-06	1.847E-06
W	2.954E-06	2.016E-06	1.799E-06	1.598E-06	1.406E-06	1.257E-06	1.030E-06
WSW	2.257E-06	1.499E-06	1.332E-06	1.180E-06	1.035E-06	9.249E-07	7.575E-07
SW	2.403E-06	1.660E-06	1.495E-06	1.341E-06	1.194E-06	1.079E-06	9.011E-07
SSW	1.870E-06	1.238E-06	1.103E-06	9.799E-07	8.633E-07	7.736E-07	6.371E-07
S	1.346E-06	7.493E-07	6.444E-07	5.539E-07	4.727E-07	4.130E-07	3.267E-07
SSE	1.358E-06	7.845E-07	6.800E-07	5.887E-07	5.058E-07	4.442E-07	3.541E-07
SE	1.428E-06	9.111E-07	8.058E-07	7.104E-07	6.210E-07	5.528E-07	4.499E-07
ESE	1.846E-06	1.155E-06	1.015E-06	8.895E-07	7.721E-07	6.831E-07	5.501E-07
E	2.727E-06	1.625E-06	1.414E-06	1.227E-06	1.056E-06	9.286E-07	7.414E-07
ENE	2.833E-06	1.609E-06	1.388E-06	1.195E-06	1.021E-06	8.925E-07	7.060E-07
NE	2.750E-06	1.557E-06	1.343E-06	1.157E-06	9.895E-07	8.658E-07	6.859E-07
NNE	2.653E-06	1.536E-06	1.332E-06	1.153E-06	9.910E-07	8.703E-07	6.935E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.068E-06	9.961E-07	8.588E-07	5.977E-08	5.726E-08	5.491E-08	3.365E-08
NNW	1.985E-06	1.855E-06	1.605E-06	1.202E-07	1.152E-07	1.106E-07	6.824E-08
NW	2.777E-06	2.611E-06	2.287E-06	1.916E-07	1.838E-07	1.766E-07	1.101E-07
WNW	1.816E-06	1.707E-06	1.495E-06	1.244E-07	1.193E-07	1.146E-07	7.140E-08
W	1.012E-06	9.462E-07	8.200E-07	6.322E-08	6.064E-08	5.823E-08	3.619E-08
WSW	7.440E-07	6.957E-07	6.035E-07	4.668E-08	4.476E-08	4.297E-08	2.663E-08
SW	8.865E-07	8.339E-07	7.316E-07	6.104E-08	5.856E-08	5.624E-08	3.496E-08
SSW	6.260E-07	5.864E-07	5.102E-07	3.991E-08	3.827E-08	3.674E-08	2.276E-08
S	3.199E-07	2.960E-07	2.515E-07	1.468E-08	1.404E-08	1.344E-08	8.116E-09
SSE	3.470E-07	3.218E-07	2.746E-07	1.741E-08	1.667E-08	1.599E-08	9.815E-09
SE	4.416E-07	4.121E-07	3.558E-07	2.510E-08	2.405E-08	2.307E-08	1.418E-08
ESE	5.394E-07	5.016E-07	4.300E-07	2.871E-08	2.751E-08	2.638E-08	1.622E-08
E	7.265E-07	6.741E-07	5.757E-07	3.865E-08	3.703E-08	3.552E-08	2.185E-08
ENE	6.914E-07	6.397E-07	5.432E-07	3.312E-08	3.170E-08	3.038E-08	1.852E-08
NE	6.718E-07	6.219E-07	5.285E-07	3.167E-08	3.030E-08	2.902E-08	1.760E-08
NNE	6.796E-07	6.302E-07	5.374E-07	3.312E-08	3.170E-08	3.037E-08	1.843E-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	8850	11520	15610	16670	47000	70000
N	2.650E-08	1.838E-08	1.229E-08	1.126E-08	2.858E-09	1.596E-09
NNW	5.371E-08	3.747E-08	2.536E-08	2.329E-08	6.095E-09	3.441E-09
NW	8.682E-08	6.111E-08	4.192E-08	3.861E-08	1.033E-08	5.749E-09
WNW	5.635E-08	3.967E-08	2.723E-08	2.508E-08	6.731E-09	3.756E-09
W	2.854E-08	2.002E-08	1.364E-08	1.255E-08	3.332E-09	1.881E-09
WSW	2.102E-08	1.468E-08	9.935E-09	9.124E-09	2.350E-09	1.295E-09
SW	2.757E-08	1.929E-08	1.310E-08	1.203E-08	3.097E-09	1.670E-09
SSW	1.795E-08	1.254E-08	8.499E-09	7.808E-09	2.027E-09	1.117E-09
S	6.398E-09	4.418E-09	2.938E-09	2.690E-09	7.138E-10	4.225E-10
SSE	7.782E-09	5.415E-09	3.626E-09	3.324E-09	8.646E-10	4.988E-10
SE	1.118E-08	7.767E-09	5.204E-09	4.770E-09	1.208E-09	6.705E-10
ESE	1.279E-08	8.911E-09	5.999E-09	5.506E-09	1.438E-09	8.220E-10
E	1.726E-08	1.199E-08	8.036E-09	7.368E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.663E-09	6.092E-09	1.536E-09	8.915E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.691E-09	1.402E-09	8.060E-10
NNE	1.456E-08	1.004E-08	6.639E-09	6.069E-09	1.521E-09	8.677E-10

Tue May 7 15:01:47 2024 CHIQ
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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	330	490	539	592	652	707	812
N	3.413E-06	2.169E-06	1.919E-06	1.693E-06	1.481E-06	1.319E-06	1.074E-06
NNW	5.544E-06	3.835E-06	3.436E-06	3.061E-06	2.700E-06	2.419E-06	1.986E-06
NW	6.301E-06	4.862E-06	4.445E-06	4.034E-06	3.621E-06	3.288E-06	2.758E-06
WNW	4.179E-06	3.196E-06	2.917E-06	2.644E-06	2.371E-06	2.152E-06	1.804E-06
W	2.783E-06	1.941E-06	1.740E-06	1.551E-06	1.370E-06	1.228E-06	1.010E-06
WSW	2.139E-06	1.449E-06	1.293E-06	1.148E-06	1.011E-06	9.050E-07	7.436E-07
SW	2.286E-06	1.603E-06	1.448E-06	1.303E-06	1.163E-06	1.053E-06	8.817E-07
SSW	1.782E-06	1.198E-06	1.071E-06	9.538E-07	8.425E-07	7.565E-07	6.249E-07
S	1.316E-06	7.383E-07	6.359E-07	5.473E-07	4.676E-07	4.090E-07	3.239E-07
SSE	1.319E-06	7.695E-07	6.684E-07	5.798E-07	4.989E-07	4.388E-07	3.505E-07
SE	1.380E-06	8.892E-07	7.883E-07	6.966E-07	6.102E-07	5.440E-07	4.439E-07
ESE	1.774E-06	1.125E-06	9.918E-07	8.712E-07	7.582E-07	6.721E-07	5.428E-07
E	2.612E-06	1.582E-06	1.381E-06	1.202E-06	1.037E-06	9.138E-07	7.317E-07
ENE	2.740E-06	1.576E-06	1.363E-06	1.176E-06	1.007E-06	8.816E-07	6.990E-07
NE	2.672E-06	1.530E-06	1.323E-06	1.142E-06	9.779E-07	8.567E-07	6.800E-07
NNE	2.586E-06	1.511E-06	1.312E-06	1.138E-06	9.795E-07	8.612E-07	6.876E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	1.054E-06	9.840E-07	8.496E-07	5.968E-08	5.717E-08	5.483E-08	3.362E-08
NNW	1.951E-06	1.824E-06	1.582E-06	1.200E-07	1.150E-07	1.104E-07	6.814E-08
NW	2.714E-06	2.555E-06	2.243E-06	1.910E-07	1.833E-07	1.761E-07	1.098E-07
WNW	1.775E-06	1.670E-06	1.466E-06	1.240E-07	1.190E-07	1.143E-07	7.125E-08
W	9.925E-07	9.291E-07	8.070E-07	6.306E-08	6.049E-08	5.809E-08	3.613E-08
WSW	7.305E-07	6.838E-07	5.943E-07	4.655E-08	4.464E-08	4.286E-08	2.659E-08
SW	8.676E-07	8.169E-07	7.182E-07	6.083E-08	5.836E-08	5.605E-08	3.488E-08
SSW	6.142E-07	5.758E-07	5.020E-07	3.979E-08	3.816E-08	3.664E-08	2.272E-08
S	3.173E-07	2.937E-07	2.497E-07	1.466E-08	1.402E-08	1.342E-08	8.110E-09
SSE	3.435E-07	3.188E-07	2.724E-07	1.738E-08	1.665E-08	1.597E-08	9.807E-09
SE	4.358E-07	4.070E-07	3.519E-07	2.506E-08	2.401E-08	2.303E-08	1.416E-08
ESE	5.325E-07	4.956E-07	4.255E-07	2.868E-08	2.747E-08	2.635E-08	1.620E-08
E	7.173E-07	6.661E-07	5.697E-07	3.859E-08	3.698E-08	3.547E-08	2.183E-08
ENE	6.847E-07	6.339E-07	5.389E-07	3.309E-08	3.167E-08	3.035E-08	1.851E-08
NE	6.661E-07	6.169E-07	5.249E-07	3.164E-08	3.028E-08	2.900E-08	1.759E-08
NNE	6.739E-07	6.252E-07	5.338E-07	3.309E-08	3.167E-08	3.034E-08	1.842E-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	8850	11520	15610	16670	47000	70000
N	2.648E-08	1.837E-08	1.229E-08	1.126E-08	2.857E-09	1.597E-09
NNW	5.365E-08	3.743E-08	2.534E-08	2.327E-08	6.093E-09	3.441E-09
NW	8.667E-08	6.102E-08	4.187E-08	3.857E-08	1.032E-08	5.748E-09
WNW	5.625E-08	3.961E-08	2.719E-08	2.505E-08	6.727E-09	3.756E-09
W	2.851E-08	1.999E-08	1.362E-08	1.253E-08	3.330E-09	1.881E-09
WSW	2.099E-08	1.467E-08	9.925E-09	9.115E-09	2.349E-09	1.295E-09
SW	2.751E-08	1.926E-08	1.308E-08	1.202E-08	3.095E-09	1.670E-09
SSW	1.792E-08	1.253E-08	8.489E-09	7.799E-09	2.026E-09	1.117E-09
S	6.394E-09	4.416E-09	2.937E-09	2.689E-09	7.138E-10	4.225E-10
SSE	7.777E-09	5.413E-09	3.625E-09	3.323E-09	8.646E-10	4.989E-10
SE	1.117E-08	7.762E-09	5.202E-09	4.767E-09	1.208E-09	6.707E-10
ESE	1.279E-08	8.907E-09	5.997E-09	5.504E-09	1.438E-09	8.221E-10
E	1.724E-08	1.199E-08	8.032E-09	7.365E-09	1.899E-09	1.090E-09
ENE	1.462E-08	1.008E-08	6.662E-09	6.092E-09	1.536E-09	8.917E-10
NE	1.386E-08	9.508E-09	6.235E-09	5.691E-09	1.403E-09	8.062E-10
NNE	1.456E-08	1.004E-08	6.638E-09	6.068E-09	1.521E-09	8.680E-10

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Synopsis Report

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

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

Non-Radon Population Assessment
Thu Mar 14 07:58:10 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Effective Dose Equivalent (mrem)
1.98E-06

At This Location: 8850 Meters West Northwest
Dataset Name: N_Pop23.DAT
Dataset Date: Mar 14, 2024 07:58 AM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd
Pop File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_023.pop

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 8850 Meters West Northwest
Lifetime Fatal Cancer Risk: 5.65E-13

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

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenals	5.59E-07	3.72E-06
UB_Wall	5.85E-07	3.90E-06
Bone_Sur	5.25E-05	3.10E-04
Brain	5.29E-07	3.52E-06
Breasts	5.46E-07	3.64E-06
St_Wall	5.61E-07	3.74E-06
SI_Wall	5.69E-07	3.79E-06
ULI_Wall	6.04E-07	4.03E-06
LLI_Wall	7.28E-07	4.88E-06
Kidneys	7.33E-07	4.76E-06
Liver	5.99E-06	3.56E-05
Muscle	5.77E-07	3.85E-06
Ovaries	1.36E-06	8.46E-06
Pancreas	5.60E-07	3.73E-06
R_Marrow	3.20E-06	2.00E-05
Skin	2.80E-06	1.90E-05
Spleen	5.63E-07	3.75E-06
Testes	1.36E-06	8.47E-06
Thymus	5.54E-07	3.69E-06
Thyroid	5.77E-07	3.85E-06
GB_Wall	5.56E-07	3.71E-06
Ht_Wall	5.66E-07	3.77E-06
Uterus	5.72E-07	3.82E-06
ET_Reg	7.07E-07	4.56E-06
Lung	1.44E-06	8.85E-06
Effectiv	1.98E-06	1.22E-05

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

Risk Range	# of People	# of People in This Risk Range or Higher	Deaths in This Risk Range	Deaths in This Risk Range or Higher
1.0E+00 TO 1.0E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-01 TO 1.0E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-02 TO 1.0E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-03 TO 1.0E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-04 TO 1.0E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.0E-05 TO 1.0E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LESS THAN 1.0E-06	1.16E+05	1.16E+05	5.52E-06	5.52E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2023

Nuclide	Type	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	2.2E-07	6.1E-09	3.1E-09	2.2E-07
Pu-239	M	1.000	5.6E-08	3.6E-08	3.1E-09	9.6E-08
Am-241	M	1.000	3.8E-07	1.8E-07	5.0E-09	5.6E-07
Sr-90	M	1.000	2.4E-07	4.2E-07	2.9E-07	9.5E-07
Cs-137	F	1.000	6.9E-07	1.2E-06	8.1E-07	2.7E-06
U-233	M	1.000	4.0E-08	2.0E-08	1.1E-08	7.1E-08
U-238	M	1.000	1.6E-08	1.4E-08	1.1E-08	4.1E-08

SITE INFORMATION

Temperature:	18.950	degrees C
Precipitation:	21.920	cm/y
Humidity:	8.000	g/cu m
Mixing Height:	1000.0	m

SOURCE INFORMATION

Source Number:	1	2	3
Stack Height (m):	7.27	7.50	15.10
Diameter (m):	4.66	1.80	2.30
Plume Rise Momentum (m/s): (Exit Velocity)	5.49	21.10	5.30

ADJUSTED 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

Beef Cattle Density:	4.13E-02
Milk Cattle Density:	1.14E-03
Land Fraction Cultivated for Vegetable Crops:	1.38E-03

POPULATION DATA

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
WNW	0	0	0	0	0	2	0
W	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
SSW	0	0	0	3	0	0	0
S	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0	0	0	0	68	0	0
NNW	0	0	0	0	0	22	0
NW	0	0	0	0	0	0	0
WNW	0	5	1448	0	0	0	31
W	0	0	33546	0	0	0	0
WSW	0	0	1502	0	0	0	14
SW	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
S	0	3	0	0	0	0	0
SSE	0	0	0	0	0	64	22
SE	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	2202
E	0	0	0	0	0	0	3056
ENE	0	0	0	0	0	213	0
NE	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0	0	0	0	0	0
NNW	0	0	0	0	0	0
NW	0	0	1153	13177	0	0
WNW	0	0	0	0	0	0
W	0	0	0	0	0	0
WSW	0	0	0	0	0	0
SW	0	0	0	0	0	0
SSW	0	0	0	0	0	0
S	0	0	0	57	0	0
SSE	0	0	0	0	0	0
SE	0	0	0	0	0	0
ESE	0	0	0	0	0	0
E	0	0	0	0	0	0
ENE	0	477	40508	0	0	0
NE	0	0	6529	0	0	0
NNE	0	0	0	11668	0	0

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
General Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Population Assessment
Thu Mar 14 07:58:10 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Pop23.DAT
Dataset Date: Mar 14, 2024 07:58 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_023.pop

Thu Mar 14 07:58:10 2024 GENERAL
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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	2.19E-06	1.80E-03
Pu-239	M	1.000	2.19E-06	1.80E-03
Am-241	M	1.000	2.19E-06	1.80E-03
Sr-90	M	1.000	2.19E-06	1.80E-03
Cs-137	F	1.000	2.19E-06	1.80E-03
U-233	M	1.000	2.19E-06	1.80E-03
U-238	M	1.000	2.19E-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	1.00E-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)

NUMBER OF BEEF CATTLE

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	13	7	2	4	10	62	19
NNW	13	7	2	4	10	62	19
NW	13	7	2	4	10	62	19
WNW	13	7	2	4	10	62	19
W	13	7	2	4	10	62	19
WSW	13	7	2	4	10	62	19
SW	13	7	2	4	10	62	19
SSW	13	7	2	4	10	62	19
S	13	7	2	4	10	62	19
SSE	13	7	2	4	10	62	19
SE	13	7	2	4	10	62	19
ESE	13	7	2	4	10	62	19
E	13	7	2	4	10	62	19
ENE	13	7	2	4	10	62	19
NE	13	7	2	4	10	62	19
NNE	13	7	2	4	10	62	19

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	42	104	1529	236	294	502	499
NNW	42	104	1529	236	294	502	499
NW	42	104	1529	236	294	502	499
WNW	42	104	1529	236	294	502	499
W	42	104	1529	236	294	502	499
WSW	42	104	1529	236	294	502	499
SW	42	104	1529	236	294	502	499
SSW	42	104	1529	236	294	502	499
S	42	104	1529	236	294	502	499
SSE	42	104	1529	236	294	502	499
SE	42	104	1529	236	294	502	499
ESE	42	104	1529	236	294	502	499
E	42	104	1529	236	294	502	499
ENE	42	104	1529	236	294	502	499
NE	42	104	1529	236	294	502	499
NNE	42	104	1529	236	294	502	499

NUMBER OF BEEF CATTLE

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	52	600	467	685	26	39
NNW	52	600	467	685	26	39
NW	52	600	467	685	26	39
WNW	52	600	467	685	26	39
W	52	600	467	685	26	39
WSW	52	600	467	685	26	39
SW	52	600	467	685	26	39
SSW	52	600	467	685	26	39
S	52	600	467	685	26	39
SSE	52	600	467	685	26	39
SE	52	600	467	685	26	39
ESE	52	600	467	685	26	39
E	52	600	467	685	26	39
ENE	52	600	467	685	26	39
NE	52	600	467	685	26	39
NNE	52	600	467	685	26	39

NUMBER OF MILK CATTLE

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0	0	0	0	0	2	1
NNW	0	0	0	0	0	2	1
NW	0	0	0	0	0	2	1
WNW	0	0	0	0	0	2	1
W	0	0	0	0	0	2	1
WSW	0	0	0	0	0	2	1
SW	0	0	0	0	0	2	1
SSW	0	0	0	0	0	2	1
S	0	0	0	0	0	2	1
SSE	0	0	0	0	0	2	1
SE	0	0	0	0	0	2	1
ESE	0	0	0	0	0	2	1
E	0	0	0	0	0	2	1
ENE	0	0	0	0	0	2	1
NE	0	0	0	0	0	2	1
NNE	0	0	0	0	0	2	1

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	1	3	42	7	8	14	14
NNW	1	3	42	7	8	14	14
NW	1	3	42	7	8	14	14
WNW	1	3	42	7	8	14	14
W	1	3	42	7	8	14	14
WSW	1	3	42	7	8	14	14
SW	1	3	42	7	8	14	14
SSW	1	3	42	7	8	14	14
S	1	3	42	7	8	14	14
SSE	1	3	42	7	8	14	14
SE	1	3	42	7	8	14	14
ESE	1	3	42	7	8	14	14
E	1	3	42	7	8	14	14
ENE	1	3	42	7	8	14	14
NE	1	3	42	7	8	14	14
NNE	1	3	42	7	8	14	14

NUMBER OF MILK CATTLE

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	1	17	13	19	1	1
NNW	1	17	13	19	1	1
NW	1	17	13	19	1	1
WNW	1	17	13	19	1	1
W	1	17	13	19	1	1
WSW	1	17	13	19	1	1
SW	1	17	13	19	1	1
SSW	1	17	13	19	1	1
S	1	17	13	19	1	1
SSE	1	17	13	19	1	1
SE	1	17	13	19	1	1
ESE	1	17	13	19	1	1
E	1	17	13	19	1	1
ENE	1	17	13	19	1	1
NE	1	17	13	19	1	1
NNE	1	17	13	19	1	1

AREA OF VEGETABLE CROP PRODUCTION (M**2)

	Distance (meters)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NNW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
WNW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
W	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
WSW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SSW	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
S	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SSE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
SE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
ESE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
E	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
ENE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03
NNE	4.3E+03	2.4E+03	5.5E+02	1.5E+03	3.4E+03	2.1E+04	6.2E+03

	Distance (meters)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NNW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
WNW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
W	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
WSW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SSW	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
S	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SSE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
SE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
ESE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
E	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
ENE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05
NNE	1.4E+04	3.5E+04	5.1E+05	7.9E+04	9.8E+04	1.7E+05	1.7E+05

AREA OF VEGETABLE CROP PRODUCTION (M**2)

	Distance (meters)					
Direction	64250	67250	72000	76750	79600	79850
N	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NNW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
WNW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
W	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
WSW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SSW	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
S	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SSE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
SE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
ESE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
E	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
ENE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04
NNE	1.7E+04	2.0E+05	1.6E+05	2.3E+05	8.6E+03	1.3E+04

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
ENTERED 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 (Actual fractions of food types from outside area can be greater than the minimum fractions listed below.)	
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

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Weather Data

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Population Assessment
Thu Mar 14 07:58:10 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Pop23.DAT
Dataset Date: Mar 14, 2024 07:58 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_023.pop

Thu Mar 14 07:58:10 2024 WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.040	3.140	3.260	3.290	2.850	2.210	0.000	0.073
NNW	2.110	3.020	3.340	4.300	4.150	3.320	0.000	0.131
NW	2.120	3.100	3.340	4.120	4.100	3.470	0.000	0.167
WNW	1.890	2.500	2.680	3.610	4.190	3.750	0.000	0.104
W	1.590	2.610	2.630	4.410	4.530	3.390	0.000	0.064
WSW	1.550	1.920	2.620	3.790	3.910	2.830	0.000	0.043
SW	1.620	2.220	2.430	3.400	3.070	3.410	0.000	0.048
SSW	1.850	2.090	2.620	3.960	3.480	3.550	0.000	0.038
S	1.830	3.100	3.310	3.120	3.490	3.880	0.000	0.026
SSE	1.970	2.930	3.900	4.050	3.370	1.860	0.000	0.029
SE	1.870	2.460	2.680	2.790	2.960	2.220	0.000	0.027
ESE	1.710	2.080	2.160	3.770	3.540	2.980	0.000	0.033
E	1.830	2.650	3.700	5.580	4.960	1.450	0.000	0.059
ENE	1.880	2.660	3.450	5.220	3.720	2.570	0.000	0.057
NE	1.860	2.660	2.850	4.130	1.880	0.000	0.000	0.050
NNE	1.900	2.420	3.000	3.170	2.180	1.190	0.000	0.049

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	2.970	4.090	4.480	4.460	3.460	3.110	0.000
NNW	3.070	4.280	4.820	5.560	4.820	3.660	0.000
NW	3.100	4.310	4.820	5.370	4.750	3.810	0.000
WNW	2.840	3.720	4.070	5.070	4.850	4.000	0.000
W	2.470	3.530	3.900	5.820	5.440	3.740	0.000
WSW	2.390	3.120	3.670	5.690	5.190	3.370	0.000
SW	2.540	3.370	4.010	5.360	3.960	3.770	0.000
SSW	2.800	3.130	3.990	5.670	4.430	3.780	0.000
S	2.910	4.500	4.560	4.000	3.960	4.050	0.000
SSE	2.810	4.350	4.870	4.960	3.870	2.570	0.000
SE	2.760	3.390	3.620	4.000	3.620	3.090	0.000
ESE	2.550	3.090	3.500	5.460	4.410	3.170	0.000
E	2.740	4.120	5.200	7.660	6.030	2.350	0.000
ENE	2.790	3.930	5.180	6.960	5.120	2.570	0.000
NE	2.780	3.810	4.440	5.760	2.970	0.000	0.000
NNE	2.710	3.560	4.170	4.300	2.890	1.670	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.2310	0.1230	0.2189	0.2802	0.1387	0.0082	0.0000
NNW	0.1047	0.0737	0.1447	0.3507	0.3065	0.0196	0.0000
NW	0.0777	0.0394	0.0867	0.2984	0.4416	0.0563	0.0000
WNW	0.0802	0.0473	0.0829	0.2682	0.4537	0.0677	0.0000
W	0.1159	0.0471	0.0866	0.3499	0.3658	0.0346	0.0000
WSW	0.1307	0.0642	0.0958	0.3838	0.2815	0.0440	0.0000
SW	0.1342	0.0502	0.1211	0.3448	0.2574	0.0924	0.0000
SSW	0.1518	0.0609	0.1362	0.3552	0.2337	0.0622	0.0000
S	0.2641	0.1518	0.3674	0.1643	0.0398	0.0125	0.0000
SSE	0.2852	0.1393	0.2260	0.2667	0.0777	0.0051	0.0000
SE	0.2693	0.1126	0.1853	0.2674	0.1500	0.0154	0.0000
ESE	0.2453	0.0864	0.1493	0.3116	0.2047	0.0027	0.0000
E	0.1618	0.0940	0.1400	0.4206	0.1795	0.0041	0.0000
ENE	0.2173	0.1163	0.1855	0.4157	0.0647	0.0005	0.0000
NE	0.2605	0.1278	0.2174	0.3688	0.0256	0.0000	0.0000
NNE	0.2839	0.1511	0.2560	0.2633	0.0432	0.0024	0.0000
TOTAL	0.1570	0.0807	0.1474	0.3230	0.2599	0.0319	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 19.0 degrees C
292.11 K
Precipitation: 21.9 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: 4.576 m/s

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

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Dose and Risk Summaries

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

Non-Radon Population Assessment
Thu Mar 14 07:58:10 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Pop23.DAT
Dataset Date: Mar 14, 2024 07:58 AM
Wind File: C:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd
Pop File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_023.pop

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenals	5.59E-07	3.72E-06
UB_Wall	5.85E-07	3.90E-06
Bone_Sur	5.25E-05	3.10E-04
Brain	5.29E-07	3.52E-06
Breasts	5.46E-07	3.64E-06
St_Wall	5.61E-07	3.74E-06
SI_Wall	5.69E-07	3.79E-06
ULI_Wall	6.04E-07	4.03E-06
LLI_Wall	7.28E-07	4.88E-06
Kidneys	7.33E-07	4.76E-06
Liver	5.99E-06	3.56E-05
Muscle	5.77E-07	3.85E-06
Ovaries	1.36E-06	8.46E-06
Pancreas	5.60E-07	3.73E-06
R_Marrow	3.20E-06	2.00E-05
Skin	2.80E-06	1.90E-05
Spleen	5.63E-07	3.75E-06
Testes	1.36E-06	8.47E-06
Thymus	5.54E-07	3.69E-06
Thyroid	5.77E-07	3.85E-06
GB_Wall	5.56E-07	3.71E-06
Ht_Wall	5.66E-07	3.77E-06
Uterus	5.72E-07	3.82E-06
ET_Reg	7.07E-07	4.56E-06
Lung	1.44E-06	8.85E-06
Effectiv	1.98E-06	1.22E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	4.10E-07	2.79E-06
INHALATION	1.30E-06	7.62E-06
AIR IMMERSION	1.46E-11	8.55E-11
GROUND SURFACE	2.61E-07	1.78E-06
INTERNAL	1.71E-06	1.04E-05
EXTERNAL	2.61E-07	1.78E-06
TOTAL	1.98E-06	1.22E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
Pu-238	3.59E-07	2.10E-06
U-234	3.82E-15	2.60E-14
Th-230	1.09E-18	7.36E-18
Ra-226	1.10E-19	7.44E-19
Rn-222	6.11E-21	4.14E-20
Po-218	1.09E-25	7.40E-25
Pb-214	3.99E-18	2.70E-17
At-218	4.11E-25	2.78E-24
Bi-214	2.33E-17	1.58E-16
Rn-218	2.07E-27	6.91E-27
Po-214	1.29E-21	8.76E-21
Tl-210	9.10E-21	6.17E-20
Pb-210	1.37E-20	9.28E-20
Bi-210	2.21E-19	1.50E-18
Hg-206	0.00E+00	0.00E+00
Po-210	5.66E-23	3.83E-22
Tl-206	4.93E-25	2.00E-24
Pu-239	1.67E-07	9.79E-07
U-235m	1.24E-18	1.11E-17
U-235	1.45E-16	9.85E-16
Th-231	1.48E-17	1.00E-16
Pa-231	1.94E-20	1.32E-19
Ac-227	5.75E-23	3.91E-22
Th-227	2.74E-20	1.86E-19
Fr-223	2.59E-22	1.76E-21
Ra-223	3.07E-20	2.08E-19
Rn-219	1.33E-20	9.02E-20
At-219	0.00E+00	0.00E+00
Bi-215	1.84E-26	3.68E-29
Po-215	4.06E-23	2.76E-22
Pb-211	2.61E-20	1.77E-19
Bi-211	1.07E-20	7.30E-20
Tl-207	1.35E-20	9.18E-20
Po-211	5.17E-24	3.51E-23
Am-241	8.11E-07	4.76E-06
Np-237	4.39E-14	2.98E-13
Pa-233	3.62E-13	2.46E-12
U-233	7.87E-09	4.70E-08
Th-229	5.39E-12	3.66E-11
Ra-225	7.63E-13	5.18E-12
Ac-225	9.15E-13	6.21E-12
Fr-221	1.86E-12	1.27E-11
At-217	1.57E-14	1.07E-13
Bi-213	1.14E-11	7.72E-11
Po-213	2.42E-15	1.64E-14
Tl-209	2.93E-12	1.99E-11
Pb-209	2.21E-13	1.50E-12
Sr-90	1.20E-07	8.15E-07
Y-90	1.63E-08	1.11E-07

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
Cs-137	2.52E-07	1.71E-06
Ba-137m	2.38E-07	1.62E-06
U-238	3.73E-09	2.23E-08
Th-234	1.02E-10	6.94E-10
Pa-234m	1.39E-09	9.48E-09
Pa-234	2.75E-11	1.87E-10
TOTAL	1.98E-06	1.22E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagu	5.54E-15	4.81E-13
Stomach	1.99E-14	1.73E-12
Colon	6.25E-14	5.47E-12
Liver	6.43E-14	4.98E-12
LUNG	1.67E-13	1.32E-11
Bone	3.08E-14	2.38E-12
Skin	2.73E-15	2.41E-13
Breast	2.07E-14	1.82E-12
Ovary	1.40E-14	1.14E-12
Bladder	1.37E-14	1.19E-12
Kidneys	3.63E-15	3.07E-13
Thyroid	1.54E-15	1.35E-13
Leukemia	8.62E-14	7.55E-12
Residual	7.24E-14	6.33E-12
Total	5.65E-13	4.69E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	2.02E-13	1.78E-11
INHALATION	2.30E-13	1.74E-11
AIR IMMERSION	7.94E-18	6.03E-16
GROUND SURFACE	1.33E-13	1.17E-11
INTERNAL	4.32E-13	3.52E-11
EXTERNAL	1.33E-13	1.17E-11
TOTAL	5.65E-13	4.69E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Pu-238	6.47E-14	4.90E-12
U-234	1.32E-21	1.18E-19
Th-230	4.61E-25	4.04E-23
Ra-226	5.97E-26	5.24E-24
Rn-222	3.33E-27	2.93E-25
Po-218	4.88E-32	4.28E-30
Pb-214	2.13E-24	1.87E-22
At-218	5.06E-32	4.44E-30
Bi-214	1.23E-23	1.08E-21
Rn-218	1.13E-33	4.89E-32
Po-214	7.09E-28	6.23E-26
Tl-210	4.86E-27	4.27E-25
Pb-210	6.13E-27	5.39E-25
Bi-210	2.45E-26	2.15E-24
Hg-206	0.00E+00	0.00E+00
Po-210	3.11E-29	2.73E-27
Tl-206	5.54E-32	2.91E-30
Pu-239	2.72E-14	2.07E-12
U-235m	9.02E-25	1.05E-22
U-235	7.86E-23	6.91E-21
Th-231	6.75E-24	5.94E-22
Pa-231	1.01E-26	8.92E-25
Ac-227	2.15E-29	1.89E-27
Th-227	1.49E-26	1.31E-24
Fr-223	9.64E-29	8.49E-27
Ra-223	1.66E-26	1.46E-24
Rn-219	7.27E-27	6.40E-25
At-219	0.00E+00	0.00E+00
Bi-215	8.20E-33	2.12E-34
Po-215	2.22E-29	1.96E-27
Pb-211	9.32E-27	8.20E-25
Bi-211	5.87E-27	5.16E-25
Tl-207	1.74E-27	1.53E-25
Po-211	2.83E-30	2.49E-28
Am-241	1.33E-13	1.02E-11
Np-237	2.16E-20	1.90E-18
Pa-233	1.95E-19	1.72E-17
U-233	7.68E-15	5.86E-13
Th-229	2.85E-18	2.51E-16
Ra-225	3.46E-19	3.04E-17
Ac-225	4.82E-19	4.24E-17
Fr-221	1.01E-18	8.90E-17
At-217	8.59E-21	7.56E-19
Bi-213	4.92E-18	4.33E-16
Po-213	1.32E-21	1.16E-19
Tl-209	1.56E-18	1.38E-16
Pb-209	2.91E-20	2.56E-18
Sr-90	7.01E-14	6.17E-12
Y-90	1.94E-15	1.72E-13

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Cs-137	1.27E-13	1.12E-11
Ba-137m	1.29E-13	1.13E-11
U-238	3.60E-15	2.75E-13
Th-234	5.28E-17	4.66E-15
Pa-234m	2.44E-16	2.15E-14
Pa-234	1.49E-17	1.32E-15
TOTAL	5.65E-13	4.69E-11

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

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-06	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	1.3E-06	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.7E-08	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-07	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	9.3E-07	3.8E-07	0.0E+00	0.0E+00	0.0E+00	1.6E-07
W	0.0E+00	0.0E+00	1.9E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	1.4E-07	0.0E+00	0.0E+00	0.0E+00	5.7E-08
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	1.1E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-08	2.4E-08
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.8E-08
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E-08
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-08	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	2.0E-07	1.8E-07	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	1.6E-08	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	3.8E-08	3.5E-08	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	3.3E-08	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	3.2E-08	0.0E+00	0.0E+00

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E-09	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	3.8E-09	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.6E-09	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.8E-09	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	4.7E-09	5.5E-07	0.0E+00	0.0E+00	0.0E+00	5.0E-09
W	0.0E+00	0.0E+00	6.5E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	2.1E-07	0.0E+00	0.0E+00	0.0E+00	8.0E-10
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	3.4E-10	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-09	5.3E-10
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.3E-08
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-07
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-08	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	2.3E-07	2.4E-06	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	9.0E-10	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	1.8E-08	1.4E-06	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	2.1E-07	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	3.7E-07	0.0E+00	0.0E+00

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

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-13	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	3.7E-13	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-14	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-14	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	2.7E-13	1.1E-13	0.0E+00	0.0E+00	0.0E+00	4.7E-14
W	0.0E+00	0.0E+00	5.7E-14	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	4.1E-14	0.0E+00	0.0E+00	0.0E+00	1.7E-14
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	3.5E-14	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.6E-15	7.6E-15
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-14
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-14
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-14	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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

	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	5.8E-14	5.4E-14	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	5.1E-15	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	1.2E-14	1.1E-14	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	1.0E-14	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	1.0E-14	0.0E+00	0.0E+00

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

	Distance (m)						
Direction	2000	4500	5100	5450	6200	8850	11500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-14	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	1.4E-14	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

	Distance (m)						
Direction	13000	16000	32500	48500	51750	56250	61500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-14	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-14	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	1.7E-14	2.1E-12	0.0E+00	0.0E+00	0.0E+00	1.9E-14
W	0.0E+00	0.0E+00	2.5E-11	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	7.9E-13	0.0E+00	0.0E+00	0.0E+00	3.1E-15
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	1.4E-15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.1E-15	2.2E-15
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.3E-13
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-13
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.2E-14	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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	Distance (m)					
Direction	64250	67250	72000	76750	79600	79850
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	8.7E-13	9.1E-12	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	3.8E-15	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	7.5E-14	5.8E-12	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	8.8E-13	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	1.6E-12	0.0E+00	0.0E+00

Maximum Residential Location
(5.5 miles [8,850 meters] WNW)
Chi/Q Tables

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Population Assessment
Thu Mar 14 07:58:10 2024

Facility: Waste Isolation Pilot Plant
Address: 26 miles east of Carlsbad, NM
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2023

Comments: NESHAPs Report for CY 2023 (Version 4.1.1.0)

Dataset Name: N_Pop23.DAT
Dataset Date: Mar 14, 2024 07:58 AM
Wind File: PC:\Users\NESHAP\Documents\CAP88\Wind Files\WIPP_023.wnd
Population File: C:\Users\NESHAP\Documents\CAP88\Population Files\WIPP_023.pop

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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	2000	4500	5100	5450	6200	8850	11500
N	2.645E-07	7.185E-08	6.006E-08	5.440E-08	4.487E-08	2.657E-08	1.845E-08
NNW	5.119E-07	1.448E-07	1.209E-07	1.096E-07	9.068E-08	5.386E-08	3.764E-08
NW	7.824E-07	2.305E-07	1.931E-07	1.755E-07	1.458E-07	8.720E-08	6.146E-08
WNW	5.097E-07	1.497E-07	1.253E-07	1.139E-07	9.459E-08	5.659E-08	3.990E-08
W	2.653E-07	7.591E-08	6.361E-08	5.779E-08	4.793E-08	2.864E-08	2.012E-08
WSW	1.964E-07	5.613E-08	4.700E-08	4.268E-08	3.536E-08	2.110E-08	1.476E-08
SW	2.518E-07	7.349E-08	6.160E-08	5.597E-08	4.643E-08	2.771E-08	1.941E-08
SSW	1.680E-07	4.803E-08	4.022E-08	3.651E-08	3.024E-08	1.803E-08	1.262E-08
S	7.051E-08	1.764E-08	1.472E-08	1.329E-08	1.089E-08	6.408E-09	4.434E-09
SSE	7.966E-08	2.081E-08	1.747E-08	1.583E-08	1.306E-08	7.797E-09	5.436E-09
SE	1.105E-07	3.013E-08	2.524E-08	2.287E-08	1.889E-08	1.121E-08	7.801E-09
ESE	1.282E-07	3.440E-08	2.881E-08	2.610E-08	2.155E-08	1.281E-08	8.941E-09
E	1.709E-07	4.639E-08	3.880E-08	3.517E-08	2.905E-08	1.729E-08	1.204E-08
ENE	1.534E-07	3.970E-08	3.318E-08	3.001E-08	2.470E-08	1.464E-08	1.011E-08
NE	1.489E-07	3.800E-08	3.172E-08	2.866E-08	2.354E-08	1.387E-08	9.534E-09
NNE	1.545E-07	3.980E-08	3.325E-08	3.005E-08	2.469E-08	1.459E-08	1.008E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.569E-08	1.191E-08	4.627E-09	2.739E-09	2.502E-09	2.211E-09	1.896E-09
NNW	3.215E-08	2.461E-08	9.785E-09	5.851E-09	5.356E-09	4.745E-09	4.075E-09
NW	5.281E-08	4.078E-08	1.649E-08	9.924E-09	9.084E-09	8.031E-09	6.800E-09
WNW	3.429E-08	2.649E-08	1.073E-08	6.468E-09	5.923E-09	5.240E-09	4.441E-09
W	1.723E-08	1.325E-08	5.326E-09	3.200E-09	2.932E-09	2.599E-09	2.225E-09
WSW	1.261E-08	9.649E-09	3.794E-09	2.254E-09	2.060E-09	1.818E-09	1.537E-09
SW	1.661E-08	1.274E-08	5.003E-09	2.972E-09	2.712E-09	2.385E-09	1.985E-09
SSW	1.079E-08	8.259E-09	3.261E-09	1.945E-09	1.779E-09	1.571E-09	1.325E-09
S	3.760E-09	2.845E-09	1.127E-09	6.862E-10	6.316E-10	5.658E-10	4.969E-10
SSE	4.623E-09	3.514E-09	1.385E-09	8.298E-10	7.611E-10	6.775E-10	5.896E-10
SE	6.639E-09	5.046E-09	1.958E-09	1.158E-09	1.057E-09	9.336E-10	7.967E-10
ESE	7.622E-09	5.814E-09	2.308E-09	1.379E-09	1.263E-09	1.122E-09	9.739E-10
E	1.024E-08	7.789E-09	3.058E-09	1.822E-09	1.670E-09	1.484E-09	1.290E-09
ENE	8.554E-09	6.444E-09	2.487E-09	1.473E-09	1.350E-09	1.203E-09	1.057E-09
NE	8.041E-09	6.025E-09	2.285E-09	1.343E-09	1.229E-09	1.093E-09	9.577E-10
NNE	8.530E-09	6.426E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.029E-09

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	64250	67250	72000	76750	79600	79850
N	1.790E-09	1.684E-09	1.535E-09	1.405E-09	1.333E-09	1.327E-09
NNW	3.851E-09	3.628E-09	3.314E-09	3.038E-09	2.887E-09	2.874E-09
NW	6.429E-09	6.060E-09	5.538E-09	5.077E-09	4.822E-09	4.800E-09
WNW	4.200E-09	3.960E-09	3.620E-09	3.319E-09	3.153E-09	3.139E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.451E-09	1.366E-09	1.245E-09	1.140E-09	1.082E-09	1.077E-09
SW	1.873E-09	1.763E-09	1.606E-09	1.468E-09	1.391E-09	1.384E-09
SSW	1.252E-09	1.179E-09	1.075E-09	9.846E-10	9.345E-10	9.302E-10
S	4.705E-10	4.443E-10	4.075E-10	3.754E-10	3.579E-10	3.565E-10
SSE	5.574E-10	5.254E-10	4.805E-10	4.413E-10	4.199E-10	4.181E-10
SE	7.518E-10	7.073E-10	6.446E-10	5.896E-10	5.594E-10	5.569E-10
ESE	9.200E-10	8.666E-10	7.914E-10	7.256E-10	6.896E-10	6.865E-10
E	1.219E-09	1.148E-09	1.049E-09	9.631E-10	9.162E-10	9.123E-10
ENE	9.981E-10	9.398E-10	8.584E-10	7.877E-10	7.495E-10	7.463E-10
NE	9.036E-10	8.500E-10	7.753E-10	7.104E-10	6.754E-10	6.724E-10
NNE	9.718E-10	9.146E-10	8.345E-10	7.647E-10	7.269E-10	7.236E-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	2000	4500	5100	5450	6200	8850	11500
N	2.605E-07	7.139E-08	5.972E-08	5.411E-08	4.466E-08	2.649E-08	1.841E-08
NNW	5.047E-07	1.439E-07	1.202E-07	1.091E-07	9.028E-08	5.370E-08	3.755E-08
NW	7.665E-07	2.284E-07	1.915E-07	1.742E-07	1.448E-07	8.679E-08	6.122E-08
WNW	4.995E-07	1.483E-07	1.243E-07	1.131E-07	9.396E-08	5.634E-08	3.975E-08
W	2.612E-07	7.539E-08	6.322E-08	5.745E-08	4.768E-08	2.854E-08	2.006E-08
WSW	1.929E-07	5.565E-08	4.664E-08	4.237E-08	3.513E-08	2.101E-08	1.471E-08
SW	2.457E-07	7.266E-08	6.097E-08	5.544E-08	4.603E-08	2.755E-08	1.932E-08
SSW	1.648E-07	4.759E-08	3.988E-08	3.623E-08	3.004E-08	1.795E-08	1.257E-08
S	6.989E-08	1.757E-08	1.467E-08	1.325E-08	1.086E-08	6.397E-09	4.428E-09
SSE	7.878E-08	2.069E-08	1.739E-08	1.576E-08	1.301E-08	7.778E-09	5.425E-09
SE	1.087E-07	2.991E-08	2.507E-08	2.273E-08	1.879E-08	1.118E-08	7.781E-09
ESE	1.270E-07	3.426E-08	2.871E-08	2.602E-08	2.150E-08	1.279E-08	8.931E-09
E	1.693E-07	4.617E-08	3.864E-08	3.503E-08	2.895E-08	1.725E-08	1.202E-08
ENE	1.526E-07	3.963E-08	3.313E-08	2.996E-08	2.467E-08	1.463E-08	1.011E-08
NE	1.479E-07	3.791E-08	3.166E-08	2.861E-08	2.350E-08	1.386E-08	9.531E-09
NNE	1.527E-07	3.957E-08	3.308E-08	2.990E-08	2.458E-08	1.455E-08	1.006E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.566E-08	1.189E-08	4.623E-09	2.738E-09	2.501E-09	2.210E-09	1.897E-09
NNW	3.208E-08	2.456E-08	9.773E-09	5.845E-09	5.351E-09	4.742E-09	4.074E-09
NW	5.261E-08	4.064E-08	1.645E-08	9.908E-09	9.070E-09	8.019E-09	6.798E-09
WNW	3.416E-08	2.640E-08	1.071E-08	6.457E-09	5.913E-09	5.233E-09	4.440E-09
W	1.719E-08	1.322E-08	5.318E-09	3.196E-09	2.929E-09	2.597E-09	2.224E-09
WSW	1.257E-08	9.619E-09	3.787E-09	2.252E-09	2.058E-09	1.816E-09	1.537E-09
SW	1.653E-08	1.268E-08	4.990E-09	2.966E-09	2.707E-09	2.381E-09	1.985E-09
SSW	1.074E-08	8.230E-09	3.255E-09	1.942E-09	1.776E-09	1.568E-09	1.325E-09
S	3.756E-09	2.842E-09	1.127E-09	6.860E-10	6.315E-10	5.657E-10	4.971E-10
SSE	4.615E-09	3.509E-09	1.384E-09	8.296E-10	7.609E-10	6.775E-10	5.899E-10
SE	6.623E-09	5.035E-09	1.956E-09	1.157E-09	1.057E-09	9.334E-10	7.974E-10
ESE	7.614E-09	5.809E-09	2.307E-09	1.379E-09	1.263E-09	1.122E-09	9.741E-10
E	1.023E-08	7.777E-09	3.056E-09	1.821E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.551E-09	6.443E-09	2.487E-09	1.473E-09	1.350E-09	1.203E-09	1.057E-09
NE	8.039E-09	6.024E-09	2.285E-09	1.344E-09	1.230E-09	1.093E-09	9.585E-10
NNE	8.513E-09	6.415E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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	64250	67250	72000	76750	79600	79850
N	1.791E-09	1.685E-09	1.536E-09	1.406E-09	1.334E-09	1.328E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.038E-09	2.887E-09	2.874E-09
NW	6.428E-09	6.059E-09	5.537E-09	5.076E-09	4.821E-09	4.800E-09
WNW	4.199E-09	3.958E-09	3.619E-09	3.319E-09	3.153E-09	3.139E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.451E-09	1.366E-09	1.246E-09	1.140E-09	1.082E-09	1.077E-09
SW	1.874E-09	1.763E-09	1.607E-09	1.468E-09	1.392E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.847E-10	9.347E-10	9.304E-10
S	4.706E-10	4.444E-10	4.076E-10	3.755E-10	3.581E-10	3.566E-10
SSE	5.577E-10	5.257E-10	4.807E-10	4.415E-10	4.202E-10	4.184E-10
SE	7.525E-10	7.079E-10	6.452E-10	5.901E-10	5.600E-10	5.574E-10
ESE	9.202E-10	8.668E-10	7.917E-10	7.258E-10	6.898E-10	6.868E-10
E	1.219E-09	1.149E-09	1.050E-09	9.637E-10	9.168E-10	9.128E-10
ENE	9.984E-10	9.401E-10	8.587E-10	7.880E-10	7.498E-10	7.466E-10
NE	9.042E-10	8.507E-10	7.759E-10	7.110E-10	6.759E-10	6.730E-10
NNE	9.731E-10	9.159E-10	8.357E-10	7.658E-10	7.279E-10	7.247E-10

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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	2000	4500	5100	5450	6200	8850	11500
N	2.614E-07	7.149E-08	5.979E-08	5.417E-08	4.471E-08	2.651E-08	1.842E-08
NNW	5.064E-07	1.441E-07	1.204E-07	1.092E-07	9.037E-08	5.374E-08	3.757E-08
NW	7.701E-07	2.289E-07	1.918E-07	1.745E-07	1.450E-07	8.688E-08	6.127E-08
WNW	5.018E-07	1.486E-07	1.246E-07	1.133E-07	9.410E-08	5.639E-08	3.978E-08
W	2.622E-07	7.551E-08	6.331E-08	5.753E-08	4.774E-08	2.856E-08	2.007E-08
WSW	1.936E-07	5.575E-08	4.672E-08	4.244E-08	3.518E-08	2.103E-08	1.472E-08
SW	2.470E-07	7.284E-08	6.111E-08	5.555E-08	4.612E-08	2.758E-08	1.934E-08
SSW	1.655E-07	4.769E-08	3.996E-08	3.629E-08	3.008E-08	1.796E-08	1.258E-08
S	7.002E-08	1.759E-08	1.468E-08	1.326E-08	1.087E-08	6.400E-09	4.429E-09
SSE	7.897E-08	2.072E-08	1.741E-08	1.577E-08	1.302E-08	7.782E-09	5.427E-09
SE	1.091E-07	2.995E-08	2.511E-08	2.276E-08	1.881E-08	1.118E-08	7.785E-09
ESE	1.273E-07	3.429E-08	2.873E-08	2.604E-08	2.151E-08	1.280E-08	8.933E-09
E	1.697E-07	4.622E-08	3.868E-08	3.506E-08	2.897E-08	1.726E-08	1.202E-08
ENE	1.528E-07	3.965E-08	3.314E-08	2.998E-08	2.467E-08	1.463E-08	1.011E-08
NE	1.481E-07	3.793E-08	3.167E-08	2.862E-08	2.351E-08	1.386E-08	9.531E-09
NNE	1.531E-07	3.961E-08	3.311E-08	2.993E-08	2.460E-08	1.456E-08	1.006E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.567E-08	1.190E-08	4.624E-09	2.738E-09	2.501E-09	2.210E-09	1.897E-09
NNW	3.210E-08	2.457E-08	9.776E-09	5.846E-09	5.352E-09	4.742E-09	4.075E-09
NW	5.265E-08	4.067E-08	1.646E-08	9.911E-09	9.073E-09	8.022E-09	6.799E-09
WNW	3.419E-08	2.642E-08	1.071E-08	6.459E-09	5.916E-09	5.234E-09	4.440E-09
W	1.720E-08	1.322E-08	5.320E-09	3.197E-09	2.929E-09	2.597E-09	2.224E-09
WSW	1.258E-08	9.625E-09	3.789E-09	2.252E-09	2.058E-09	1.817E-09	1.537E-09
SW	1.655E-08	1.269E-08	4.993E-09	2.968E-09	2.708E-09	2.382E-09	1.985E-09
SSW	1.075E-08	8.236E-09	3.256E-09	1.943E-09	1.777E-09	1.569E-09	1.325E-09
S	3.757E-09	2.843E-09	1.127E-09	6.861E-10	6.315E-10	5.657E-10	4.970E-10
SSE	4.617E-09	3.510E-09	1.384E-09	8.296E-10	7.609E-10	6.775E-10	5.899E-10
SE	6.626E-09	5.037E-09	1.956E-09	1.157E-09	1.057E-09	9.334E-10	7.972E-10
ESE	7.616E-09	5.810E-09	2.307E-09	1.379E-09	1.263E-09	1.122E-09	9.740E-10
E	1.023E-08	7.780E-09	3.057E-09	1.822E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.551E-09	6.443E-09	2.487E-09	1.473E-09	1.350E-09	1.203E-09	1.057E-09
NE	8.039E-09	6.025E-09	2.285E-09	1.344E-09	1.230E-09	1.093E-09	9.583E-10
NNE	8.516E-09	6.417E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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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	64250	67250	72000	76750	79600	79850
N	1.790E-09	1.685E-09	1.536E-09	1.406E-09	1.334E-09	1.328E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.038E-09	2.887E-09	2.874E-09
NW	6.428E-09	6.059E-09	5.538E-09	5.076E-09	4.821E-09	4.800E-09
WNW	4.199E-09	3.959E-09	3.619E-09	3.319E-09	3.153E-09	3.139E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.451E-09	1.366E-09	1.246E-09	1.140E-09	1.082E-09	1.077E-09
SW	1.874E-09	1.763E-09	1.606E-09	1.468E-09	1.391E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.847E-10	9.346E-10	9.304E-10
S	4.706E-10	4.444E-10	4.076E-10	3.755E-10	3.581E-10	3.566E-10
SSE	5.576E-10	5.256E-10	4.807E-10	4.415E-10	4.201E-10	4.183E-10
SE	7.523E-10	7.078E-10	6.451E-10	5.900E-10	5.599E-10	5.573E-10
ESE	9.202E-10	8.668E-10	7.916E-10	7.258E-10	6.898E-10	6.867E-10
E	1.219E-09	1.149E-09	1.050E-09	9.636E-10	9.167E-10	9.127E-10
ENE	9.983E-10	9.400E-10	8.586E-10	7.879E-10	7.497E-10	7.465E-10
NE	9.041E-10	8.505E-10	7.757E-10	7.109E-10	6.758E-10	6.729E-10
NNE	9.728E-10	9.156E-10	8.354E-10	7.656E-10	7.277E-10	7.245E-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	2000	4500	5100	5450	6200	8850	11500
N	2.587E-07	7.120E-08	5.958E-08	5.399E-08	4.458E-08	2.646E-08	1.840E-08
NNW	4.993E-07	1.433E-07	1.198E-07	1.087E-07	9.001E-08	5.360E-08	3.749E-08
NW	7.555E-07	2.270E-07	1.905E-07	1.733E-07	1.441E-07	8.654E-08	6.108E-08
WNW	4.921E-07	1.474E-07	1.236E-07	1.125E-07	9.353E-08	5.616E-08	3.965E-08
W	2.580E-07	7.500E-08	6.293E-08	5.721E-08	4.751E-08	2.847E-08	2.002E-08
WSW	1.906E-07	5.537E-08	4.644E-08	4.220E-08	3.501E-08	2.096E-08	1.468E-08
SW	2.422E-07	7.221E-08	6.064E-08	5.515E-08	4.582E-08	2.746E-08	1.927E-08
SSW	1.626E-07	4.733E-08	3.969E-08	3.606E-08	2.991E-08	1.790E-08	1.254E-08
S	6.952E-08	1.753E-08	1.464E-08	1.322E-08	1.084E-08	6.391E-09	4.425E-09
SSE	7.833E-08	2.065E-08	1.736E-08	1.573E-08	1.299E-08	7.771E-09	5.422E-09
SE	1.079E-07	2.982E-08	2.501E-08	2.268E-08	1.875E-08	1.116E-08	7.774E-09
ESE	1.261E-07	3.417E-08	2.864E-08	2.597E-08	2.146E-08	1.278E-08	8.924E-09
E	1.680E-07	4.603E-08	3.854E-08	3.495E-08	2.889E-08	1.723E-08	1.201E-08
ENE	1.517E-07	3.955E-08	3.307E-08	2.992E-08	2.463E-08	1.462E-08	1.010E-08
NE	1.473E-07	3.785E-08	3.163E-08	2.858E-08	2.348E-08	1.386E-08	9.530E-09
NNE	1.522E-07	3.952E-08	3.305E-08	2.988E-08	2.456E-08	1.455E-08	1.006E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.565E-08	1.189E-08	4.623E-09	2.738E-09	2.501E-09	2.210E-09	1.898E-09
NNW	3.203E-08	2.453E-08	9.766E-09	5.842E-09	5.349E-09	4.739E-09	4.074E-09
NW	5.249E-08	4.055E-08	1.643E-08	9.898E-09	9.061E-09	8.013E-09	6.797E-09
WNW	3.408E-08	2.634E-08	1.069E-08	6.450E-09	5.907E-09	5.228E-09	4.438E-09
W	1.715E-08	1.319E-08	5.313E-09	3.194E-09	2.926E-09	2.595E-09	2.224E-09
WSW	1.255E-08	9.604E-09	3.784E-09	2.250E-09	2.057E-09	1.816E-09	1.537E-09
SW	1.649E-08	1.265E-08	4.985E-09	2.964E-09	2.705E-09	2.379E-09	1.985E-09
SSW	1.072E-08	8.215E-09	3.251E-09	1.941E-09	1.775E-09	1.567E-09	1.325E-09
S	3.753E-09	2.841E-09	1.127E-09	6.859E-10	6.314E-10	5.657E-10	4.972E-10
SSE	4.613E-09	3.507E-09	1.384E-09	8.296E-10	7.609E-10	6.775E-10	5.901E-10
SE	6.617E-09	5.031E-09	1.956E-09	1.157E-09	1.057E-09	9.334E-10	7.977E-10
ESE	7.609E-09	5.805E-09	2.306E-09	1.379E-09	1.263E-09	1.122E-09	9.742E-10
E	1.022E-08	7.772E-09	3.055E-09	1.821E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.548E-09	6.441E-09	2.487E-09	1.473E-09	1.350E-09	1.204E-09	1.058E-09
NE	8.038E-09	6.025E-09	2.286E-09	1.344E-09	1.230E-09	1.094E-09	9.589E-10
NNE	8.513E-09	6.415E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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	64250	67250	72000	76750	79600	79850
N	1.791E-09	1.686E-09	1.537E-09	1.406E-09	1.335E-09	1.329E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.039E-09	2.887E-09	2.874E-09
NW	6.426E-09	6.058E-09	5.537E-09	5.076E-09	4.821E-09	4.799E-09
WNW	4.197E-09	3.957E-09	3.618E-09	3.318E-09	3.152E-09	3.138E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.452E-09	1.366E-09	1.246E-09	1.141E-09	1.082E-09	1.078E-09
SW	1.874E-09	1.763E-09	1.607E-09	1.469E-09	1.392E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.849E-10	9.348E-10	9.306E-10
S	4.707E-10	4.445E-10	4.077E-10	3.756E-10	3.582E-10	3.567E-10
SSE	5.578E-10	5.258E-10	4.809E-10	4.417E-10	4.203E-10	4.185E-10
SE	7.528E-10	7.082E-10	6.455E-10	5.904E-10	5.603E-10	5.577E-10
ESE	9.204E-10	8.670E-10	7.918E-10	7.260E-10	6.900E-10	6.869E-10
E	1.219E-09	1.149E-09	1.050E-09	9.638E-10	9.169E-10	9.129E-10
ENE	9.987E-10	9.404E-10	8.589E-10	7.882E-10	7.500E-10	7.468E-10
NE	9.047E-10	8.511E-10	7.763E-10	7.113E-10	6.763E-10	6.733E-10
NNE	9.734E-10	9.162E-10	8.360E-10	7.661E-10	7.281E-10	7.249E-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	2000	4500	5100	5450	6200	8850	11500
N	2.586E-07	7.119E-08	5.957E-08	5.399E-08	4.458E-08	2.646E-08	1.840E-08
NNW	4.992E-07	1.433E-07	1.198E-07	1.087E-07	9.000E-08	5.359E-08	3.749E-08
NW	7.552E-07	2.270E-07	1.904E-07	1.733E-07	1.441E-07	8.653E-08	6.107E-08
WNW	4.920E-07	1.474E-07	1.236E-07	1.125E-07	9.352E-08	5.616E-08	3.965E-08
W	2.580E-07	7.499E-08	6.293E-08	5.720E-08	4.750E-08	2.847E-08	2.002E-08
WSW	1.905E-07	5.536E-08	4.643E-08	4.219E-08	3.500E-08	2.096E-08	1.468E-08
SW	2.420E-07	7.219E-08	6.062E-08	5.514E-08	4.581E-08	2.746E-08	1.927E-08
SSW	1.626E-07	4.732E-08	3.968E-08	3.605E-08	2.991E-08	1.789E-08	1.254E-08
S	6.951E-08	1.753E-08	1.464E-08	1.322E-08	1.084E-08	6.391E-09	4.424E-09
SSE	7.831E-08	2.064E-08	1.736E-08	1.573E-08	1.299E-08	7.771E-09	5.422E-09
SE	1.078E-07	2.981E-08	2.500E-08	2.267E-08	1.874E-08	1.116E-08	7.774E-09
ESE	1.260E-07	3.417E-08	2.864E-08	2.597E-08	2.146E-08	1.278E-08	8.924E-09
E	1.680E-07	4.603E-08	3.854E-08	3.494E-08	2.889E-08	1.723E-08	1.201E-08
ENE	1.517E-07	3.955E-08	3.307E-08	2.992E-08	2.463E-08	1.462E-08	1.010E-08
NE	1.472E-07	3.785E-08	3.162E-08	2.858E-08	2.348E-08	1.386E-08	9.530E-09
NNE	1.521E-07	3.952E-08	3.304E-08	2.987E-08	2.456E-08	1.455E-08	1.006E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.565E-08	1.188E-08	4.623E-09	2.737E-09	2.501E-09	2.210E-09	1.898E-09
NNW	3.203E-08	2.452E-08	9.766E-09	5.842E-09	5.349E-09	4.739E-09	4.074E-09
NW	5.249E-08	4.055E-08	1.643E-08	9.898E-09	9.061E-09	8.012E-09	6.797E-09
WNW	3.408E-08	2.634E-08	1.069E-08	6.450E-09	5.907E-09	5.228E-09	4.438E-09
W	1.715E-08	1.319E-08	5.312E-09	3.194E-09	2.926E-09	2.595E-09	2.224E-09
WSW	1.255E-08	9.603E-09	3.784E-09	2.250E-09	2.057E-09	1.816E-09	1.537E-09
SW	1.649E-08	1.265E-08	4.984E-09	2.963E-09	2.705E-09	2.379E-09	1.985E-09
SSW	1.072E-08	8.214E-09	3.251E-09	1.941E-09	1.775E-09	1.567E-09	1.325E-09
S	3.753E-09	2.841E-09	1.127E-09	6.859E-10	6.314E-10	5.657E-10	4.972E-10
SSE	4.612E-09	3.507E-09	1.384E-09	8.296E-10	7.609E-10	6.775E-10	5.901E-10
SE	6.617E-09	5.031E-09	1.956E-09	1.157E-09	1.057E-09	9.334E-10	7.977E-10
ESE	7.609E-09	5.805E-09	2.306E-09	1.379E-09	1.263E-09	1.122E-09	9.742E-10
E	1.022E-08	7.771E-09	3.055E-09	1.821E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.548E-09	6.441E-09	2.487E-09	1.473E-09	1.350E-09	1.204E-09	1.058E-09
NE	8.038E-09	6.025E-09	2.286E-09	1.344E-09	1.230E-09	1.094E-09	9.589E-10
NNE	8.512E-09	6.415E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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	64250	67250	72000	76750	79600	79850
N	1.791E-09	1.686E-09	1.537E-09	1.406E-09	1.335E-09	1.329E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.039E-09	2.887E-09	2.874E-09
NW	6.426E-09	6.058E-09	5.537E-09	5.076E-09	4.821E-09	4.799E-09
WNW	4.197E-09	3.957E-09	3.618E-09	3.318E-09	3.152E-09	3.138E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.452E-09	1.366E-09	1.246E-09	1.141E-09	1.082E-09	1.078E-09
SW	1.874E-09	1.763E-09	1.607E-09	1.469E-09	1.392E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.849E-10	9.348E-10	9.306E-10
S	4.707E-10	4.445E-10	4.077E-10	3.756E-10	3.582E-10	3.567E-10
SSE	5.578E-10	5.258E-10	4.809E-10	4.417E-10	4.203E-10	4.185E-10
SE	7.528E-10	7.082E-10	6.455E-10	5.905E-10	5.603E-10	5.577E-10
ESE	9.204E-10	8.670E-10	7.918E-10	7.260E-10	6.900E-10	6.869E-10
E	1.219E-09	1.149E-09	1.050E-09	9.638E-10	9.169E-10	9.129E-10
ENE	9.987E-10	9.404E-10	8.589E-10	7.882E-10	7.500E-10	7.468E-10
NE	9.047E-10	8.511E-10	7.763E-10	7.114E-10	6.763E-10	6.733E-10
NNE	9.734E-10	9.162E-10	8.360E-10	7.661E-10	7.282E-10	7.250E-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	2000	4500	5100	5450	6200	8850	11500
N	2.611E-07	7.147E-08	5.977E-08	5.416E-08	4.470E-08	2.650E-08	1.842E-08
NNW	5.047E-07	1.440E-07	1.202E-07	1.091E-07	9.030E-08	5.371E-08	3.755E-08
NW	7.670E-07	2.285E-07	1.916E-07	1.743E-07	1.448E-07	8.682E-08	6.124E-08
WNW	4.997E-07	1.484E-07	1.244E-07	1.131E-07	9.398E-08	5.635E-08	3.976E-08
W	2.612E-07	7.540E-08	6.322E-08	5.746E-08	4.769E-08	2.854E-08	2.006E-08
WSW	1.930E-07	5.569E-08	4.668E-08	4.240E-08	3.516E-08	2.102E-08	1.471E-08
SW	2.462E-07	7.275E-08	6.104E-08	5.550E-08	4.608E-08	2.757E-08	1.933E-08
SSW	1.649E-07	4.763E-08	3.991E-08	3.625E-08	3.005E-08	1.795E-08	1.257E-08
S	6.994E-08	1.758E-08	1.468E-08	1.325E-08	1.086E-08	6.398E-09	4.428E-09
SSE	7.889E-08	2.071E-08	1.741E-08	1.577E-08	1.302E-08	7.782E-09	5.428E-09
SE	1.090E-07	2.995E-08	2.510E-08	2.276E-08	1.880E-08	1.118E-08	7.785E-09
ESE	1.270E-07	3.427E-08	2.871E-08	2.603E-08	2.150E-08	1.279E-08	8.931E-09
E	1.692E-07	4.618E-08	3.865E-08	3.504E-08	2.896E-08	1.726E-08	1.202E-08
ENE	1.525E-07	3.962E-08	3.312E-08	2.996E-08	2.466E-08	1.462E-08	1.011E-08
NE	1.480E-07	3.791E-08	3.167E-08	2.861E-08	2.351E-08	1.386E-08	9.531E-09
NNE	1.531E-07	3.963E-08	3.312E-08	2.994E-08	2.461E-08	1.456E-08	1.007E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.567E-08	1.190E-08	4.624E-09	2.738E-09	2.502E-09	2.210E-09	1.897E-09
NNW	3.209E-08	2.456E-08	9.774E-09	5.846E-09	5.352E-09	4.742E-09	4.074E-09
NW	5.263E-08	4.065E-08	1.646E-08	9.909E-09	9.071E-09	8.020E-09	6.798E-09
WNW	3.417E-08	2.640E-08	1.071E-08	6.458E-09	5.914E-09	5.233E-09	4.440E-09
W	1.719E-08	1.322E-08	5.318E-09	3.197E-09	2.929E-09	2.597E-09	2.224E-09
WSW	1.257E-08	9.623E-09	3.788E-09	2.252E-09	2.058E-09	1.817E-09	1.537E-09
SW	1.654E-08	1.269E-08	4.992E-09	2.967E-09	2.708E-09	2.382E-09	1.985E-09
SSW	1.075E-08	8.233E-09	3.255E-09	1.943E-09	1.776E-09	1.569E-09	1.325E-09
S	3.756E-09	2.843E-09	1.127E-09	6.860E-10	6.315E-10	5.657E-10	4.971E-10
SSE	4.617E-09	3.510E-09	1.384E-09	8.297E-10	7.610E-10	6.775E-10	5.899E-10
SE	6.626E-09	5.037E-09	1.957E-09	1.157E-09	1.057E-09	9.335E-10	7.973E-10
ESE	7.615E-09	5.809E-09	2.307E-09	1.379E-09	1.263E-09	1.122E-09	9.741E-10
E	1.023E-08	7.779E-09	3.056E-09	1.821E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.550E-09	6.443E-09	2.487E-09	1.473E-09	1.350E-09	1.203E-09	1.057E-09
NE	8.039E-09	6.025E-09	2.286E-09	1.344E-09	1.230E-09	1.093E-09	9.584E-10
NNE	8.519E-09	6.419E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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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	64250	67250	72000	76750	79600	79850
N	1.791E-09	1.685E-09	1.536E-09	1.406E-09	1.334E-09	1.328E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.039E-09	2.887E-09	2.874E-09
NW	6.428E-09	6.059E-09	5.537E-09	5.076E-09	4.821E-09	4.800E-09
WNW	4.199E-09	3.958E-09	3.619E-09	3.319E-09	3.153E-09	3.139E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.451E-09	1.366E-09	1.246E-09	1.140E-09	1.082E-09	1.077E-09
SW	1.874E-09	1.763E-09	1.607E-09	1.468E-09	1.392E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.847E-10	9.347E-10	9.304E-10
S	4.706E-10	4.444E-10	4.076E-10	3.755E-10	3.581E-10	3.566E-10
SSE	5.576E-10	5.256E-10	4.807E-10	4.415E-10	4.202E-10	4.184E-10
SE	7.524E-10	7.078E-10	6.451E-10	5.901E-10	5.599E-10	5.574E-10
ESE	9.202E-10	8.668E-10	7.917E-10	7.258E-10	6.898E-10	6.868E-10
E	1.219E-09	1.149E-09	1.050E-09	9.636E-10	9.167E-10	9.127E-10
ENE	9.984E-10	9.401E-10	8.587E-10	7.880E-10	7.498E-10	7.466E-10
NE	9.042E-10	8.507E-10	7.758E-10	7.110E-10	6.759E-10	6.730E-10
NNE	9.728E-10	9.156E-10	8.354E-10	7.656E-10	7.276E-10	7.244E-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	2000	4500	5100	5450	6200	8850	11500
N	2.599E-07	7.134E-08	5.968E-08	5.408E-08	4.464E-08	2.648E-08	1.841E-08
NNW	5.017E-07	1.436E-07	1.200E-07	1.089E-07	9.014E-08	5.365E-08	3.752E-08
NW	7.607E-07	2.277E-07	1.910E-07	1.738E-07	1.445E-07	8.667E-08	6.115E-08
WNW	4.955E-07	1.478E-07	1.240E-07	1.128E-07	9.374E-08	5.625E-08	3.970E-08
W	2.594E-07	7.518E-08	6.306E-08	5.732E-08	4.759E-08	2.851E-08	2.004E-08
WSW	1.917E-07	5.552E-08	4.655E-08	4.229E-08	3.508E-08	2.099E-08	1.470E-08
SW	2.441E-07	7.247E-08	6.083E-08	5.532E-08	4.595E-08	2.751E-08	1.930E-08
SSW	1.637E-07	4.747E-08	3.979E-08	3.615E-08	2.998E-08	1.792E-08	1.256E-08
S	6.972E-08	1.755E-08	1.466E-08	1.324E-08	1.085E-08	6.394E-09	4.426E-09
SSE	7.860E-08	2.068E-08	1.738E-08	1.575E-08	1.301E-08	7.777E-09	5.425E-09
SE	1.084E-07	2.988E-08	2.506E-08	2.272E-08	1.878E-08	1.117E-08	7.780E-09
ESE	1.265E-07	3.421E-08	2.868E-08	2.599E-08	2.148E-08	1.279E-08	8.927E-09
E	1.685E-07	4.610E-08	3.859E-08	3.499E-08	2.892E-08	1.724E-08	1.201E-08
ENE	1.520E-07	3.958E-08	3.309E-08	2.993E-08	2.464E-08	1.462E-08	1.011E-08
NE	1.476E-07	3.788E-08	3.164E-08	2.860E-08	2.349E-08	1.386E-08	9.531E-09
NNE	1.527E-07	3.959E-08	3.309E-08	2.992E-08	2.459E-08	1.456E-08	1.006E-08

	Distance (meters)						
Dir	13000	16000	32500	48500	51750	56250	61500
N	1.566E-08	1.189E-08	4.624E-09	2.738E-09	2.502E-09	2.210E-09	1.897E-09
NNW	3.206E-08	2.454E-08	9.770E-09	5.844E-09	5.350E-09	4.741E-09	4.074E-09
NW	5.256E-08	4.060E-08	1.644E-08	9.903E-09	9.066E-09	8.016E-09	6.797E-09
WNW	3.412E-08	2.637E-08	1.070E-08	6.454E-09	5.911E-09	5.230E-09	4.439E-09
W	1.717E-08	1.320E-08	5.315E-09	3.195E-09	2.927E-09	2.596E-09	2.224E-09
WSW	1.256E-08	9.613E-09	3.786E-09	2.251E-09	2.057E-09	1.816E-09	1.537E-09
SW	1.652E-08	1.267E-08	4.988E-09	2.965E-09	2.707E-09	2.381E-09	1.985E-09
SSW	1.074E-08	8.224E-09	3.253E-09	1.942E-09	1.775E-09	1.568E-09	1.325E-09
S	3.755E-09	2.842E-09	1.127E-09	6.860E-10	6.314E-10	5.657E-10	4.971E-10
SSE	4.615E-09	3.509E-09	1.384E-09	8.296E-10	7.610E-10	6.775E-10	5.900E-10
SE	6.622E-09	5.034E-09	1.956E-09	1.157E-09	1.057E-09	9.335E-10	7.975E-10
ESE	7.611E-09	5.807E-09	2.306E-09	1.379E-09	1.263E-09	1.122E-09	9.742E-10
E	1.022E-08	7.775E-09	3.056E-09	1.821E-09	1.669E-09	1.484E-09	1.290E-09
ENE	8.549E-09	6.442E-09	2.487E-09	1.473E-09	1.350E-09	1.203E-09	1.058E-09
NE	8.039E-09	6.025E-09	2.286E-09	1.344E-09	1.230E-09	1.094E-09	9.587E-10
NNE	8.517E-09	6.418E-09	2.464E-09	1.458E-09	1.334E-09	1.184E-09	1.031E-09

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	64250	67250	72000	76750	79600	79850
N	1.791E-09	1.685E-09	1.537E-09	1.406E-09	1.335E-09	1.329E-09
NNW	3.850E-09	3.628E-09	3.314E-09	3.039E-09	2.887E-09	2.874E-09
NW	6.427E-09	6.058E-09	5.537E-09	5.076E-09	4.821E-09	4.799E-09
WNW	4.198E-09	3.958E-09	3.618E-09	3.318E-09	3.152E-09	3.138E-09
W	2.103E-09	1.982E-09	1.812E-09	1.662E-09	1.580E-09	1.573E-09
WSW	1.451E-09	1.366E-09	1.246E-09	1.140E-09	1.082E-09	1.077E-09
SW	1.874E-09	1.763E-09	1.607E-09	1.468E-09	1.392E-09	1.385E-09
SSW	1.252E-09	1.179E-09	1.076E-09	9.848E-10	9.348E-10	9.305E-10
S	4.707E-10	4.445E-10	4.077E-10	3.756E-10	3.581E-10	3.567E-10
SSE	5.577E-10	5.257E-10	4.808E-10	4.416E-10	4.202E-10	4.184E-10
SE	7.526E-10	7.080E-10	6.453E-10	5.903E-10	5.601E-10	5.575E-10
ESE	9.203E-10	8.669E-10	7.918E-10	7.259E-10	6.899E-10	6.869E-10
E	1.219E-09	1.149E-09	1.050E-09	9.637E-10	9.168E-10	9.128E-10
ENE	9.986E-10	9.403E-10	8.588E-10	7.882E-10	7.500E-10	7.467E-10
NE	9.045E-10	8.509E-10	7.761E-10	7.112E-10	6.761E-10	6.732E-10
NNE	9.730E-10	9.158E-10	8.356E-10	7.658E-10	7.279E-10	7.247E-10