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

November 20, 2023

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

Dear Chair Connery:

As committed to in my September 15, 2023, letter regarding safety systems at the Plutonium Facility 4 (PF-4) at the Los Alamos National Laboratory, enclosed is deliverable four, the PF-4 Ventilation System Crosswalk. The enclosed crosswalk includes a high-level discussion of what would be necessary to achieve a Safety Class (SC) or a Safety Significant (SS) Active Confinement Ventilation System (ACVS) at PF-4, including a more detailed table of:

- The SS ACVS and support systems as they exist today and the planned end state for its components and support systems;
- The improvements to the ACVS and support systems that would be necessary to achieve designation as an SC, Seismic Design Category 3, Limit State C control, as defined in Department of Energy Order (DOE O) 420.1C, Chg. 3, *Facility Safety*;
- The improvements to the ACVS and support systems that would be necessary to achieve designation as an SS, Seismic Design Category 3, Limit State C control; and
- DOE technical and industry standards that are invoked as required by DOE O 420.1C applicable to a ventilation project.

Should you have any questions, please contact Theodore A. Wyka, Manager, Los Alamos Field Office, at (202) 586-3471.

Sincerely,

Jill Hruby

Enclosure

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PF-4 Ventilation System Crosswalk Between Current State, End State, and Safety Class Active Confinement Ventilation

This enclosure provides a description of the current Confinement strategy, a high-level summary of the modifications that would be required to achieve a Safety Class (SC) Active Confinement Ventilation System (ACVS), and the current path forward for maintaining and improving the ventilation system. More details regarding the Ventilation System Stoplight Chart (Figure 1) are provided. Lastly, a Crosswalk (Table 1) that identifies the planned end state, the improvements needed to meet Safety Significant (SS) seismic design category (SDC)-3, the improvements needed to meet SC SDC-3, and the relevant Department of Energy Order (DOE O) 420.1C, *Facility Safety*, Invoked Standards, is also provided at the component level.

Current Confinement Strategy

PF-4 currently has a SS ACVS and a SC passive confinement system. The confinement levels for PF-4 were designed and constructed to Atomic Energy Commission (AEC) Manual, Chapter 6301, *Facilities General Design Criteria* (AEC 6301), which defines confinement in terms of:

- Primary confinement, which is made up of containers and process enclosures, including certain ventilation subsystems.
- Secondary confinement, which is the operating area compartments, laboratory, or other rooms and their ventilation subsystems.
- Tertiary confinement, which is the structure and its associated ventilation systems, basement supply, basement exhaust, and corridor supply.

Each of the ventilation systems is equipped with high efficiency particulate air (HEPA) filtration. When the SS ACVS is operable, airflow and differential pressure between each level of confinement ensures airflow is from areas of low contamination to areas of higher contamination. An ACVS also assures all releases to the environment are filtered.

When the ACVS is not operable, the passive confinement ventilation system is required to be operable. During passive confinement, the building structure and confinement doors provide a robust physical barrier, qualified to withstand all design basis events, to prevent release of radioactive materials. The HEPA filter plenums and the ductwork between the plenums and the building structure provide a filtered pathway to prevent release of radioactive material. In this configuration, diurnal cycles, wind, and changes in atmospheric pressure are balanced in the facility through these filtered flow paths.

PF-4 confinement is a series of robust confinement features that provide multiple barriers to prevent radioactive particulate releases. The philosophy behind a robust facility includes the use of multi-layered barriers against the potential release of hazardous material, modern safety and support systems, fault-tolerant design, the use of passive engineered controls, and a complete facility Documented Safety Analysis (DSA). The current PF-4 DSA has evaluated hazards and accidents associated with facility operations and categorized the ACVS as SS and the passive confinement system as SC, capable of performing its safety function during and after a SDC-3 seismic event.

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Safety Class Active Ventilation System

In 2012, Los Alamos National Laboratory (LANL) presented the recommended potential scope for TA-55 Reinvestment Project (TRP) III. On February 18, 2014, the National Nuclear Security Administration (NNSA) Deputy Administrator for Defense Programs (NA-10) approved a SC ACVS as a potential scope-work for TRP III which was to be evaluated during the conceptual design. The primary driver for the upgrade to the SC ACVS was Defense Nuclear Facility Safety Board (DNFSB/Board) concerns published as Recommendation 2004-2, *Active Confinement Systems*, and Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, and the associated DOE Implementation Plans. The specific conditions of concern are fires potentially initiated inside the facility resulting from a design basis seismic event (i.e., SDC-3).

Pre-conceptual alternatives were formulated. These focused on the use of the Zone 2 bleed-off system as the active exhaust and included maintaining functionality of the Zone 1 exhaust system. This approach was fundamentally different from how the current ventilation system operates today but would be needed for a SC ACVS since post seismic accident scenarios indicate that Zone 1 support systems may not survive a seismic event of that magnitude. Major elements of this approach were:

- New stand-alone independent heating, ventilation, and air conditioning (HVAC) control system(s) designed and installed to meet SC standards for hardware and software.
- New SC controls would have to interface to all the PF-4 primary air movers and damper controls to be able to isolate/direct flow to the SC systems.
- Achieving SC damper control would require that all the damper controls be changed to electric actuators or would require the compressed air system and the damper control components within the control panel cabinets to be upgraded to SC. This affects approximately 50 dampers.
- All credited components of a SC ACVS would require SC power systems and infrastructure. Control power must be through a SC uninterruptible power supply (UPS) to ensure bump-less operation in the event of a loss of normal power.
- Credited primary air movers will require SC generator power. Redundant generators will be required. A means of supplying power during the generator startup-to-load delay time would have to be devised.

In 2016, SC ACVS was de-scoped from TRP III by NNSA as it was deemed that the marginal benefits of upgrading the ventilation system to a SC ACVS in a single line item did not justify the cost, which was estimated to be as high as $400 million (M) in 2015, and that the reduction of offsite consequence from potential maximum design basis seismic events could be met through other more cost-effective means, such as the upgrade of the fire suppression system.

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Upgrades to Date and Planned End State

The current path forward, as outlined in the TA-55 Project Execution Strategy (PES) is the modification of individual major components of the existing PF-4 ventilation systems to manage obsolescence and to improve the current SS ACVS. Overcoming obsolescence often requires extensive localized changes. These modifications are made at the SDC-3 level to the extent practicable and only at the major component level (e.g., the new component is installed but the associated infrastructure such as cabling is only modified to support the component installation) as a maintenance upgrade. The process of replacement often requires adaptation of the new component to the installation location (e.g., extending existing conduit to the new component). For instance, the Variable Frequency Drive (VFD) upgrade required substantial modifications to the existing infrastructure to install the new VFD, such as conduit. The facility is effectively and proactively addressing obsolescence issues as they have been prioritized. Individual components will be upgraded and installed as replacements are needed. While these incremental upgrades could support the ACVS being credited as SC (e.g., seismic qualification installation to SDC-3, Limit State (LS)-C) in the future, these upgrades alone will not be sufficient for the entire system to be credited as SC. Equipment end states resulting from these maintenance projects are dictated by the approved safety basis for the facility. Any upgrades and improvements above those required are done to increase reliability and margin resulting in a more robust system.

A SC ACVS would require substantial facility infrastructure upgrades far in excess to those that are currently planned. The ventilation system and associated support systems would need to meet SC seismic and redundancy requirements of DOE O 420.1C. This would include installing redundant systems, controls, power sources, etc., as well as separating safety and non-safety systems and minimizing nonessential system interfaces. The existing power distribution does not meet Institute of Electrical and Electronics Engineers (IEEE) 323, *Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations,* nor does it have appropriate separation per IEEE 384, *Standard Criteria for Independence of Class 1E Equipment and Circuits.* The existing power distribution was also not designed to meet single failure criteria per IEEE 379, *Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems.* Consequently, co-located major components and associated infrastructure (e.g., power delivery) would require separation to avoid common cause failure. In addition to upgrading the seismic performance of the ventilation system, surrounding systems will need to also be analyzed for 2-over-1 concerns and potentially be retrofitted.

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Summary

The requested information is provided below in a crosswalk matrix. This information is pre-conceptual in nature. Only pre-project planning activities were completed in the earliest stages of this proposed TRP III Project scope, which was subsequently cancelled. Upgrades to achieve a SC ACVS for PF-4 were conceptualized as part of the TRP III project but never developed into any level of design. These upgrades were subsequently de-scoped as the cost of a SC ACVS and benefit were better understood and alternative means of improving the site safety posture (e.g., increase seismic performance of the Fire Suppression System) were developed. Specific and targeted modifications to provide a robust and reliable ventilation system were proposed; some of which have been completed and others planned.

The following stoplight chart provides a high-level overview of the ventilation system upgrades and has been previously communicated:

Ventilation System – Upgrades

Fan Upgrades:

New Zone 1 Fans (8)
New Zone 2 Bleed-Off (BO) Fans (4)
- Variable Frequency Drives (VFDs) (12)
- Pressure Differential Transmitters (PDTs) • (6) • (6)
- Remove BO Fans

Controls Upgrades:

New HVAC Finite Control Set (FCS) Equipment
- Revised Control Scheme

UPS Upgrades:

Installation of Second UPS and Associated Support Systems
- Replacement of TRP 11 UPS

Electrical Distribution Upgrades:

North Diesel Generator (DG)
- South Diesel Generator (DG)
- Independent DG Control System
- Dedicated Switchgear (2)
- Automatic Transfer Switch (2)
- Distribution Panel Boards (PBs) (2)

Power Distribution to Loads
UPS Field Load Centers (LP-14, 15, 16, and 45)
- IEEE 379/384 Compliance

Seismic Upgrades:

Zone 2 Ductwork Bracing
- Zone 2 Ductwork Seam Reinforcements
- Electrical Distribution System (EDS) Conduit

Damper/Actuators Upgrades:
- SC Actuators (Electro-hydraulic) and Dampers
- Damper SC Power
- New Actuators Failure Scheme

Legend:

Planned in PES/G2
- **Complete**
- **Not in current scope**

Figure 1: Ventilation System Upgrade Stoplight Chart

The master activities identified above are tabulated below in a crosswalk consistent with the Board's request for information. Each master line of component replacements is evaluated at a high-level to explain the requirements in the absence of formal project documentation such as an overarching conceptual or definitive design. This is a high-level estimate of scope and need. Additional upgrade items that were not considered in the stoplight chart but would require attention to meet SC ACVS or SDC-3 criteria are also discussed. Specific activities in the table and deliverables are outlined.

A brief definition of each item master activity is provided below:

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- **New Zone 1 Fans (8)**

  Eight Zone 1 fans are being replaced to meet American Society of Mechanical Engineers (ASME) Code on Nuclear Air and Gas Treatment (AG-1) requirements and will be qualified to seismic Performance Category 3 (PC-3). This is a current and active project. These eight fans (and appurtenances) will provide long-term reliability and greater integrity. Installation will occur in the coming fiscal years. The scope of the project includes new Zone 1 fans and motors, flexible connections, inertia bases, and anchorage. All new components will establish seismic performance to PC-3 at the component level.

- **New Zone 2 BO Fans (4)**

  Four Zone 2 BO fans are being replaced to meet ASME AG-1 requirements and will be qualified to PC-3. This is a current and active project. These four fans (and appurtenances) will provide long-term reliability and greater integrity. Installation will occur in the coming fiscal years. The scope of the project includes new Zone 2 fans and motors, flexible connections, dampers, and anchorage. All new components will establish seismic performance to PC-3 at the component level.

- **VFDs (12)**

  12 VFDs serving eight Zone 1 fans and 4 Zone 2 BO fans were installed in 2021 to overcome obsolescence in the Motor Control Centers (MCCs). The SS electrical distribution system (support system) provides electrical service via MCCs to the credited fan loads. The VFDs were installed in long-term preparation to replace the MCCs with SS PBs that would be qualified to PC-3 performance. The VFDs have been installed to PC-3. The existing PC-2 conduit runs were reused and not upgraded. The control system components were not upgraded.

- **PDTs (12)**

  The existing fan control utilizes a shared PDT that feeds a shared Pressure Differential Indicating Controller (PDIC), which in turn drives two VFDs (one running fan and the standby/redundant fan). As part of SC ACVS, the scope was to install PDTs dedicated to each VFD based upon the dedicated PDT control loop. This eliminates the complexity and single point of failure. Six PDT components were replaced as part of an overall effort to address obsolescence. The remaining six are not designed or planned. The existing PC-2 conduit and infrastructure was not upgraded further. Additional design and evaluation are needed to complete this replacement, but there are no requirements driving it at this time.

- **Remove BO Fans**

  The removal of two abandoned fans is complete. The fans were not operational and were not used from the time of building commissioning. This was done to remove unmaintained fans and to make room for new equipment installations (i.e., fans and VFDs).

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- **North DG**

  A second DG and associated control system is being installed for the Auxiliary Power System (APS). The installation is being done at the seismic SDC-3 level. The existing APS is credited as Other Hazard Controls (OHC) in the DSA, and the addition of the second diesel generator and control system will not alter the OHC classification. The overall infrastructure for the APS would need to be evaluated and upgraded to provide isolation, independence, and full redundancy at the increased credited safety level.

- **South DG**

  Installing a South DG would provide IEEE compliance with separation and independence. The long-term goal is to provide better defense and redundancy and for full compliance to invoked standards of DOE O 420.1C. The overall infrastructure for the APS would need to be reworked to provide isolation, independence, and full redundancy.

- **Independent DG Control System**

  The current control system is part of the OHC APS, and installation of the North DG and new control system will maintain the OHC classification. Upgrading the APS to support SC ACVS would require a complete upgrade to provide isolation, independence, and redundancy. The independent DG control will not be required until a South DG is installed. There are no requirements to upgrade at this time.

- **Dedicated Switchgear (2)**

  The PF-4 Switchgear rooms (one in the North basement and one in the South basement) currently house both non-safety medium voltage (13.2 kilovolts (kV)) and safety related low voltage (480 volts (V)) service. The non-safety medium voltage switchgear and transformer sets are being moved outside of PF-4 by a subproject that is under preliminary planning. This non-safety equipment will be procured and installed as standard industrial equipment. This move overcomes obsolescence as well as removes a potential medium voltage electrical accident and failure from inside PF-4 and frees floor space to install upgraded panel boards to replace MCCs. The 480 ventilation and air conditioning (VAC) switchgear is not slated for upgrade at this time.

- **Automatic Transfer Switch (2)**

  The two MCC dedicated automatic transfer switches (ATSs) provide backup power from APS to the safety related loads (MCC-611 and MCC-612) in PF-4 upon loss of offsite power. These two switches and associated conduit and connections are qualified to PC-2. New ATSs must be seismically qualified and installed. The infrastructure would require adaptation to allow for SC-type service as needed to establish redundance, separation, and independence. The ability to cross-tie service between South and North generators would also be required.

- **Distribution PBs (2)**

  MCCs that carry safety related loads (MCC-611 and MCC-612) require replacement. The removal of the 13.2 kilovolt-ampere (kVA) switchgear affords the floor space needed to

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install new PBs or combination units. These new PBs would be qualified to PC-3 and located in the PF-4 switchgear rooms. There is no current plan to separate the non-safety low voltage switchgear from the safety related low voltage switchgear.

- **Power Distribution to Loads**

  All safety related loads are powered from EDS via MCC-611 and MCC-612. These are topics discussed above. The VFDs for the 12 fans of interest and other smaller loads utilize common conduit pathways and supports installed during the mid-1970s. These support pathways must be upgraded to meet PC-3 or new conduit runs installed independent of the PC-2 conduit runs. Additionally, seismic interaction (2-over-1) must be carefully evaluated in any case in order to upgrade to the power delivery.

- **UPS Field Load Centers (LP-14, 15, 16, and 45)**

  The UPS power delivery panels in the basement of PF-4 require update and upgrade. These panels provide critical power to controls and monitoring equipment primarily for the Ventilation system. LP-15 and LP-16 have been upgraded to meet PC-3, and LP-14 and LP-45 are currently under construction/replacement to meet PC-3. Existing distribution infrastructure is at the PC-2 level. This infrastructure would have to be fully upgraded to meet PC-3 performance criteria.

- **IEEE 379/384 Compliance**

  The principles of IEEE 379 and 384 must be applied to designate new or modified equipment as SC. This applies to all the support systems that ensure ventilation remains operational as required by the new SC designation. The broad spectrum of ventilation and requisite support equipment were installed without these standards (code of record) and large changes would be required to meet these requirements. Existing Ventilation, Electrical Distribution, Auxiliary Power, Utility Power, and Instrument Air are all major systems that must be addressed to attain the required upgrade.

- **Zone 2 Ductwork Bracing**

  Portions of the Zone 2 ductwork running from the Laboratory Recirculation dump dampers to the BO plenums was identified as an area for seismic improvement. This flow path is important for the BO subsystem to perform its design functions (maintain the Laboratory rooms negative with respect to the outside). Further importance was placed on this ductwork when the TRP III SC ACVS upgrades were being considered because the Zone 2 BO fans were proposed as the only running fans during a design basis accident. Substantial seismic bracing has been added to this ductwork in the PF-4 basement. This significantly improves the seismic response of this ductwork and meets PC-3 seismic criteria, but further evaluation may be required.

- **Zone 2 Ductwork Seam Reinforcements**

  During seismic integrity walkdowns that stemmed from the 10-year natural phenomena hazards assessments required by DOE O 420.1C and subsequent Safety, Analytics, Forecasting, Evaluation, and Reporting efforts, it was identified that carbon steel ductwork

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throughout the basement of PF-4 did not meet current Sheet Metal and Air Conditioning Contractors' National Association construction standard. Specifically, the welded flanges of the ductwork had not been reinforced with bolts, rivets, screws, or spot welds. A calculation was developed to analyze this ductwork and its seismic performance. All existing SC confinement ductwork was found to meet SDC-3 level criteria as-is with no modification required. All existing safety significant ductwork was found to meet SDC-2 level criteria. If this safety significant ductwork (spanning hundreds of feet in the PF-4 basement) was to be brought up to SDC-3 criteria, additional evaluation would be required. The results of the evaluation may stipulate ductwork seam reinforcement through the addition of bolts, rivets, screws, or spot welds.

- **EDS Conduit**

  The existing safety significant EDS (including power distribution from the MCCs to the individual loads) is not separated from non-safety loads, has not been evaluated from a single failure perspective, and has substantial 2/1 seismic interaction concerns if upgrade to SDC-3 criteria were required. The two PF-4 switchgear rooms that house the critical EDS equipment are very crowded with PC-2 qualified installations. The medium voltage replacement project will have to account for new conduit runs to meet PC-3 from the load side of the transformers located outside of PF-4 into the basement switchgear rooms.

- **New HVAC FCS Equipment**

  New HVAC control equipment was recently installed and commissioned in PF-4. It was done as a maintenance project to overcome obsolescence. It meets PC-3 as commissioned. The full replacement that was described for ACVS was far more complex and would have required compliance to ISA and IEEE requirements consistent with its SC-type function. DOE Standard (STD) 1195, *Design of Safety Significant Safety Instrumented Systems Used at DOE Nonreactor Nuclear Facilities*, does not apply to SC controls and a compromise between hard-wired controls and PLC controls had not been developed to address the greater control issues for such a SC function.

- **Revised Control Scheme**

  The details of a control scheme for an ACVS have not been developed. If a SC ACVS were to be developed, modifications to the existing control scheme would be required. Damper failure positions will likely be changed, and a new control system that is compliant with DOE O 420.1C and various invoked standards would also be necessary. At the SS response level, compliance with DOE-STD-1195 would be compulsory. At the SC level, a simplified control system that meets IEEE 323, 344, 379, 384, and others would be needed to assure operation under all design basis scenarios. This may also necessitate a design that does not rely on PLC control for the ventilation system or the emergency power systems.

- **SC Actuators (Electro-hydraulic) and Dampers**

  The original TRP III ACVS concept postulated replacing all pneumatic-controlled safety related ventilation dampers with new electro-hydraulic components. This would eliminate or simplify the need for the Instrument Air System (IAS) as a safety significant support system

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and transfer that support function to electrical distribution. Dampers and actuators were conceptualized to be fully replaced and the failure positions changed to better accommodate an ACVS strategy. After ACVS was de-scoped from TRP III, continued reliance on IAS was identified as a path to greater reliability. The electro-hydraulic upgrade scheme was never taken beyond pre-conceptual ideas. It would involve approximately 50 dampers and actuators.

- **Damper SC Power**

  If safety related dampers were to be replaced with electro-hydraulic units, new electric actuators (about 50) would require a new dedicated power source and conduit runs at a PC-3 level. This would require new distribution means (panels) as well as new conduits and conductors without seismic interaction concerns.

- **New Actuators Failure Scheme**

  The failure position of many dampers require reconsideration for an ACVS strategy. Many plenum isolation dampers are currently designed to fail open on loss of air pressure and fail closed in all other scenarios. Changing to an ACVS strategy would require a detailed failure modes analysis and changes to the failure positions as necessary.

- **Installation of Second UPS and Associated Support Systems**

  The TRP II Project to replace the existing UPS in the basement of PF-4 was to install a fully redundant UPS intended to meet the IEEE requirements to address SC-level UPS power. The redundant UPS was de-scoped, but most of the infrastructure was installed to allow a follow-on project to more readily install a second unit. The original Gutor UPS is now obsolete due to a Swiss law that precludes replacement, spares, or service. The facility began procurement and installation design of a new Mitsubishi UPS to be installed using the installed infrastructure in PF-391. This unit is currently being installed.

- **Replacement of TRP II UPS**

  As mentioned above, the Gutor UPS is obsolete. There is a project devised to demolish the TRP II UPS and install a redundant Mitsubishi UPS that is already procured.

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Table 1: Ventilation System Crosswalk

	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
1.0	Upgrades to Fans					
1.1	New Zone 1 Fans: 8 fans and support systems	SC (Confinement) SS (Ventilation)	Planned in PES/G2 (fan components only). SS Ventilation – Ventilation system designated as Safety Significant; no upgrades other than replacing fans. SC Confinement – The fans will be designed, tested, and installed to PC-3 SC to meet Confinement function.	• Individual fan replacement (8) Qualified per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Seismic Upgrades – Upgrade seismic capacity of power load distribution - throughout basement to SDC-3. Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Control Upgrades – Refer to section 2.0. • Electrical Distribution Upgrades – Refer to section 4.1, 4.4, 4.5 4.6, 4.7.	• Same as SS. • Generator Power Upgrades – See section 4.1 & 4.2. • Control Upgrades – Refer to section 2.0. • Electrical Distribution Upgrades – Refer to section 4.1, 4.4, 4.5 4.6, 4.7.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
1.2	New Zone 2 BO Fans: 4 fans and support systems	SC (Confinement) SS (Ventilation)	Planned in PES/G2 (fan components only). SS Ventilation – Ventilation system designated as Safety Significant; no upgrades other than replacing fans. The rotating elements are only required to meet SS for the existing required Ventilation function. SC Confinement – The fans will be designed, tested, and installed to PC-3 SC to meet Confinement function.	Same as Zone 1 fans above.	Same as Zone 1 fans above.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
1.3	VFDs: Zone 1 – 8 Zone 2 BO – 4	SS	Complete (VFD components only). SS Ventilation – Only VFDs were replaced, and	• Seismic Upgrades – Upgrade seismic capacity of cable trays and power load distribution-throughout PF-4	• Same as SS. • Generator Power Upgrades – Refer to section 4.1, 4.2, 4.3, 4.4, and 4.5.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			nothing more requires upgrade to meet PC-2 SS ventilation function.	basement to SDC-3. Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Control Upgrades – Refer to section 2.0. • Electrical Distribution Upgrades – Refer to section 4.1, 4.4, 4.5 4.6, 4.7.	• Control Upgrades – Refer to section 2.0. • Electrical Distribution Upgrades – Refer to section 4.1, 4.4, 4.5 4.6, 4.7.	• Institute of Electrical and IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
1.4	PDTs	SS	Complete – SS Ventilation Six controlling PDTs complete (components only) that control six fan pairs. Six redundant PDTs not planned	• PDT Installation (6) Qualified per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Seismic Upgrades – Upgrade seismic capacity of cable trays	• PDT Installation (12) to meet single-point failure of principles of IEEE 379. • New and dedicated seismically rated to SDC-3 cable route individual PDT to VFD (12). Evaluate surrounding systems for 2/1 concerns at	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			(SC ACVS). Only the PDTs were replaced, and nothing more requires upgrade to meet PC-2 Ventilation function.	and power load distribution-throughout basement to SDC-3. Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • 24 V Power Sources to PC-3.	Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
2.0	Upgrades to Controls					
2.1	New HVAC FCS Equipment	SS	Complete (Maintenance Replacement Only). SS Ventilation – Only the major HVAC controls components were replaced, and nothing more requires upgrade to meet PC-2 SS Ventilation function.	• Upgrade seismic capacity of cable trays and power load distribution throughout basement to SDC-3. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	• Upgrade seismic capacity of cable trays and power load distribution throughout basement to SDC-3. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems • ACVS control would likely require hard-	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
					wired relay control or a hybrid digital.	Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
2.2	Revised Control Scheme	N/A	Not conceptualized. NNSA/LANL will revisit the control scheme upon completing other component replacements. Nothing is proposed since TRP III project was cancelled.	The details of a control scheme for a SS ACVS have not been developed. Damper failure positions will likely be changed, and a new control system that is compliant with DOE O 420.1C and various invoked standards would also be necessary.	• Full damper replacement Qualified per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Revise failure state in accordance with fully developed scheme. • Revised actuator motive force (electric vs. air). • Complete control design and install at SC level. Requirement defined via Design Upgrade Analysis.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
						• IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
3.0	Upgrades to the UPS					
3.1	Installation of second UPS & Associated Support Systems	SS	Ongoing construction is underway for the second UPS at the SS level. However, equipment and installation will meet PC-3.	See electrical distribution upgrades sections 4.1-4.6, 4.8.	• See electrical distribution upgrades sections 4.1-4.6, 4.8. • Evaluate and correct separation requirement between redundant power panels/boards (located in the same room) as would be required by IEEE 379 and IEEE 384.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
3.2	Replacement of TRP II UPS	SS	Planned (project in PES/G2). TRP II UPS replacement at SS level, but equipment and install will meet PC-3.	See electrical distribution upgrades sections 4.1-4.6, 4.8.	• See electrical distribution upgrades sections 4.1-4.6, 4.8. • Evaluate and correct separation requirement between redundant power panels/boards (located in the same room) as would be required by IEEE 379 and IEEE 384.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.0	Upgrades to Electrical Distribution					
4.1	North Diesel Generator (DG-3)	OHC	Planned (DG-3 replacement only at OHC). Only the major components are	• Replacement of Control System at SDC-3. • Replacement of Switchgear at SDC-3.	• In addition to SS: • South Diesel Generator Installation – Refer to Section 4.2.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			replaced. Nothing more requires upgrade to meet its OHC function.	• Replacement of Automatic Transfer Switches – Refer to section 4.5. • Components qualified per IEEE 344-2013 - IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Electrical Distribution Upgrades – Refer to sections 4.5, 4.6, 4.7. • Upgrade seismic capacity of duct bank and above ground conductors to SDC-3. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	• Electrical Distribution Upgrades – Refer to section 4.1, 4.4, 4.5 4.6, 4.7. • Independent Control System – Refer to section 4.3.	Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.2	South Diesel Generator	N/A	NNSA/LANL will not install a South Diesel Generator	Not required.	See North Generator above.	See North Generator above.
4.3	Independent DG Control System	N/A	Not yet planned in G2/PES.	Not required.	• Installation of Control System at SDC-3 qualified per IEEE 344-2013 - IEEE	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			Independent DG Control System will be OHC.		Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Evaluate system against IEEE-379 & 384. Perform upgrades as required. • Seismic Upgrades – Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Electrical Distribution Upgrades – Refer to section 4.5, 4.6, 4.7.	Criteria for DOE Facilities • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.4	Dedicated Switchgear	SS (480 VAC) NS (13.2 kVA)	Planned outyear replacement projects in G2 to overcome obsolescence. 480 VAC will be designed/installed to SS level.	• Medium voltage, 13.2 kVA, switchgear and transformers (non-safety) is obsolete and must be upgraded to accommodate installation (space) of credited upgrades. Overcoming obsolescence and	• Medium voltage, 13.2 kVA, switchgear and transformers (non-safety) must be upgraded to accommodate installation of credited upgrades. Overcoming obsolescence and	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			13.2 kVA will be designed/installed to national codes and standards.	removing medium voltage accident scenario. Designed to national codes and standards. • Low voltage switchgear (480 VAC) requires complete replacement to meet SDC-3, LS C. Qualification per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	removing medium voltage accident scenario. • Low voltage switchgear (480 VAC) requires complete replacement to meet SDC-3, Qualification per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.5	Automatic Transfer Switches	OHC/SS	Not yet planned in G2/PES. ATS will be monitored for obsolescence. As needed, ATS projects can be	• Replacement of Automatic Transfer Switch at SDC-3. Qualified per IEEE 344-201, IEEE Standard for Seismic Qualification of	• Same as SS. • Installation of a dedicated ATS for South Diesel Generator.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			added to PES/G2. Equipment will be executed to OHC/SS level based on specific function.	Equipment for Nuclear Power Generating Stations. • Electrical Distribution Upgrades – Refer to sections in 4.0. • Upgrade seismic capacity of power load distribution to SDC-3. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	• Coordination manual switching for cross-connection. • Electrical Distribution Upgrades – Refer to sections in 4.0. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	• IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.6	Distribution PBs	SS	Planned (MCC components only installed as SS). Existing safety related MCC's will be replaced with equipment necessary to meet the requirements for a safety support system as	• Replacement/installation of MCC and Distribution PBs at SDC-3. Qualified per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations.	• Same as SS. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			derived in the DSA.	• Seismic Upgrades – Evaluate surrounding systems for 2/1 concerns at SDC-3, LS C, level. Based on the evaluation, perform seismic upgrades to these systems. • Power Distribution to Loads – Refer to section 4.7.		Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.7	Power Distribution to Loads (System Boundary) – Load center to load conduit	SS	Not yet planned in G2/PES. Equipment infrastructure installed to SS but not for the entire infrastructure. Reuse of existing SS infrastructure will be adequate for the service.	• Upgrade existing PC-2 conduit and supports or replace with new. 12 fans/VFDs require distribution upgrade from upgraded power centers (PB/MCC) to load. Several thousand feet of conduit in PF-4 basement overhead. • Seismic Upgrades – Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the	• Same as SS. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
				evaluation, perform seismic upgrades to these systems. Switchgear rooms present a unique challenge.		Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
4.8	UPS Field Load Centers (LP-14, 15,16, and 45)	SS	LP-15, 16 panel replacements are complete. LP-14, 45 are under construction. SS UPS - Only the major components were/are replaced as SS equipment, and nothing more requires upgrade to meet its PC-2 function.	• Replacement addresses obsolescence of equipment and was installed to meet PC-3 requirements (panels only). • Upgrade existing PC-2 conduit and supports or replace with new. Existing loads require distribution upgrade from upgraded power centers to load. Several thousand feet of conduit in PF-4 basement overhead. • Seismic Upgrades – Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the	• Replacement/installation UPS field load centers at SDC-3. Qualified per IEEE 344-2013, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • Seismic Upgrades – Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Electrical Distribution Upgrades – Refer to sections in 4.0. UPS is generator backed	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
				evaluation, perform seismic upgrades to these systems. Switchgear rooms present a unique challenge. • Electrical Distribution Upgrades – Refer to sections in 4.0. UPS is generator backed and fed from redundant MCCs.	and fed from redundant MCCs. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	Independence of Class IE Equipment and Circuits.
4.9	IEEE 379 & 384 Compliance	N/A	Continue actions needed to ensure IEEE 379 & 384 compliance as component replacements are made. Not required for the existing services.	Not required.	Evaluate affected and interfacing systems for single-failure criteria and Independence of class IE equipment and circuits. Based on the evaluation, perform upgrades to these systems.	• IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
5.0	Seismic Upgrades					
5.1	Zone 2 Ductwork Bracing (BO ductwork in basement only)	SS	Complete – the safety significant ductwork bracing is the planned end state.	• Bracing was added at the PC-3 level to limited ductwork in the basement leading to BO (complete)	Same as SS.	DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
				• Evaluate existing ductwork to meet SDC-3. Implement required upgrades. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems. • Ductwork will not be addressed in the remainder of the building.		
5.2	Zone 2 Ductwork Seam Reinforcements	SS/SC	Not Planned yet in G2/PES. SS/SC reinforcements - Welded seams will be evaluated and installed at the SDC-2 and SDC-3 level as appropriate	• Existing SC Confinement ductwork already meets PC-3 criteria. • Evaluate non-confinement ductwork and surrounding systems for SDC-3 and 2/1 concerns. Based on the evaluation, perform seismic upgrades to these systems.	• Same as SS. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities.
5.3	EDS Conduit	SS	Not yet planned in G2/PES.	• The medium voltage replacement project will have to account for new conduit runs	• Same as SS. • Evaluate system against IEEE-379 &	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			Any replacement of EDS conduit will be conducted at SS Newly installed and braced conduit will meet PC-2 or beyond, but there is no requirement to address any existing replacements.	to meet SDC-3 and wind hazards from the load side of the transformers located outside of PF-4 into the basement switchgear rooms. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	384. Perform upgrades as required.	Criteria for DOE Facilities • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
5.4	Seismic Interactions	N/A	Seismic evaluations completed. Note that the LANL seismic PSHS is expected to be completed in 2025 and may provide additional	Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	Same as SS.	See above by system.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			information for evaluating seismic interactions.			
6.0	Dampers/Actuators Upgrades					
6.1	SC Actuators (Electro-hydraulic) and Dampers	SC, SS	Not yet planned in G2/PES. Actuators/dampers replaced will be done as maintenance actions at this time and will be at the SC or SS level as appropriate.	• Replacement/installation of Actuators and Dampers at SDC-3 for all Zone 1, Zone 2, Inlets, and Outlets to SDC-3 qualified per DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • This may be as many as 50 dampers. 29 dampers are directly targeted, and failure modes may dictate broader installation. • New electrical source and conduit. • Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	• Same as SS • Various Ductwork may require upgrade to SDC-3.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
6.2	Damper Power	SS	Not yet planned in G2/PES. Damper power sources will be installed as SS but will meet PC-3.	• New electric actuators (about 50) require a new dedicated power source and conduit runs at a PC-3 level. This would require a new distribution means (panels) qualified to IEEE 344-2013 - IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations. • New conduit and conductors installed to SDC-3. Evaluate surrounding systems for 2/1 concerns at SDC-3 level. Based on the evaluation, perform seismic upgrades to these systems.	• Same as SS. • Evaluate system against IEEE-379 & 384. Perform upgrades as required.	• DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities. • IEEE 379-2014, IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems. • IEEE 323-2003 (R2008), IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station. • IEEE 384-2008, IEEE Standard Criteria for Independence of Class IE Equipment and Circuits.
6.3	New Actuators Failure Scheme	SC, SS	Not yet planned in G2/PES. Equipment installed to execute the new	Evaluation and conceptualization are required to fully develop the new scheme. Sections above provide adequate guidance.	Evaluation and conceptualization are required to fully develop the new scheme. Sections above provide adequate guidance.	See sections above.

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	Ventilation and Support System Components	Existing Component Classification	Planned End State	Improvements Necessary for SS SDC-3, LS-C	Improvements Necessary for SC SDC-3, LS-C	420.1C Invoked Standards[1]
			actuator failure scheme will be at SS or SC level as appropriate.			
7.0	Design Upgrade Analysis	N/A	TA-55 PES projects are not major modifications requiring design upgrade analysis per DOE-STD-1189-2016.	Not required.	A design upgrade analysis shall be performed to evaluate the application of nuclear safety design criteria and requirements the existing facility. Potentially upgrade facility systems based on this analysis.	DOE-STD-1189-2016, Integration of Safety into the Design Process.

Note:

1. Invoked standards in accordance with DOE O 420.1C for SC upgrades only. There is no regulatory basis or other driver to upgrade a SS system to SDC-3, LS-C.

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