RAI Volume 2, Chapter 2.1.1.2, Second Set, Number 2:

> Describe the electric loads that are classified as "non-shed," including the technical basis for the classification (SAR Section 1.4.1.1.1.3). Also, explain how these loads differ from ITS/Non-ITS loads, and the criteria for load shedding and restoration sequences.

1. RESPONSE

1.1 DESCRIBE THE ELECTRIC LOADS THAT ARE CLASSIFIED AS "NON-SHED" AND PROVIDE THE TECHNICAL BASIS FOR THE CLASSIFICATION

The repository structures, systems, and components are classified as important to safety (ITS) or non-ITS in accordance with the guidance set forth in SAR Section 1.9. The term "non-shed" used in SAR Section 1.4.1.1.1.3 for the non-ITS standby diesel generator loads is not a classification. The term non-shed is used to designate normal electric power system loads that are significant to the efficient, continued operation of the repository, and upon the loss of offsite power, are automatically loaded onto the non-ITS standby diesel generators.

1.2 EXPLAIN HOW NON-SHED LOADS DIFFER FROM IMPORTANT TO SAFETY/NOT IMPORTANT TO SAFETY LOADS AND CRITERIA FOR LOAD SHEDDING AND RESTORATION SEQUENCES

The non-ITS standby diesel generators start automatically upon the loss of offsite power and provide standby power to the normal electric power system, as described in SAR Section 1.4.1.1.2. All loads have access to the standby diesel generators through the normal electric power distribution equipment. The non-ITS standby diesel generator loads comprise both non-shed loads that are automatically loaded on the non-ITS standby diesel generators after they are started, and loads that are initially shed and then manually transferred. There are no code, standard, or regulatory requirements for the selection of non-shed loads to remain operational upon the loss of offsite power. Examples of non-shed loads are provided in SAR Section 1.4.1.1.1.3 and include such loads as the Central Control Center Facility, and Fire, Rescue, and Medical Facility.

The non-shed loads described in SAR Section 1.4.1.1.1.3 are not fed from the independent, physically separated, ITS diesel generators and associated 13.8 kV ITS switchgear and distribution.

The design features for load shedding and power restoration of the non-ITS standby diesel generators are derived from the methods and practices of NFPA 70, *National Electrical Code*; NFPA 110, *Standard for Emergency and Standby Power Systems*; and IEEE Std 446-1995, *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*. SAR Section 1.4.1.1.2 describes the load shedding and restoration process for the non-ITS standby diesel generators.

The ITS diesel generators are started and sequenced to connect ITS electrical loads as shown in SAR Figures 1.4.1-18 and 1.4.1-19. The ITS load sequencer described in SAR Section 1.4.1.2.1 automatically connects the Emergency Diesel Generator Facility loads first, followed by the Canister Receipt and Closure Facilities (1 through 3) loads, and finally the Wet Handling Facility loads. The response to RAI 2.2.1.1.7-6-002 provides additional information regarding starting and sequencing of ITS electrical loads.

2. COMMITMENTS TO NRC

None.

3. DESCRIPTION OF PROPOSED LA CHANGE

None.

4. REFERENCES

IEEE Std 446-1995. *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 242952.

NFPA 70. 2005. *National Electrical Code*. 2005 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 258735.

NFPA 110. 2005. *Standard for Emergency and Standby Power Systems*. 2005 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 257240.

RAI Volume 2, Chapter 2.1.1.2, Second Set, Number 4:

Provide specific design codes and standards used for ITS and non-ITS electrical interlocks (SAR section 1.4.1).

On SAR page 1.4.1-8, ITS circuit breaker interlock is mentioned, which prevents automatic closing of an ITS diesel generator to an energized or faulted bus. SAR Figure 1.4.1-3 (Sheet 1 of 12) depicts a single line electrical diagram of the CRCF Normal AC Electrical power. It shows two incoming 480 V Load Centers – one on Bus A and the other one on Bus B. The caption of the figure mentions a non-ITS electrical interlock that prevents one tie and three incoming breakers from closing at the same time. There is no information on the specific standards and codes with which the electrical interlock complies.

1. RESPONSE

The principal design codes and standards related to important to safety (ITS) interlocks are addressed in the supplemental response to RAI 2.2.1.1.7-5-001. Circuit breaker electrical interlocks provided to prevent automatic closing of an ITS diesel generator circuit breaker to an energized or faulted bus includes the design codes and standards in RAI 2.2.1.1.7-5-001 and the following IEEE standards:

- IEEE Std 387-1995, *Standard Criteria for Diesel-Generator Units Applied as Standby Power Generating Stations*
- IEEE Std 741-1997, *Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations*.

The normal electrical power supply non-ITS tie circuit breaker and two incoming (source) circuit breakers shown in SAR Figure 1.4.1-3 (Sheets 1, 10, and 11) are electrically interlocked to prevent all three non-ITS circuit breakers from being closed at the same time. Non-ITS auto transfer control provides automatic bus transfer upon failure of one source, with voltage monitoring and time delay.

Non-ITS electrical interlock and transfer control is designed using the methods and practices of:

- IEEE Std 141-1993, *IEEE Recommended Practice for Electric Power Distribution for Industrial Plants*
- IEEE Std 142-1991, *IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems*
- IEEE Std 241-1990, *IEEE Recommended Practice for Electric Power Systems in Commercial Buildings*
- IEEE Std 446-1995, *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*

- IEEE Std 1015-2006, *IEEE Recommended Practice for Applying Low Voltage Circuit Breakers Used in Industrial and Commercial Power Systems*

- NFPA 70, *National Electrical Code*.

Non-ITS electrical systems and components consisting of interlocked controllers and similar assemblies, which are intended to transfer power to a common load or output between multiple inputs, are designed to the methods and practices of UL 1008-2008, *UL Standard for Safety Transfer Switch Equipment—Fifth Edition*.

2. COMMITMENTS TO NRC

None.

3. DESCRIPTION OF PROPOSED LA CHANGE

None.

4. REFERENCES

IEEE Std 141-1993. 1994. *IEEE Recommended Practice for Electric Power Distribution for Industrial Plants*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 240362.

IEEE Std 142-1991. 2006. *IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems*. 5th Edition. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 258141.

IEEE Std 241-1990, Reaffirmed 1997. 1998. *IEEE Recommended Practice for Electric Power Systems in Commercial Buildings*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 255956.

IEEE Std 387-1995. 2001. *Standard Criteria for Diesel-Generator Units Applied as Standby Power Generating Stations*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 258750.

IEEE Std 446-1995. *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 242952.

IEEE Std 741-1997. 2002. *IEEE Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 255428.

IEEE Std 1015-2006. *IEEE Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems*. New York, New York: The Institute of Electrical and Electronics Engineers.

NFPA 70. 2005. *National Electrical Code*. 2005 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 258735.

UL 1008-2008. *UL Standard for Safety Transfer Switch Equipment—Fifth Edition*. Northbrook, Illinois: Underwriters Laboratories.