REQUEST FOR ADDITIONAL INFORMATION
Volume 2 – Preclosure
Chapter 2.1.1.7 - Design of Structures, Systems and Components Important to Safety and Safety Controls
Set 6 (RAI #1 - #9)

The following questions pertain to DOE's design of the important-to-safety (ITS) Electric Power described in SAR Section 1.4.1. The ITS electric power supply is relied on for safety functions of structures, systems, and components, described in SAR Sections 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.8, 1.3.3, 1.4.1, and 1.4.2. The information requested below is needed to verify compliance with 10 CFR 63.112(f).

RAI #1

Justify the basis for the probability of loss of offsite power (LOSP) used in the Table 1.4.1-1.

The applicant used a probability of LOSP that appears to be based on general historical data for frequency of LOSP experienced in the United States in general, rather than more specific experience available for the Western Region, where the repository is to be located.

RAI #2

Provide information on the criteria for selecting the extent of voltage degradation that would initiate the start-up of the emergency diesel generators (EDGs) (SAR Section 1.4.1.2.1, page 1.4.1-8) and how the criteria relates to historical LOSP data in RAI # 1.

The applicant states in SAR section 1.4.1.2.1 that the ITS EDGs start automatically upon sensing LOSP by sensing low voltage or degraded voltage. However, the criteria for determination of low or degraded voltage or the respective thresholds at which the offsite power will be disconnected from ITS Trains A & B and the ITS EDGs will be started and sequenced to connect to ITS loads have not been provided.

RAI #3

Provide information on methodology and criteria used for deciding which electrical loads are required to be powered by the ITS Electrical Power Supply.

In SAR Figures 1.4.1-12 and 1.4.1-13 for the ITS Electric Power Trains A & B, the applicant has shown the components not identified as ITS (e.g. non ITS Exhaust Fans and Lighting Panels) along with the ITS components. It is not clear why the components not identified as ITS are shown as powered by the ITS Electric Power.

RAI #4

Provide the following design-related information:

(a) Description of how ITS components and systems are designed within CRCF, WHF and EDGF to provide spatial diversity, independence, isolation, redundancy, single- failure criteria and other required characteristics of such wiring and connections within ITS facilities to meet the IEEE Codes referenced in SAR Section 1.4.1.5;

(b) Provide ITS electrical power requirements for ITS electrical power-dependent equipment in each ITS facility, which should include: (i) design criteria and design bases for total power utilization requirements and for sizing of total electrical power being made available to supply the loads for each main supply bus and for each distribution subsystem, and (ii) design criteria and design bases for any power supply sizing margins, for each facility containing ITS equipment;

(c) Provide design criteria and design bases for implementation of ITS Train A and Train B power connections to individual ITS loads within each facility. The information should include: (i) design criteria and design bases for physical diversity, redundancy, cooling, protection, independence, isolation, and other requirements for such power connections, and (ii) design criteria and design bases for power flow and control components (for example, relays, starters, variable speed drives, and other power controlling, switching, or protection components) involved in the connection or control of ITS power to end users within each facility;

(d) Ventilation requirements and design criteria for battery installations for DC power systems and battery-operated Uninterruptible Power Supply systems. The information should include design criteria or design information to support the conclusion made in SAR Section 1.2.4, in which the applicant stated that adequate ventilation is provided to prevent the buildup of explosive atmospheres in battery rooms;

(e) Clarification on whether the provision of the adequate ventilation, delineated in (d) above, is applied to: (i) 125V DC power systems and Uninterruptible Power Supply systems, (ii) which facilities, and (iii) ITS electrical power systems and normal electrical power and ITS electrical power systems; and

(f) Location, housing, cooling, physical protection, and separation/single-failure design of the ITS 13.8kV transformers (trains A & B) for the CRCF and WHF.

RAI #5

Provide information on the criteria used for the design of the ITS electrical power supply for the surface facility non-confinement HVAC system designed to cool and ventilate electrical and battery rooms in the EDGF.

Criteria for required performance of ITS electrical power supplies for ITS surface facility confinement HVAC systems designed for cooling and ventilation of electrical equipment and battery rooms in the CRCF and WHF are included in SAR Table 1.4.1-1. Criteria for performance of portions of surface non-confinement HVAC systems designed to provide cooling and ventilation of electrical equipment and battery rooms in the EDGF are included in SAR Tables 1.9.3 and 1.9.4. However, the criteria for required performance of ITS electrical power supplies, which provide power to portions of surface non-confinement HVAC systems, are not provided.

RAI #6

Provide additional information to clarify what ITS functions require ITS electrical power in the Receipt Facility (RF). SAR Figures 1.4-10 and 1.4-11 show ITS power feeder for the RF; however, ITS power distribution and loads for the RF are not reflected in the balance of the SAR.

RAI #7

Justify the exclusion of the EDGF Uninterruptible Power Supply from ITS Electrical Power Supply reliability calculations.

A SAR reference, "*CRCF Reliability and Event Sequence Categorization Analysis*, Section B8.2.2," includes a statement that the EDGF Uninterruptible Power Supply supports the ITS diesel generator control systems. During a LOSP event, this function provides electrical power needed instrumentation and controls for automatic startup and loading of the ITS EDGs and other related functions.

RAI #8

Clarify why, for the design of the ITS Diesel Generators, DOE has made reference in Section 1.4.1.5 to the regulatory positions of NRC Regulatory Guide 1.9 Rev. 3, 1993 which endorses an old version of industry standard IEEE 387-1984, instead of the current version of Regulatory Guide 1.9 (Rev. 4, March 2007), which endorses IEEE Standard 387-1995.

In its explanation in SAR Section 1.4.1.2.8, DOE attempts to clarify where IEEE 387 versions are used, however there are regulatory positions affecting testing and other requirements in the current version of Regulatory Guide 1.9 which have not been addressed. SAR Section 1.4.1.5 makes reference to both versions of IEEE Standard 387 (i.e., both the 1984 version and the 1995 version, but only Rev. 3 of Regulatory Guide 1.9).

RAI #9

Clarify the use (or non-use) of Single-Failure criteria in the design of the ITS electrical power system.

The list of specific references for the ITS electric power system provided in SAR Section 1.4.2.1.8 does not directly include references to a Single-Failure Criterion as a basis for the design of the system. The list of general references provided in SAR Section 1.4.1.5 does, however, include a reference to an IEEE Std 379-2000. 2001 Standard, *Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems*. It is not clear if the applicant's ITS electrical power system design described in the SAR meets the single-failure criterion. Staff needs the information to verify compliance with 10 CFR 63.21(c) (3) (ii).