

Regulatory Compliance Strategy For Recovery-Driven Underground Ventilation System Changes – 16355

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ABSTRACT

The Waste Isolation Pilot Plant (WIPP) facility is managed and operated by Nuclear Waste Partnership LLC (NWP) for the U.S Department of Energy (DOE). On February 14, 2014, a radiological event occurred in the WIPP facility underground repository, which resulted in the release of transuranic isotopes contaminating a portion of the underground primarily along the ventilation path from Panel 7, the location of the incident. The release was initially detected by an underground continuous air monitor (CAM) which caused an automatic switch of the ventilation system to filtration mode and ventilation was directed through high-efficiency particulate air (HEPA) filtration banks located in the surface exhaust building. When the HEPA filtration was engaged, the underground normal ventilation was reduced from 425,000 standard cubic feet per minute (scfm) to 60,000 scfm. Since the event, all exhaust air is filtered through HEPA filters at 60,000 scfm to minimize the possibility of exposure to workers, the public and the environment.

Ventilation of fresh air to the WIPP underground is a primary limitation to performing underground recovery activities; therefore, recovery-driven ventilation changes are needed. The safe recovery of the WIPP facility and resumption of normal waste emplacement activities require an increase in ventilation capacity to be accomplished in three phases: 1) Interim Ventilation System, 2) Supplemental Ventilation System and 3) Permanent Ventilation System. Each phase adds increased air flow to the underground and allows for underground activities to be performed concurrently.

The regulatory strategy for ventilation recovery focuses on ensuring that needed changes to the WIPP facility are protective of human health and the environment. Recovery-driven ventilation changes are implemented using the procedures, processes, and regulations that are required by the two primary regulatory agencies for the WIPP facility: the U.S. Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) as well as DOE requirements. Regulatory compliance is being achieved for the three ventilation phases to restore underground ventilation by providing the regulators and stakeholders opportunities for involvement during the design and development processes. A strategy for a tiered NMED permitting process and a plan for developing required EPA documentation are under consideration. The Project's objective is to resume normal waste emplacement activities with safety, protection of the public, the worker and the environment as the highest priorities. Important elements of

ensuring that WIPP facility recovery and future waste emplacement activities occur as planned are transparency and communication with the regulatory community.

INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) facility is the United States' first repository for the permanent disposal of defense-generated transuranic radioactive waste generated from the research and production of nuclear weapons. At approximately 11:14 PM Mountain Standard Time on Friday, February 14, 2014, a continuous air monitor (CAM) detected airborne radiation in the WIPP underground. The CAM activated an automatic switch of the ventilation system to filtration mode, and ventilation was directed through high-efficiency particulate air (HEPA) filtration banks located in the surface exhaust building. As a result, the underground air flow was reduced from 425,000 standard cubic feet per minute (scfm) to 60,000 scfm. Since the event, exhaust air is filtered through HEPA filters at 60,000 scfm to minimize the possibility of exposure to workers, the public and the environment.

The safe and timely recovery of the WIPP facility and resumption of normal waste emplacement activities require an increase in ventilation capacity to be accomplished in three phases: 1) Interim Ventilation System (IVS), 2) Supplemental Ventilation System (SVS) and 3) Permanent Ventilation System (PVS). Each phase adds increased air flow to the underground and allows for underground activities to be performed concurrently.

Regulatory compliance is being achieved for the three ventilation phases to restore underground ventilation by providing the primary regulatory agencies for the WIPP facility, the U.S. Environmental Protection Agency and the New Mexico Environment Department (NMED), and stakeholders opportunities for involvement during the design and development processes. The regulatory strategy for a tiered NMED permitting process and a plan for developing required EPA documentation are underway. Important elements of ensuring that WIPP recovery and future waste emplacement activities occur as planned are transparency and communication with the regulatory community.

DISCUSSION

Ventilation – The Limiting Factor

On February 14, 2014, during the radiological release, the ventilation system performed as it was designed. The underground CAM that was monitoring airborne radioactivity levels in Panel 7 exhaust air alarmed and automatically switched the underground ventilation system to HEPA filtration mode. Since the occurrence of the event, underground ventilation at the WIPP facility has been operating in filtration mode. When the HEPA filtration was engaged, the underground air flow was reduced from 425,000 scfm to 60,000 scfm.

Although recovery activities such as roof bolting, which provides safe working conditions in the repository, contamination reduction and installation of the initial closures in Panel 6 and closure of Room 7 of Panel 7 can be performed at 60,000

scfm, the number of pieces of diesel equipment that can be operated concurrently is limited by the available ventilation in the work area and the minimum ventilation flow rate assigned to each piece of equipment based on Mine, Safety and Health Administration air quality guidelines. Currently, ventilation adjustments are made in each location where equipment is operating to ensure equipment airflow requirements are met. In addition, hybrid bolting machines, which run on diesel as well as electric, have been recently purchased for use in the underground to enable ground control activities to be increased without impacting other operations that require the use of diesel equipment.

The safe and timely recovery of the WIPP facility requires some improvements and modifications to the existing ventilation system. Modifications to the existing ventilation system require an increase in ventilation capacity to occur in three phases. Each phase adds increased air flow to the underground and allows for additional underground activities to be performed concurrently.

1. Interim Ventilation System
2. Supplemental Ventilation System
3. Permanent Ventilation System

Interim Ventilation System

The Interim Ventilation System (IVS), as shown in Figure 1, is planned as part of the WIPP recovery operations that will increase airflow using two skid-mounted fans and HEPA filtration units, thereby adding approximately 46,000 additional scfm to the current 60,000 scfm system to achieve a total ventilation flow of approximately 106,000 scfm. The IVS exhaust air will continue to exit the system through HEPA filters and will continue to be sampled for radioactive particulates prior to release to the atmosphere. The additional filtered air flow will enable more concurrent work and limited waste handling operations to occur. The IVS fans will be able to run in conjunction with or separately from the SVS since the IVS exhaust air will be filtered. The exhaust flow from the IVS is combined with the current exhaust flow before it is vented to the atmosphere. The common emission point (stack) is referred to as Station B because this is the designation of the stack monitoring station.

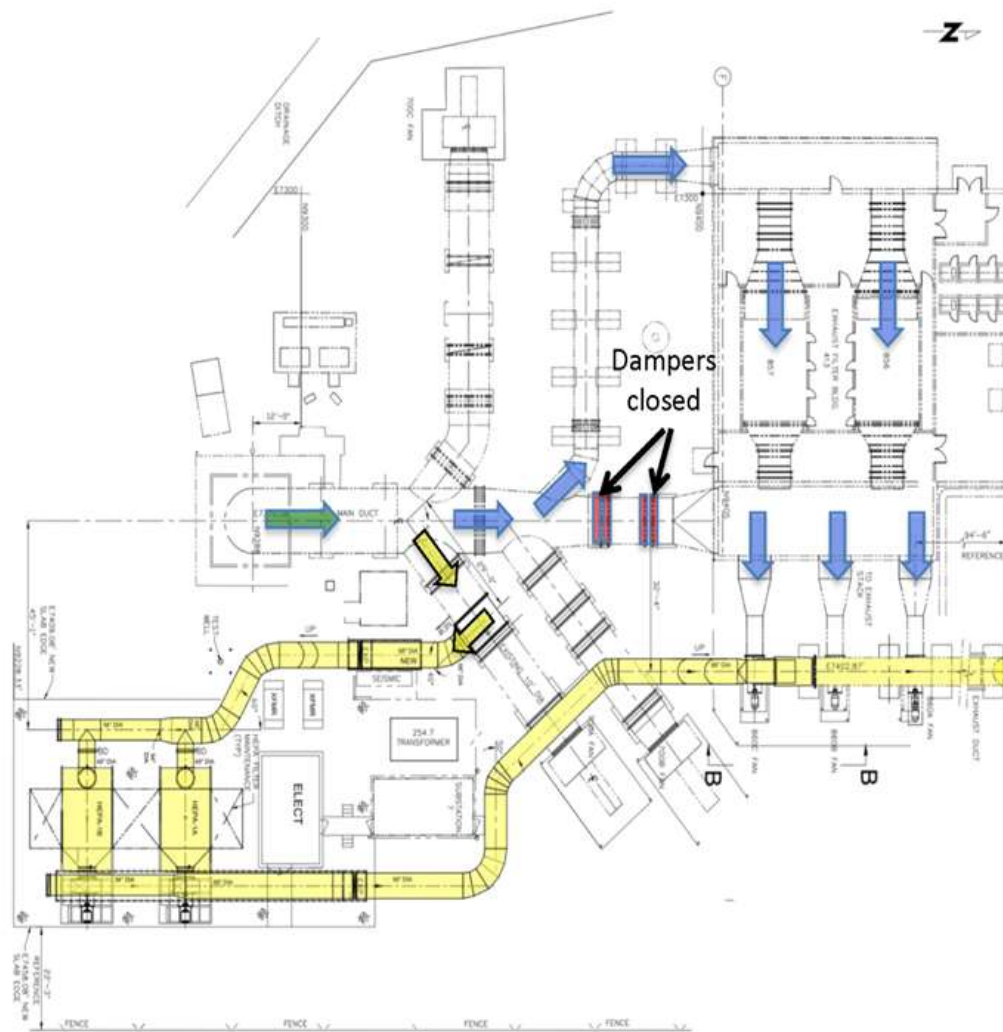


Figure 1. Interim Ventilation System

IVS – National Environmental Policy Act Requirements and Regulatory Strategy

In preparation for documenting IVS-driven changes, NWP and the CBFO National Environmental Policy Act (NEPA) Compliance Officer performed an Environmental Impact Analysis and a regulatory review of 10 Code of Federal Regulations (CFR) Part 1021, *National Environmental Policy Act Implementing Procedures* [1]. On November 17, 2014, the CBFO NEPA Compliance Officer issued a determination that the proposed installation of an IVS to support recovery activities at the WIPP facility was in accordance with 10 CFR Part 1021, Subpart D, *Typical Classes of Action, B2.5 – Facility safety and environmental improvements* [1], and a Categorical Exclusion was applied. The IVS proposal fits within a class of actions that is listed in Appendix A or B of 10 CFR Part 1021, Subpart D [1]. To meet this classification, a determination was needed by the CBFO NEPA Compliance Officer as to whether changes needed for IVS would comply with the following criteria:

Would not (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The CBFO NEPA Compliance Officer determined that the changes needed for IVS fits within the specified classes of action as specified and determined that the action is categorically excluded from further NEPA review. The NEPA Compliance Officer completed a U.S. Department of Energy Categorical Exclusion Determination Form identifying the proposed action and the Categorical Exclusion applied from 10 CFR Part 1021, Subpart D [1].

IVS - NMED Requirements and Regulatory Strategy

On August 26, 2014, the Permittees (the DOE and NWP) submitted a Notification of Planned Physical Alteration to the Permitted Facility in accordance with the WIPP Hazardous Waste Facility Permit (Permit), Part 1, Section 1.7.11.1., *Reporting Planned Changes* (20.4.1.900 New Mexico Administrative Code (NMAC) incorporating 40 CFR §270.30(l)(1)) [2], notifying the NMED of the Permittees' intent to augment the current ventilation system with the IVS. Upon completion of the IVS alteration, a letter will be submitted to the NMED with a New Mexico registered professional engineer's statement that the facility has been constructed pursuant to the design and applicable Permit requirements. The NMED will have

the opportunity to inspect the alteration to the ventilation system in accordance with the Permit Part 1, Section 1.7.11. [2].

IVS - EPA Requirements and Regulatory Strategy

The NWP evaluated the Memorandum of Understanding (MOU) between the DOE and the EPA [3] and the requirements in 40 CFR Part 61, Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities (NESHAPs); [4], 40 CFR Part 191, Subpart A, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level and Transuranic Wastes*, Subpart A, *Environmental Standards for Management and Storage* [5] and 40 CFR Part 194, *Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations*, §194.4(b)(3) [6].

The NESHAPs provisions of the Subpart H regulations only apply to the WIPP facility or the IVS project, as agreed to by the DOE and the EPA in the MOU of 1995 [3], which stated that DOE will implement the requirements of Subpart H for WIPP until such time as the facility has completely closed. Section 2a of the MOU states:

Facilities meeting the requirements of 40 CFR Part 61, Section 61.96(b) are exempt from filing an application for approval to construct or modify.

A facility is eligible for exemption from submitting an application for any new construction or modification within the existing facility if the effective dose equivalent to be caused by all emissions from the completed construction or modification is less than 1% of the standard prescribed in Section 61.92 and the facility was shown to be in compliance with all provisions of the subpart in the last annual report. As stated in Section 61.96(b), the effective dose equivalent shall be calculated with the source term derived using Appendix D or other EPA approved procedures as input to the air dispersion and other computer models. DOE facilities not subject to the continuous monitoring requirements of section 61.93(b) are eligible for this exemption once a program which meets the periodic confirmatory measurement requirement is implemented.

A calculation was performed to demonstrate that the new construction associated with IVS is exempt from filing an application for approval to construct or modify. This calculation, known as the "source term," evaluated the emissions assuming normal operations, without taking credit for control devices, and assumed the breached drum remaining in the WIPP underground was unsealed. This calculation utilizes 40 CFR Part 61, *National Emissions Standards for Hazardous Air Pollutants*, Appendix D to Part 61, *Methods for Estimating Radionuclide Emissions* [7], which are approved by the EPA for performing exempt calculations. The estimated effective dose equivalent (EDE) to the Maximally Exposed Offsite Individual was calculated to be 1.0E-04mrem/yr., which is 1000 times less than the 40 CFR §61.96 [4] limit of 0.1 mrem/yr. required for exemption.

Thus, the IVS construction is exempt from submitting an application for EPA approval to construct or modify. However, in accordance with 40 CFR Part 61, Subpart H, *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities*, §61.94, *Compliance and Reporting*, [4], the DOE is required annually to submit, the *Annual Periodic Confirmatory Measurement Compliance Report* to both EPA Office of Radiation and Indoor Air and the appropriate EPA regional office, EPA Region 6.

The addition of the new IVS ventilation to the exhaust at the Station B stack becomes a modified source. As described in 40 CFR §61.15(b) [4], when an existing source becomes a new source it must be qualified under the requirements of 40 CFR §61.93(c) [4]. Qualification of Station B will be done using test data from a geometrically similar design, pursuant with American National Standard/Health Physics Society (ANSI/HPS) N13.1-1999 [8] to demonstrate compliance with the sample location criteria. The Qualification Report, pertaining to the qualification of Station B sampling location, will be available for EPA inspection per 40 CFR Part 61, §61.95, *Recordkeeping Requirements* [4].

To determine the monitoring requirements for the IVS, the potential emissions of the source (emission estimate is based on normal operations but assuming no control devices) is $1.0E-04$ mrem/yr. In accordance with 40 CFR Part 61, §61.93 [4], this source is only required to perform periodic confirmatory measurements to ensure the emissions remain low. Based on the ANSI/HPS N13.1-1999 criteria [8], the IVS exhaust is a Potential Impact Category (PIC) 3 source. In the case of the IVS, the monitoring that is currently in place at Station B exceeds the PIC 3 requirements and meets the criteria for a PIC 2 source. Therefore, no additional monitoring will be required.

Supplemental Ventilation System

The Supplemental Ventilation System (SVS) will be operated in conjunction with the IVS. The SVS will consist of an underground booster fan to push a nominal 130,000 scfm from the Air Intake Shaft that will exhaust through the Salt Shaft. The SVS clean air circuit for mining and maintenance is separate from the circuit for disposal operations. The SVS fan is designed to enable mining-related operations to resume on a reduced scale. Because of the amount of salt dust mining creates, the SVS will provide an unfiltered exhaust path for the salt-dust laden air. A diagram of the SVS circuit is provided in Figure 2 below.

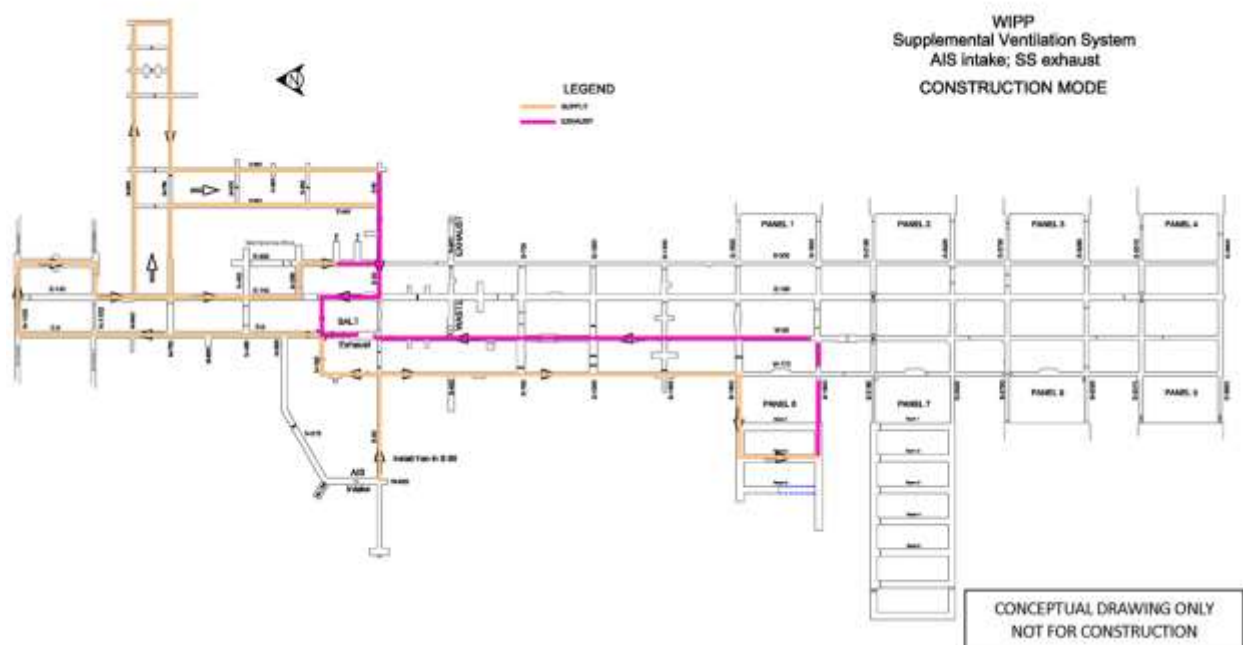


Figure 2. Supplemental Ventilation System – Construction Mode

SVS - NEPA Requirements and Regulatory Strategy

The NWP is in the process of a thorough review of WIPP Project programmatic NEPA documents and NEPA regulations. The changes needed for SVS facility improvements to support enhanced safety and environmental improvements by providing additional air flow are being made in accordance with Appendix B to Subpart D of 10 CFR §1021 [1]. The exclusion criteria specifically identify the applicability of the Categorical Exclusion for facility air filtration systems and the start-up after suspension of operations at a facility.

The NWP made a recommendation to the CBFO NEPA Compliance Officer to approve the construction and operation of the SVS project as categorically excluded from additional NEPA documentation in accordance with the DOE NEPA regulations at 10 CFR §1021, Appendix D [1]. The same Categorical Exclusion for the IVS, B2.5 Facility safety and environmental improvements, appears to apply to the SVS.

SVS - NMED Requirements and Regulatory Strategy

On April 22, 2015, the Permittees submitted a Notification of Planned Physical Alteration to the Permitted Facility in accordance with Permit, Part 1, Section 1.7.11.1. (20.4.1.900 New Mexico Administrative Code (NMAC) incorporating 40 CFR §270.30(l)) [2] notifying the NMED of the Permittees' intent to upgrade the current ventilation system by adding the SVS. Upon completion of the SVS alteration, a letter will be submitted to the NMED with a New Mexico registered professional engineer's statement that the facility has been constructed or modified

in compliance with the Permit. The NMED will be provided the opportunity to inspect the alteration to the ventilation system in accordance with the Permit, Part 1, Section 1.7.11. [2]. The Permittees also anticipate submitting Class 1 Permit modification notifications to revise descriptive Permit text to address changes to the current ventilation system, including the addition of both the IVS and SVS. Class 1 permit modification notifications apply to minor changes that keep the Permit current with routine changes (e.g., changes to ventilation pathways to support underground activities) to the facility or its operation. The changes do not substantially alter the Permit conditions or present a reduction in the protection of human health or the environment.

SVS - EPA Requirements and Regulatory Strategy

The SVS is designed to exhaust clean uncontaminated air to the accessible environment. Since there will not be an increase in emissions of radionuclides (i.e., the hazardous pollutants to which 40 CFR Part 61, Subpart H [4] applies) changes needed for SVS are not considered a modification or a new source; therefore, the EPA is not required to approve changes needed for the SVS. Consequently, the requirement of §61.94(b)(8) to “provide a brief description of construction and modifications which were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived under §61.96” [4] is also not applicable.

Under normal operations, uncontaminated air will be exhausted via the SVS and, therefore, not be subjected to the sampling and monitoring provisions of 40 CFR Part 61, Subpart H [4]. However, in a regulatory assessment, the NWP recommended to the CBFO that a CAM be operated near the exhaust point in the underground. This action is intended to provide the following capabilities:

- Provide notification of potential contamination in the clean air circuit
- Provide assurance that underground conditions will be monitored
- Provide a means of estimating emissions, should an abnormal condition occur

Although the requirements of ANSI/HPS N13.1-1999 [8] are not applicable to the SVS, the SVS would meet the criteria for a PIC 4 source, which is the least restrictive category in N13.1. A PIC 4 source is required to use “annual administrative review of facility uses to confirm absence of radioactive materials in forms and quantities not conforming to prescribed specifications and limits.” In this case the prescribed specifications and limits would be the CAM alarm, as recommended.

Permanent Ventilation System

The Permanent Ventilation System (PVS) is needed to restore the WIPP facility to full operations. The PVS will provide the WIPP underground ventilation for long-term operations. The PVS project is being developed and executed in accordance with DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* [9]. As identified in the DOE Order, Critical Decisions (CDs), such as

approving the mission need, alternative selections, cost range and final design, are essential for regulatory compliance related to the PVS project.

As part of Critical Decision-0 (CD-0), the DOE approved the mission need for a fully functional and effective PVS. After CD-0 was approved on October 22, 2014, the NWP began development of CD-1 documentation to evaluate design options and recommended two alternatives to be considered in the final design. On December 23, 2015, the DOE approved CD-1 for a Safety Significant Confinement Ventilation System and Exhaust Shaft [10].

With the approval of CD-1, the Project Planning Phase of the PVS project is complete and the Project Execution Phase has commenced. The ventilation system and exhaust shaft designs will be developed for DOE approval during the Project Execution Phase. The documentation required for finalizing the designs and obtaining DOE's approval to begin construction of the PVS will be completed in a combined CD-2/3 format. The NWP will prepare two distinct CD-2/3 packages for DOE approval: one package for the surface ventilation system and one package for the exhaust shaft. The NWP has initiated development of CD-2/3 documentation for each of these, which address the both regulatory strategy for coordinating with the regulatory community as well as the implementation of the PVS project in a safe, compliant manner. Communication with the regulatory community is an important aspect that will be emphasized in the CD regulatory strategy documentation.

CONCLUSIONS

Ventilation at the WIPP facility is being upgraded to provide additional airflow into the WIPP underground. Increasing the airflow will allow more activities to be performed concurrently, which supports the safe and compliant recovery of the WIPP facility. Regulatory compliance is being met for the three ventilation systems by providing the regulators and stakeholders opportunities for involvement during the design and development processes. Technical exchange meetings and regular discussions with the DOE and the regulators continue to be integral in maintaining transparency and positive communications with the regulatory community. Discussions of recovery-driven ventilation plans and status will continue during the development of each ventilation project.

The IVS and the SVS are necessary to support WIPP recovery and commencement of disposal operations. Additional airflow provided by the IVS will allow more work to be performed concurrently and enable limited waste handling operations to resume. The additional construction circuit and airflow provided by the SVS will enable mining-related operations to occur. The Safety Significant Confinement Ventilation System and Exhaust Shaft selected by the DOE through the CD-2/3 process will determine the final design of the PVS for the WIPP facility. In accordance with the mission need, the PVS will allow for continued operations over the lifespan of the WIPP facility, currently scheduled for completion in 2050 [11].

REFERENCES

1. 10 Code of Federal Regulations Part 1021, *National Environmental Policy Act Implementing Procedures*.
2. Waste Isolation Pilot Plant Hazardous Waste Facility Permit Part 1, Section 1.7.11. (20.4.1.900 New Mexico Administrative Code incorporating 40 CFR 270.30(l)(1)).
3. 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. May 16, 1995.
4. 40 Code of Federal Regulations Part 61, Subpart H, *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities*.
5. 40 Code of Federal Regulations Part 191, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level and Transuranic Radioactive Wastes*.
6. 40 Code of Federal Regulations Part 194, *Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations*.
7. 40 Code of Federal Regulations Part 61, *National Emissions Standards for Hazardous Air Pollutants*, Appendix D to Part 61, *Methods for Estimating Radionuclide Emissions*.
8. American National Standard/Health Physics Society, *Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stack and Ducts of Nuclear Facilities*, ANSI/HPS N13.1-1999.
9. DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.
10. Regalbutto, M.C. to Schrader, T. A.. *Approval of Critical Decision 1 for the Waste Isolation Pilot Plant Projects: 15-D-411, Safety Significant Confinement Ventilation System, and 15-D-412, Exhaust Shaft*. December 23, 2015.
11. Marcinowski, F. to Franco, J. R.. *Planning Assumptions Regarding Waste Isolation Pilot Plant Life Cycle Baseline (Completion Date in Fiscal Year 2050)*. February 2, 2015.