DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

March 26, 2018

The Honorable James Richard Perry
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Perry:

The Defense Nuclear Facilities Safety Board (Board) has reviewed the final design of the Waste Isolation Pilot Plant (WIPP) safety significant confinement ventilation system (SSCVS). The enclosure describes the Board's concern that the final design documentation for the WIPP SSCVS does not adequately address design requirements for the full integration of the underground safety significant continuous air monitoring (CAM) system. The SSCVS relies upon the CAM system for the actuation signal to align into a safe configuration in the event of an underground radiological release. In addition, systems, structures, and components that support the CAM system and its classification are not addressed in the final design.

Yours truly,

Bruce Hamilton
Acting Chairman

Enclosure

c: Mr. Joe Olencz

Enclosure

The safety significant confinement ventilation system (SSCVS) is a major modification executed per Department of Energy (DOE) Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and with safety design criteria implemented in accordance with DOE Order 420.1, *Facility Safety*. The current Waste Isolation Pilot Plant (WIPP) SSCVS preliminary documented safety analysis (PDSA) describes the final design of the SSCVS. The SSCVS PDSA documents the final design for the combined Critical Decision (CD)-2/3 approval that DOE anticipates will occur by March 2018.

The new system design differs from the current WIPP underground ventilation system: it incorporates a non-safety salt reduction system and has the capability for manually bypassing the high-efficiency particulate air (HEPA) filters. The SSCVS safety function is to (1) filter underground exhaust air prior to its release to the environment; and (2) provide directional airflow toward the waste face and away from workers in an active disposal room. To support its safety function, upon detection of underground radiological contamination, the SSCVS relies on continuous air monitors (CAM) to provide the signals to (1) switch the SSCVS to filtration mode if the HEPA filters were bypassed, and (2) isolate the non-safety salt reduction system from the safety significant SSCVS flow path.

Members of the Board's staff identified the following safety risks related to the lack of the full integration of CAM design requirements and supporting systems in the SSCVS final design.

CAM Design Requirements—The SSCVS PDSA identifies the underground CAMs as safety-significant systems, structures, and components (SSC) that are integral to controlling hazards associated with the release of radioactive material in the WIPP underground. The CAMs support the SSCVS safety function by providing a signal to initiate isolation of the non-safety salt reduction system from the safety-significant SSCVS flow path upon detection of an underground radiological release. The CAMs also provide a signal to switch the SSCVS to filtration mode (by closing the bypass dampers), if the bypass mode had been actuated.

DOE Order 420.1C, *Facility Safety*, states that "Safety-significant SSCs must be designed to reliably perform all their safety functions." In addition, DOE Order 420.1 requires "documentation of the adequacy of confinement systems consistent with the safety in design process as described in DOE-STD-1189-2008." DOE-STD-1189-2008, *Integration of Safety into the Design Process*, requires the PDSA to identify requirements for safety significant SSCs and for systems that support them, specifically those needed to fulfill safety functions. However, the SSCVS PDSA does not document or incorporate by reference the design requirements for CAMs and does not demonstrate the design adequacy for all operational and design basis accident conditions.

DOE personnel indicated that CAMs are not part of the scope of the SSCVS Project and they will provide information on CAM design requirements when available. Documentation relating to CAM design in the PDSA is necessary to assess the integration of performance capabilities of the safety significant CAMs. The Board's staff is concerned that the CAM design

requirements and full integration into the SSCVS system have not reach maturity before CD-2/3 approval. Therefore, the CAM system cannot guarantee to provide a reliable safety function and as a consequence the SSCVS safety confinement boundary could be challenged during an underground radiological release.

CAM Supporting Systems—A CAM signal initiates the process that ends in the actuation of the salt reduction system dampers and the HEPA filters bypass dampers. This supports the SSCVS safety function to direct the underground air flow through the HEPA filters upon detection of an underground radiological release. The SSCVS PDSA does not identify the SSCs that directly support or interface with this process.

DOE Order 420.1C states that: "Interfaces, such as pressure retention boundaries, electrical supply, instrumentation, cooling water, and other support systems may exist between safety SSCs and non-safety-SSCs. These interfaces must be evaluated to identify SSC failures that would prevent safety-SSCs from performing their intended safety function."

Identification and evaluation of SSCs that interface or directly support the CAM performance criteria would ensure the adequacy of the safety classification of these SSCs. An adequate classification and evaluation of these SSCs would reduce the likelihood of failures that could prevent the SSCVS from performing its safety function.