Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585

April 19, 2023

The Honorable Joyce L. Connery
Chair, Defense Nuclear Facilities Safety Board
625 Indiana Ave. NW, Suite 700
Washington, DC 20004

Dear Chair Connery:

On behalf of the Secretary, I am responding to your December 6, 2022, communication regarding the Department of Energy's National Nuclear Security Administration (DOE/NNSA) Los Alamos Field Office equivalency approval request for a plenum deluge spray system to protect high efficiency particulate air (HEPA) filters at the Radiological Laboratory Utility Office Building (PF-400) at the Los Alamos National Laboratory (LANL). Commencing Hazard Category 3 nuclear activities at PF-400 will enable NNSA to transition operations from the Chemical and Metallurgical Research facility, a facility that presents aging infrastructure challenges. In your December letter, the Defense Nuclear Facilities Safety Board (Board) requested either a report addressing issues raised in the Board's letter or a briefing. The enclosed report fulfills that request.

As detailed in the enclosed report, the safety of PF-400 Hazard Category 3 operations relies upon safety management programs combined with defense-in-depth safety controls, per the Department's nuclear safety management framework. The PF-400 ventilation system is only one of the multiple systems that provide confinement. The PF-400 HEPA equivalency demonstrates that the active fire protection systems (i.e., detection, alarms, and sprinklers), in concert with remediation measures for fire-resistive joints and through-penetration fire-stop systems, provide PF-400 with an equivalent level of adequate fire protection. The HEPA filters will not experience damaging temperatures. Upgrading and activating the deluge system for the HEPA filters at PF-400 would not result in safety benefits that are either necessary or commensurate with the costs of maintaining the system or the risks of inadvertent discharge. With advice from the Board, NNSA is pursuing many other high-priority upgrades for nuclear facilities at LANL.

The enclosed report demonstrates that the equivalency to DOE Standard 1066-2016, *Fire Protection*, for PF-400 HEPA filter deluge is technically justified and based on appropriate fire hazards analyses. The PF-400 Documented Safety Analysis (DSA) meets the requirements of DOE Standard 1228-2019, *Preparation of Documented Safety Analysis for Hazard Category 3 DOE Nuclear Facilities*, appropriately identifying, analyzing, and controlling hazards for PF-400 Hazard Category 3 nuclear operations. The PF-400 DSA also complies with the specified method cited in 10 CFR Part 830, Subpart B, to identify effective controls based on sound safety analysis to ensure operations at LANL are safely conducted. The DSAs for Hazard Category 3 nuclear facilities do not analyze design basis accidents (as is done for Hazard Category 1 and 2 nuclear facilities) due to the significantly reduced public and worker risk posed by the lower inventories of nuclear material in Hazard Category 3 facilities. The PF-400 HEPA system and fire protection system are not DSA identified safety systems but are categorized as defense-in-depth safety controls. The PF-400 HEPA equivalency demonstrated that the active fire protection systems provide PF-400 with an equivalent level of fire protection. Therefore, NNSA/LANL conclude that safety management programs, along with defense-in-depth safety controls, adequately provide hazard prevention and mitigation. Based on the advice in your letter, and as described in the enclosed report, we will be conducting an isothermal evaluation of a fire adjacent to a HEPA filter plenum to enhance our understanding of fire behavior in PF-400.

Your December letter also requested a briefing and report on the HEPA deluge system in the Plutonium Facility 4 (PF-4), where LANL is currently evaluating whether to request a similar equivalency to DOE STD-1066-2016. As compared to the PF-400, the PF-4 is a Hazard Category 2 nuclear facility with significantly more material at risk and more complex operations. NNSA will apprise the Board when LANL submits, or decides not to submit, an equivalency request.

If you have any questions, please contact Mr. Theodore Wyka, Manager of the Los Alamos Field Office, at (505) 667-5105.

Sincerely,

Jill Hruby

Enclosure

PF-400 HEPA Filter Deluge Equivalency

Introduction:

This report provides details of the technical basis for the approved equivalency for the Radiological Laboratory Utility Office Building (PF-400) High Efficiency Particulate Air (HEPA) filters. This report also supports the National Nuclear Security Administration's conclusion that the documented safety analysis (DSA) for the Hazard Category 3 PF-400 facility appropriately complies with the requirements in Title 10 Code of Federal Regulations (CFR) Part 830, *Nuclear Safety Management,* Subpart B, *Safety Basis Requirements*. The report addresses Defense Nuclear Facilities Safety Board (DNFSB/Board) concerns raised in its December 6, 2022, letter to Secretary Granholm.

As documented in the approved equivalency, the PF-400 fire protection system appropriately protects against fire hazards that will exist for the Hazard Category-3 (HC-3) operations at the facility. NNSA believes that keeping the deluge system for PF-400 HEPA filters connected will not provide a commensurate safety benefit and resources are better deployed for other safety upgrades at LANL facilities.

PF-400 Documented Safety Analysis:

PF-400 is finalizing readiness activities to start up as a HC-3 nuclear facility with a defined and controlled limited amount of nuclear material inventory. A HC-3 nuclear facility presents lower magnitude radiological hazards with the potential for localized consequences. Consistent with the expectations set by 10 CFR Part 830 Subpart B, Appendix A, the PF-400 Documented Safety Analysis (DSA) was developed in accordance with Department of Energy (DOE) Standard (STD) DOE-STD-1228-2019, *Preparation of Documented Safety Analysis for DOE Hazard Category 3 Nuclear Facilities*, a safe harbor method that establishes DOE expectations for the scope and depth for the DSA of a HC-3 facility.

In accordance with DOE STD-1228-2019, the PF-400 facility safety basis relies primarily on initial conditions associated with material-at-risk (MAR) control and safety management programs. MAR selection at PF-400 is consistent with the preferred hazard control hierarchy: eliminate or reduce the hazard. The facility MAR selected is based on limiting the postulated co-located worker dose to a relatively low value of less than 5 rem. This necessarily limits the potential public dose to a fraction of a rem. MAR is further limited to one quarter of the facility limit in authorized areas (Laboratory, Hallways, Waste Storage Area, and Shipping/Receiving Area), to protect the hazard analysis assumptions for the facility worker. As such, no one area would have the total facility MAR.

Consistent with DOE STD 1228-2019, the DSA does not analyze design bases accidents, which are appropriate for HC-2 facilities. Rather, the DSA includes Hazards Analysis to systematically identify and evaluate facility hazards and forms the basis for selecting controls. The DSA postulated analyzes multiple fire events with various initiating mechanisms. In general, the DSA analyzes two main potential fire types: localized or small fires; and facility or larger fires. Each hazard evaluation table provides a description of the fire event and how it may progress.

Conservative qualitative assumptions are made regarding the fuel quantity and type. The location and initiating event are also factored into determining the potential fire size, frequency and MAR involved. Qualified analysts with appropriate education and experience make these assumptions conservatively so that in any unmitigated fire event, consequences are understood and, if necessary, further controls may be then identified. The hazard evaluation does not derive safety significant or safety class controls for protection of the public, co-located worker, or facility worker due to postulated unmitigated fire events due to low risk and consequences from the MAR involved. In accordance with the standards, PF-400 systems such as fire suppression, ventilation stack exhaust HEPA filters, and the radiological ventilation system, are identified as defense in depth systems. All dose consequences are low based on initial condition MAR assumptions. Specific administrative controls protect initial condition MAR limits across the facility and in individual laboratory spaces. A Specific Administrative Control prevents the occurrence of a drum over pressurization due to incompatible chemicals.

The facility relies on multiple levels of confinement to support the defense in depth philosophy. These include ventilation systems, enclosures, and process containers. No single system is required to survive Natural Phenomena Hazard (NPH) events as the unmitigated consequences derived through the hazard evaluation do not warrant such rigor. However, supporting systems and Safety Management Programs do add another level of protection to confinement. This includes the Fire Suppression System (FSS), Radiological Ventilation System (RVS), and the Fire Protection Program (FPP) with their associated key elements. Key elements include control of combustible and ignition sources, defensible space around PF-400, outside building construction (slight structural ignition hazard), lightning protection system, and storing flammable gas in designated locations and in limited volumes.

With the DSA controls, PF-400 maintains a level of confinement commensurate with the risk and consequences associated with the facility.

Responses to DNFSB issues:

The section provides responses to the specific issues in the Board's letter:

DNFSB report: The PF-400 hazard analysis identifies multiple scenarios that result in a fire initiated by either operational or seismic events that spread to the entire facility. The PF-400 documented safety analysis (DSA) notes that due to the combination of low combustible loading and "the use of combustible materials that cannot burn or ignite easily" the unmitigated likelihood of a facility fire is assumed to be "Unlikely." However, as noted below, given the ongoing issues with deficiencies in the construction quality of PF-400's fire barriers, it is plausible to have a facility fire that is more severe than the six individual fires analyzed by the CFD modeling.

NNSA Discussion:

- Fires evaluated in the hazard analysis tables range from anticipated to extremely unlikely. The DSA hazard analysis analyzes multiple postulated fire events with various initiating mechanisms. In general, the DSA hazard analysis analyzes two main fire types:

localized or small fires; and facility or larger fires. Each hazard evaluation table provides a description of the fire event and how it progresses. In general, the fuel quantity and type, location and initiating event are all factored into determining the fire size, frequency, and MAR involved. These are all evaluated by qualified analysts with appropriate education and experience. Hazard analysis accident frequencies do not take credit for controls and no frequency reduction is taken from the unmitigated analysis. All dose consequences would be low based on crediting MAR as an initial condition.

- As mentioned above, controls to mitigate or prevent fires are not derived in the DSA, mainly due to the low MAR in the facility. Thus, the hazard analyses of a postulated unmitigated facility fire do not evaluate the continuous operability of HEPA filters or the deluge system to mitigate this low consequence event. MAR limits ensure that initial condition MAR assumptions and dose consequences from the hazard analysis are protected. The fire barriers at PF-400 have deficiencies and therefore were not assumed to contain a fire and the fire model did not include activation of the sprinkler system. An actual large fire would activate the sprinkler system and mitigate the spread of the fire to additional rooms. Therefore, spread of fires from one room to another is unlikely.

- LANL self-identified fire barrier deficiencies at PF-400, primarily related to through-penetration firestop systems and limited head-of-wall conditions, and active projects are remediating deficiencies. The primary life-safety barriers (e.g., stairs) have already been repaired. Basically, there are fire barriers present in the facility that help limit fire spread to a whole facility fire. To increase the level of conservatism, the fire modeling did not include actuation of the automatic fire suppression system and are not credited or assumed to prevent such a spread. The Fire Modeling Rational Analysis report identified predicted sprinkler actuation times and temperatures, and noted that "sprinkler activation was not utilized for the purpose of halting the fire growth." In short, the fire modeling did not credit performance of fire sprinkler systems even though model building codes and standard fire protection industry practice recognize the performance of sprinklers in lieu of passive fire barriers.

- The fire modeling evaluation increased the calculated heat release rates of materials by 25 percent in each fire scenario to account for "variations in fuel material properties and/or fire area footprint," and also increased the fire growth rate to "ultra-fast" to increase the amount of time the ventilation system was subjected to elevated compartment temperatures during the model runs. The modeling also did not account for fuel decay (i.e., materials did not burn away, but maintained the peak heat release rate once achieved for the duration of the modeling time) as would typically be expected for burning materials. Therefore, another safety factor is the limited total amount of time that the ventilation system is subject to elevated thermal insult.

DNFSB report: The DSA identifies the ventilation system and HEPA exhaust filters as part of the defense in-depth strategy for these scenarios. The CFD analysis, however, evaluated the HEPA filter temperature for individual fires that were not as severe as a full facility fire. While the six individual fires may be conservative using maximum heat release rates of the combustible *materials, the CFD analysis does not evaluate the consequences of several such simultaneous fires introducing hot gases into the ventilation ducts at the same time.*

NNSA Discussion:

- The HEPA filters are defense-in-depth strategy for individual fires, they were not considered a control or part of defense-in-depth strategy for a whole facility fire. The HEPA filters are not credited, and therefore are not required, to perform a function during a facility-wide fire. Additionally, the National Fire Protection Association (NFPA) 13, *Standard for the Installation of Sprinkler Systems*, does not require sprinkler design capable of protecting a building in a whole building fire. The system is not designed to provide water if all the sprinklers are open simultaneously. The intent is for the system to mitigate the first fire and prevent spread to a whole building fire. National codes support the assumption that the HEPA filter deluge system would not operate to its design intent if the entirety of the building is on fire since the water would be simultaneously discharged through the other actuated sprinklers throughout the facility.

- The fire analysis was performed in accordance with accepted fire protection industry practice, which is not to model simultaneous fires. Instead, realistic fire models are performed. DOE-STD 1066-2016, *Fire Protection,* allows the fire modeling of temperature methodology. The *SFPE Handbook of Fire Protection Engineering* (5th Edition) and the *SFPE Engineering Guide to Performance-Based Fire Protection* (2nd Edition) were referenced in the analysis for fire modeling process and assumptions.

DNFSB report: LANL contractor personnel stated that extending the duration of the individual fires to 20 minutes is conservative. The CFD analysis, however, shows that the fire duration becomes irrelevant after the first few minutes when the ventilation system energy balance reaches a steady state condition. Multiple simultaneous fires caused by a design basis seismic event, or a facility fire, would lead to higher temperatures at the HEPA filters than those fires evaluated by the CFD analysis and used as the justification for disconnecting the filter deluge system.

NNSA discussion:

- Consistent with DOE STD-1228-2019, *Preparation of Documented Analysis for Hazard Category 3 DOE Nuclear Facilities*, as a HC-3 facility, PF-400 does not have design basis accidents requiring controls, including a design basis for seismic events. A facility wide fire would be considered as a design basis accident and therefore no controls are required for a postulated facility fire. The PF-400 DSA evaluated hazard from normal operations and process-related hazards, as well as abnormal conditions. But as a HC-3 facility, the PF-400 DSA did not include accident analysis that is included for HC-2 facilities following DOE STD 3009.

- As stated previously, controlling the MAR for PF-400 limits the consequence and risk of a full-facility fire to a point that a control to sustain HEPA filtered ventilation and protect the HEPA filters from a "bounding" temperature caused by a seismic event or any other initiator are not required.

DNFSB report: While the CFD analysis shows that the maximum HEPA filter temperature for the six postulated individual fires is below the DOE threshold value of 250 °F, the analyzed fire events do not account for more severe fires as described in the approved DSA. By not accounting for these more severe, but credible, accidents, the analysis does not align with requirements in DOE Standard 1066-2016, which states that "the technical adequacy of the alternate protective strategy shall be demonstrated by an analysis that establishes the quantitative fire demand that could potentially be created in the rooms and compartments served by the ventilation system."

NNSA discussion:

- The severe fires described in the DSA are part of the hazard analysis performed to ensure that those events will not challenge the HC-3 facility status and therefore do not require controls. The quote in the Board's report is from paragraph 4.4.4.1.1 of DOE STD 1066, which expands an objective in paragraph 4.4.4 to "prevent fires from affecting the operation of the ventilation system." However, for PF-400, the deluge system would not prevent a whole facility fire event from affecting ventilation system operation because in a postulated facility fire, the ventilation system is not assumed to operate. The DSA supports this because the ventilation system is not credited during facility fires. The analysis was done for all fires that could potentially be created in the rooms and compartments in which the ventilation system is expected to operate.

- The analysis performed meets the intent of the DOE-STD-1066-2016 methodology.

DNFSB report: DOE Order 420.1C also requires confinement capabilities "during and following accidents." This requirement is not limited to design basis accidents and applies to all events identified in the facility hazard analysis. Further, DOE Order 420.1C states that nuclear facility design "must include multiple layers of protection (as part of the design defense-in-depth) to prevent or mitigate the unintended release of radioactive materials into the environment." Since PF-400's ventilation system is part of the credited defense-in-depth strategy for confining potential releases from a number of accidents, including fires, assumptions regarding the system's performance must be based on solid technical information to ensure the requirements in the order are met.

NNSA Discussion:

- The PF-400 DSA meets the requirements of DOE STD-1228-2019 appropriately identifying, analyzing, and controlling hazards for PF-400 Hazard Category 3 nuclear operations. Safety Management Programs, along with defense-in-depth controls, provide the primary hazard prevention and mitigation in a Hazard Category 3 nuclear facility. The PF-400 HEPA system and fire protection system are not DSA identified safety systems but are defense-in-depth controls for some, but not all, hazards.

- The facility relies on multiple levels of confinement. These include ventilation systems, enclosures, and process containers. No single system is required to survive NPH events as the consequences do not warrant such rigor. However, supporting systems and Safety Management Programs do add another level of protection to confinement. This includes the FSS, RVS, and the FPP with their associated key elements. Key elements include control of combustible and ignition sources, defensible space around PF-400, outside building construction (slight structural ignition hazard), lightning protection system, and storing flammable gas in designated locations and in limited volumes.

- The PF-400 ventilation system temperature was analyzed for all the accidents in the safety basis for which it is expected to function. The ventilation system is part of a defense-in-depth strategy, it is not credited with bin reduction. Therefore, analysis of the ventilation system gas temperature is based on technical information and meets the requirements of DOE O 420.1C to provide confinement during and following accidents.

- The building envelope also provides some level of confinement even though identified by the DSA as defense-in-depth.

DNFSB report: It is also worth noting that the fire hazard analysis (FHA) for PF-400 identifies numerous deficiencies and code compliance issues with fire barriers that affect the fire safety posture of this facility. Many of these deficiencies remain open and require NNSA concurrence and funding for their closure. These deficiencies include improperly sealed penetrations, openings, and joints; lack of remote capability to actuate the HEPA deluge system; deficient or suspect penetrations in floors and fire barrier walls, including the first floor poured concrete membrane and laboratory fire barrier walls. As a result, the FHA concludes that: "Due to the deficiencies in fire doors, fire-resistant joints, and penetration firestops throughout [PF-400], it cannot be expected that a worst-case fire scenario will remain within the defined fire areas." Although this statement is made to estimate the maximum possible fire loss, it also indicates that, consistent with the DSA, small individual fires can propagate throughout the facility and create a more severe fire scenario than postulated in the CFD analysis.

NNSA Discussion:

- The deficient fire barriers are not assumed to contain a fire to a given area, but they do offer some (uncredited) mitigative benefit. In addition, the sprinkler system will mitigate the spread of fires between rooms and the sprinkler system is not modeled in the analysis. The worst-case fire scenario mentioned in the FHA predicts a whole facility fire for the purposes of evaluating the Maximum Possible Fire Loss per DOE O 420.1C. The HEPA filters and ventilation system are not assumed to operate during a postulated whole facility fire as they are not credited. Therefore, the deficiencies in the fire barriers are not a credible reason to increase the assumed likelihood of a whole facility fire, or to require other controls.

- FHAs represents a snapshot in time based on observations of conditions during the author(s)' walkdown of the facility. The deficiencies are tracked through an issues management database so that remediation progress can be reviewed between FHA cycles.

Repairs to, and replacement of, fire doors, joints, and through-penetration firestop systems have made significant progress since the last FHA update. While the deficiencies identified in the FHA generally question the effectiveness of the systems that are part of passive fire barrier construction, their performance is verified and tested in accordance with Nationally Recognized Testing Laboratory listing. However, as noted in the equivalency request, the active fire protection systems (sprinklers, detection, and alarm), in concert with remediation measures for fire-resistive joints and through-penetration fire-stop systems, provide effectiveness so that the overall building would not be compromised.

DNFSB report: Lack of Conservatism in Heat Transfer Properties and Flow Rates—The analysis assumes that ducting does not transfer heat (adiabatic conditions), which is conservative in most cases. However, one scenario examines the impact of a fire adjacent to the HEPA filter plenums. In this case, the adiabatic assumption is non-conservative because it excludes direct heat transfer from the fire to the filter plenum, which would be significant. The analysis also assumes maximum ventilation flow rates, whereas lower flow rates may produce higher temperatures at the HEPA filter.

NNSA Discussion:

- NNSA will conduct an isothermal evaluation of a fire adjacent to a HEPA filter plenum to provide additional information. We think that while an isothermal model would allow heat transfer from the room into the HEPA filter plenum, it would also allow heat transfer from inside the ducting into the ducting walls. Therefore, adiabatic modeling is an adequate assumption for the fire next to the HEPA housings, but the isothermal evaluation will provide additional context.
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- There are multiple layers of conservatism in the model, which will ensure any small lack of conservatism will not significantly impact the output:

    - The fire model excludes activation of the sprinkler system, which would provide significant insulation to the exterior of the ducting through transfer of the convective and radiant energy from the fire being absorbed by the sprinkler water in evaporation.

    - The team considered the locations used for the design fire scenarios to be the most demanding in reference to the effect on the Zone 1 and Zone 2 systems, specifically regarding thermal load on the heating, ventilation, and air conditioning network. This determination was based on the physical proximity of the areas evaluated to the HEPA filter locations and the possible design fire within the specified space.

    - During the modeling effort, the temperature measuring device (thermocouple) was placed several feet before the HEPA filter, at a "choke" point in the ducting enclosure. The ducting widens and has a larger cross-sectional area around the filter, and thus a reduced temperature would be expected than those portrayed in the analysis.

- In fire areas, the analysis leveraged excess leakage through bounding walls. This is a conservative approach given that if the leakage rates were reduced, the fire scenarios would become ventilation-controlled, and thermal conditions would decrease. The resulting transport of superheated gases would also be reduced. In general, leakages of 4.5 square feet to 6 square feet were calculated in the compartments, allowing the evaluated heat release rates to be higher than if minimal leakage (as would be expected) existed. First-order models were performed with limited leakage and therefore the Heat Release Rate (HRR) had a substantial decrease in both energy and thermal output. However, subsequent models were more conservative.

- Inlet HEPA filters were eliminated from the model. This is a conservative approach as, in a fire scenario, significant amounts of soot are produced, which greatly reduce flow into the ducting. Reduced air flow would cause the fires to become ventilation-controlled and thermal conditions would decrease. The resulting transport of superheated gases would also be reduced. Therefore, the model ensured maximum ventilation flow by eliminating the inlet HEPA filters.

- Sprinkler control/suppression was not included in the analysis. Once a postulated fire reached peak HRR based on fuel load and/or ventilation limited conditions, it would maintain that peak energy for the complete simulation time.

- In certain scenarios, a peak HRR was quantified with calculations relating to a specific fuel, such as a flammable liquids spill for Fire Scenario 1. It should not be construed that the results of the analysis only apply to that specific design fire. It was also the intent of the analysis that in these specific situations where a fuel load was quantified for the prescribed HRR, the HRR was also in-line with the bounding conditions for a ventilation-limited scenario, as discussed in the 4th sub-bullet. In other words, the specific fuel load was not of the utmost importance, but rather, the potential magnitude of the fire event that the compartment could support, considering conservative leakage rates was more important.

- The energy of all postulated fire scenarios reached their associated peak HRR's and then maintained that energy for the complete simulation time (1,200 seconds). It would be expected that in a compartment fire scenario, the fire would feature a decay phase either by fire suppression or availability of fuel to burn.

DNFSB report: Inaccurate Room Layout—In one scenario, the modeled location of the lab exhaust vent is significantly more remote than found in the facility. As a result, the analysis inaccurately analyzes this scenario because it omits an exhaust vent next to a flammable liquid storage cabinet where a pool fire is assumed to occur.

NNSA discussion:

- NNSA believes the modeled location is appropriate. Figures 19 thru 29 in the fire model report are not representative of the ducting and air flow. They only represent the heat growth of the fire. Figure 30 shows the exit temperature modeled for the room and shows the model ducting has drops from each of the hoods that exhaust into zone 2. Figure 16 shows the full duct model for the room, and it has numerous exhaust inlets including those directly above the fire. Modeling the room and exhaust ducting as adiabatic adds additional conservatism that protects the exhaust inlet geometry with respect to the fire because all heat generated in the modeled fire will enter the exhaust ducting and move down the ducting without losses. Dilution comes when the duct merges with air from other rooms. NNSA will ensure this rationale for the assumptions in the analysis that deviate from the as-built room configuration is captured in the analysis at the next opportunity.

DNFSB report (conclusion): Consequently, the CFD analysis used as the basis for disconnecting the HEPA filter deluge system is technically incorrect and inadequate to demonstrate that the maximum filter temperature is not exceeded during the fire events postulated in the facility DSA. The analysis needs to provide an adequate technical basis that higher HEPA filter temperatures resulting from fire events postulated in the DSA (i.e., multiple simultaneous fires or a facility fire) do not exceed the limiting temperature allowed by DOE Standard 1066-2016. Alternatively, the contractor may reinstate the operability of the HEPA filter deluge system to ensure that a fire in the facility would not disable its confinement capability required by the DOE directives and that the ventilation system meets requirements in applicable DOE orders and standards.

NNSA discussion:

- As discussed above, the Hazard Category 3 PF-400 DSA includes appropriate Hazards Analyses that evaluate plausible scenarios, and the resultant controls are consistent with the safe harbor DOE STD 1228-2019. The PF-400 DSA does not include design basis accidents and multiple room fire scenarios that would be appropriate for Hazard Category 2 nuclear facilities. The CFD analysis appropriately supported the PF-400 HEPA filter deluge equivalency, but we will be conducting an isothermal evaluation of a fire adjacent to a HEPA filter plenum to provide additional context to our understanding. In accordance with DOE STD-1228-2019, the PF-400 facility safety basis relies primarily on initial conditions associated with MAR control and safety management programs. With the DSA controls, PF-400 offers a robust level of confinement commensurate with the risk and consequences associated with the facility.