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DTE Energy

10 CFR 50.90

August 8, 2005
NRC-05-0051

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Letter from W. T. O'Connor, Jr. (Detroit Edison) to USNRC dated May 18, 2005, "Proposed License Amendment Request to Revise Technical Specification Requirements Associated with LCO 3.8.1 for Inoperable Offsite Circuits

Subject: Additional Information Related to the Proposed License Amendment Request to Revise Technical Specification Requirements Associated with LCO 3.8.1 for Inoperable Offsite Circuits

Detroit Edison proposed a license amendment to revise the Technical Specification requirements associated with Limiting Condition for Operation (LCO) 3.8.1 for inoperable offsite circuits on May 18, 2005 (Reference 2). The NRC reviewed the proposed license amendment and requested additional information in a phone conversation on June 29, 2005. The additional information requested by the NRC staff is enclosed.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson of my staff at (734) 586-4258.

Sincerely,

William T. O'Connor Jr.

Enclosures

A001

cc: D. P. Beaulieu
E. R. Duncan
NRC Resident Office
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

I, WILLIAM T. O'CONNOR, JR., do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

WILLIAM T. O'CONNOR, JR.
Vice President - Nuclear Generation

On this 8th day of August, 2005 before me personally appeared William T. O'Connor, Jr., being first duly sworn and says that he executed the foregoing as his free act and deed.

Notary Public

KAREN M. REED
NOTARY PUBLIC, STATE OF MI
COUNTY OF MONROE
MY COMMISSION EXPIRES Sep 2, 2011
ACTING IN COUNTY OF Monroe, Mi

ENCLOSURE 1 to
NRC-05-0051

ADDITIONAL INFORMATION RELATED TO THE REQUEST TO REVISE TECHNICAL SPECIFICATION LIMITING CONDITION FOR OPERATION (LCO) 3.8.1

ADDITIONAL INFORMATION RELATED TO THE REQUEST TO REVISE TECHNICAL SPECIFICATION LIMITING CONDITION FOR OPERATION (LCO) 3.8.1

1. **NRC Request**

   Please provide the changes to the Technical Specification Bases associated with TS LCO 3.8.1 for inoperable offsite circuits.

   Detroit Edison Response

   The marked-up, Fermi 2 Technical Specification Bases associated with TS LCO 3.8.1, which are consistent with the NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 3 Bases, are attached (Enclosure 2).

2. **NRC Request**

   Please provide the following information on the 345 kV and 120 kV transmission lines:

   a. Are the lines capable of supplying power at the required voltage to all the plant systems required for normal shutdown and emergency core cooling equipment? Explain the analysis conducted to assure adequate voltage.

   Detroit Edison Response

   Yes. Each single offsite line is capable of supplying power at the required voltage to all plant systems required for normal shutdown and emergency core cooling. The minimum specified voltages in the UFSAR for these functions are 93.3% of 120 kV, or 112 kV for Division 1, and 95.1% of 345 kV, or 328 kV for Division 2. These values were based on the results of historical load flow and stability analyses that calculated the grid response to contingencies designed to be the worst possible, and to limitations for operating requirements of Fermi 2 auxiliaries and safety-related equipment.

   The Electrical Load Monitoring System (ELMS) was used to assure adequate voltage for normal shutdown and emergency core cooling equipment prior to 2004. Since that time, Detroit Edison has converted to the Electrical Transient Analysis Program (ETAP) PowerStation Model, the same computer program used by the majority of nuclear power plants in the United States, to ensure adequate plant voltage, load flow, running voltages and short circuit currents at all system levels. These programs adjust the 120 kV and the 345 kV incoming voltage levels within several load flow conditions to reflect the under

voltage requirements to establish the worst case degraded voltage conditions on the 4160 volt Emergency Safeguards System (ESS) buses. The voltages currently assumed in ETAP for the emergency shutdown loading category are 89.5% of 120 kV for Division 1, and 87.5% of 345 kV for Division 2.

In making the transition from ELMS to ETAP, Design Calculation (DC) 6186 was performed to validate the ETAP software. Revision B of DC-6186, dated May 28, 2004 used the ETAP values of 89.5% of 120 kV for Division 1, and 87.5% of 345 kV for Division 2, and combined them with an assumed emergency shutdown load of 14.3 MW rather than the actual expected emergency shutdown load of 11.4 MW. This calculation validates the use of ETAP as a conservative model of the Fermi 2 electrical distribution system, and shows that the Fermi 2 electrical distribution system continues to meet the system voltage requirements during degraded grid voltage conditions (down to 89.5% and 87.5% , respectively for the Division 1 and 2 offsite power circuits). Therefore, if the offsite power supply remains above these levels, all plant systems required for normal shutdown and emergency core cooling will have sufficient power to perform their functions.

NRC Request

b. What is the expected reliability and availability of the offsite (preferred) power sources?

Detroit Edison Response

The Fermi 2 onsite electrical power system is divided into two divisions, each with its own independent electrical switchyard. Division 1 is fed through the 120 kV switchyard via three offsite lines. Division 2 is fed through the 345 kV switchyard via two offsite lines. The main turbine generator is connected to the ring bus located in the Division 2 switchyard. The switchyards are separated both electrically and physically. Each division supports two Engineered Safety Features (ESF) busses, with each bus backed up by its own Emergency Diesel Generator (EDG). Additionally, the Division 1 offsite circuit is backed up by four on-site Combustion Turbine Generators (CTGs), one of which (CTG 11-1) serves as the alternate AC source for Station Blackout (SBO) scenarios.

This configuration minimizes the potential for plant and switchyard centered complete Loss of Offsite Power (LOOP) scenarios. It also minimizes the chance that a localized grid disturbance in one switchyard will affect the other division.

Reliability

Total LOOP Frequency

The offsite power reliability for Fermi 2 can be quantified based upon the LOOP frequencies for both total and divisional LOOP. Draft NUREG CR-INEEL/EXT-04-02326, "Evaluation of Loss of Offsite Power Events at Nuclear Power Plants: 1986-2003", provides a generic calculation for operating plants, including Fermi 2. The generic LOOP frequency used in the NUREG, separates total frequency into five categories (listed below with accompanying numerical values for Fermi 2):

1) Grid Related (F_{grid} = 4.16E-2/yr)
2) Plant Centered (F_{plant} = 2.31E-3/yr)
3) Switchyard Centered (F_{switch} = 7.90E-3/yr)
4) Severe Weather Related (F_{sw} = 2.88E-3/yr)
5) Extreme Weather Related (F_{ew} = 2.32E-3/yr)

Normally the total LOOP frequency (F_{LOOP}) is:

$$F_{LOOP} = F_{grid} + F_{plant} + F_{switch} + F_{sw} + F_{ew}$$

However, the unique switchyard configuration for Fermi renders the potential for a switchyard or plant centered event resulting in a total LOOP as extremely remote. Therefore, the Fermi specific total LOOP frequency would be 4.68E-2/yr, with F_{plant} and F_{switch} set to zero.

$$F_{LOOP} = 4.16E\text{-}2/yr + 2.88E\text{-}3/yr + 2.32E\text{-}3/yr = 4.68E\text{-}2/yr$$

This frequency of 4.68E-2/yr (or once in every 21.4 years) is lower than that used in the Fermi PSA model of 4.98E-2/yr (or approximately once in 20.1 years). Both of these statistical sources include the August 2003 Loss of Offsite Power Event in the baseline data.

Divisional LOOP Frequency

There are several initiating events in the Fermi 2 PSA model that, when combined, give an indication as to the reliability of each offsite distribution system. For Division 1, the loss frequency (F_{OS1}) is determined by the following equation:

$$F_{OS1} = F_{LOP1} + F_{TF64} + F_{BS11} + F_{TF1} + F_{B101}$$

$$F_{OS1} = 7.56E\text{-}2/yr + 3.00E\text{-}2/yr + 4.24E\text{-}3/yr + 1.38E\text{-}2/yr + 4.24E\text{-}3/yr = 1.28E\text{-}1/yr$$
(or once in 7.8 years)

where,

1) F_{LOP1} is the Division 1 LOOP frequency due to miscellaneous events or events at locations beyond the Fermi switchyards
2) F_{TF64} is the loss of Division 1 power frequency due to Station Service Transformer 64
3) F_{BS11} is the loss of Division 1 power frequency due to loss of Bus 11
4) F_{TF1} is the loss of Division 1 power frequency due to loss of Transformer 1
5) F_{B101} is the loss of Division 1 power frequency due to loss of Bus 101

For Division 2, the loss frequency (F_{OS2}) may be determined by the following equation

$$F_{OS2} = F_{LOP2} + F_{TF65} + F_{B301} + F_{Plant}$$

$F_{OS2} = 8.67E\text{-}3/yr + 1.38E\text{-}2/yr + 4.24E\text{-}3/yr + 2.31E\text{-}3/yr = 2.90E\text{-}2/yr$ (or once in 34 years)

where,

1) F_{LOP2} is the Division 2 LOOP frequency due to miscellaneous events or events at locations beyond the Fermi switchyards
2) F_{TF65} is the loss of Division 2 power frequency due to Station Service Transformer 65
3) F_{B301} is the loss of Division 2 power frequency due to the loss of Bus 301

4) F_{Plant} is the loss of Division 2 power frequency from plant centered events (from the draft NUREG)

The numerical analysis described above examines the reliability of offsite power with respect to a "deenergization loss". It does not examine the frequency of degraded voltage conditions at the Fermi 2 site. As discussed in EPRI Report 1009110, "The Probability and Consequences of Double Sequencing Nuclear Power Plant Safety Loads, Revision 1," current LOOP frequencies do not include degraded voltage induced losses. The report concluded there was no existing statistical basis for determining the probability of degraded voltage losses.

An actual degraded grid condition occurred on the 120 kV grid several years ago. Fermi 2 was able to compensate for this by using the CTGs to locally elevate voltage. The only other significant offsite power event to have affected Fermi 2 was the August 2003 loss of power in the Midwest where the event unfolded too rapidly for corrective actions to be taken to stabilize the grid. In this case, the onsite power system operated as designed to generate sufficient onsite power until reliable offsite power could be restored.

Availability

Fermi operational procedures and the agreements between the transmission operator and Detroit Edison require that advance notifications be made to Fermi whenever line outages that affect the availability of the offsite power lines are scheduled. This process allows for the coordination of offsite and onsite maintenance activities to minimize the impact of such outages.

The availability of the offsite power circuits can be inferred from examination of line outages for the offsite power sources that feed Fermi 2. There was an instance of unavailability of one of the two parallel 345 kV Division 2 offsite feeds during Fermi 2 "at power" operations in the past five years. Planned outages on the 120 kV Division 1 lines for maintenance on outside lines and substations occur more frequently. However, these are normally scheduled on only one incoming line at a time, minimally impacting the aggregate Division 1 offsite power loss frequency. There was an instance in the past three years of a simultaneous outage of two Division 1 offsite power lines. This occurred because of emergent work on a second line while the first line was out of service for planned maintenance.

Based on this information, it can be concluded that availability is less of a concern than reliability in the examination of the potential to lose offsite power sources at the Fermi 2 plant site.

NRC Request

c. What protocol has been established with the transmission system operator to communicate to the licensee the availability of the lines to provide sufficient voltages following a plant trip or when voltages would not be adequate?

Detroit Edison Response

Fermi 2 personnel communicate directly with the Detroit Edison Central System Supervisor (CSS) who in turn communicates with the transmission operator, International Transmission Company (ITC). Requirements for ITC to communicate with Detroit Edison availability of lines due upcoming planned maintenance in advance and emergency conditions as soon as possible are covered in various points in the generator interface agreement. Specifically relating to the operation of Fermi 2, the agreement states:

- None of the transmission lines may be removed from service without prior notification except in an emergency,
- All efforts will be made to operate the system such that voltage at the switchyards will promptly recover to a minimum of 345 kV and 120kV respectively following a shutdown.
- Failure to meet the requirements specific to Fermi must be immediately communicated to Detroit Edison and Fermi 2,
- Transmission system operating procedures are required that ensure system operating conditions, including contingency events, are evaluated for adequacy. If impaired or potentially degraded grid conditions are identified, the contract specifies that this information be immediately communicated to the Fermi 2 operating staff.

In addition, Fermi 2 control room staff routinely contacts the CSS to verify the availability of incoming lines as part of shift turnover.

ENCLOSURE 2 to
NRC-05-0051

TECHNICAL SPECIFICATION
LCO 3.8.1 BASES MARKUP

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources, and the onsite standby power sources (emergency diesel generators (EDGs) 11, 12, 13, and 14). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Class 1E AC distribution system is divided into redundant load groups (Division I and Division II), so loss of any one group does not prevent the minimum safety functions from being performed. Each load group is connected to an offsite power supply and two EDGs. Additional capability exists for each load group to be connected to the alternate division's offsite power supply (referred to as the maintenance cross-tie).

Offsite power is supplied to the 120 kV and 345 kV switchyards from the transmission network by five transmission lines. From the 120 kV switchyard, an electrically and physically separated circuit provides AC power, through system service transformer 64, to 4.16 kV ESF buses 64B and 64C. From the 345 kV switchyard, an electrically and physically separated circuit provides AC power through system service transformer 65 to 4.16 kV buses 65E and 65F. A detailed description of the offsite power network and circuits to the onsite Class 1E ESF buses is found in the UFSAR, Sections 8.2 and 8.3 (Ref. 2).

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

Transformers 64 and 65 are sized to accommodate the simultaneous starting of all ESF loads on receipt of an accident signal without the need for load sequencing.

BASES

BACKGROUND (continued)

The onsite standby power source for 4.16 kV ESF buses 64B, 64C, 65E, and 65F, consists of four EDGs; EDG 11, 12, 13, and 14 respectively. An EDG starts automatically on a loss of coolant accident (LOCA) signal (i.e., low reactor water level signal or high drywell pressure signal) or on an ESF bus degraded voltage or undervoltage signal. After the EDG has started, it automatically ties to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with a LOCA signal. The EDGs also start and operate in the standby mode without tying to the ESF bus on a LOCA signal alone. Following the trip of offsite power, load shed relays strip nonpermanent loads from the ESF bus. When the EDG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the EDG.

In the event of a loss of normal power, the ESF electrical loads are automatically connected to the EDGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading of the EDGs in the process. Within approximately 55 seconds after the EDG breaker closure, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service (i.e., available to start according to designed start signals).

Ratings for the EDGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). EDGs 11, 12, 13, and 14 have the following ratings:

a. 2850 kW – continuous;

b. 3135 kW–2 hour, short time;

c. 3100 kW – 2000 hours;

d. 3250 kW – 300 hours; and

e. 3500 kW – 30 minutes.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining sufficient onsite or offsite AC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power sources; and

b. A worst case single failure.

AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Distribution System and two separate and independent divisions of two EDGs (11 and 12; 13 and 14) ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the UFSAR, and are part of the licensing basis for the unit.

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses. Each offsite circuit is physically independent and consists of incoming breakers and disconnect to the respective system service 64 or 65 transformers, and the respective circuit path including feeder breakers to 4.16 kV ESF buses.

Insert 1

Insert 1

GDC 17 – "Electric Power Systems" (Ref. 1) requires that provisions be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit. The 345 kV breaker alignment must be maintained such that this criteria continues to be met. For example, with the DF breaker open, a main generator trip would open breakers CM and CF and cause a loss of the 345 kV preferred power source. Thus, an offsite circuit must be declared inoperable when the breaker alignment is such that a loss of the main generator could lead to a loss of the respective offsite circuit.

BASES

LCO (continued)

Each EDG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. Each EDG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions, such as EDG in standby with the engine hot and EDG in standby with the engine at ambient condition. Additional EDG capabilities must be demonstrated to meet required Surveillances, e.g., capability of the EDG to revert to standby status upon restoration of offsite power.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for EDG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources as described in UFSAR Sections 8.2 and 8.3 (Ref. 2).

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources – Shutdown."

BASES

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable EDG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable EDG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

A.1

To ensure a highly reliable power source remains with one or both EDGs in one division inoperable, it is necessary to verify the availability of the OPERABLE offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions must then be entered.

A.2

Required Action A.2 is intended to provide assurance that a loss of offsite power, during the period that one or both EDGs in one division is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has an inoperable EDG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable EDG exists; and

b. A required feature on the other division (Division 1 or 2) that is redundant to a feature supported by the inoperable EDG(s) is inoperable.

BASES

ACTIONS (Continued)

If, at any time during the existence of this Condition (one or both EDGs in one division inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering one required EDG inoperable coincident with one or more inoperable redundant required support or supported features, or both, that are associated with the OPERABLE EDGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these

BASES

ACTIONS (continued)

events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE EDGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

A.3

To minimize the impact of operation with an inoperable EDG, it is necessary to periodically ensure the availability of CTG 11-1. The verification of the status of CTG 11-1 is performed by an administrative check of breaker and line availability, and the CTG 11-1 ability to supply Division I loads. Since this Required Action only specifies "verify the status," even when CTG 11-1 is not available it does not result in this Required Actions being not met. However, upon discovery that CTG 11-1 is unavailable, the limitations of Required Action A.5 are imposed.

A.4.1 and A.4.2

Required Action A.4.1 provides an allowance to avoid unnecessary testing of OPERABLE EDGs. If it can be determined that the cause of the inoperable EDG(s) does not exist on the OPERABLE EDGs, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other EDG(s), they are declared inoperable upon discovery, and Condition B of LCO 3.8.1 may be entered. Once the failure is repaired, and the common cause failure no longer exists, Required Action A.4.1 is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of those EDGs.

In the event the inoperable EDG(s) are restored to OPERABLE status prior to completing either A.4.1 or A.4.2, the plant

BASES

ACTIONS (continued)

corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition A.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE EDGs are not affected by the same problem as the inoperable EDG.

A.5 and A.6

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with no OPERABLE EDGs to one division for a period that should not exceed 72 hours. With one or both EDGs in one division inoperable, the remaining OPERABLE EDGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Required Action A.5 imposes this 72 hour Completion Time from the discovery of the non-availability CTG 11-1. However, if CTG 11-1 is available to supply Division I loads (determined by administrative check of breaker, line availability, and CTG 11-1 status) Required Action A.5 would be met and Required Action A.6 would allow the restoration time of 7 days.

The 72 hour Completion Time to restore to at least one EDG in the division in OPERABLE status takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period. The 7 day Completion Time to restore all EDGs to OPERABLE status takes into account the capacity and capability of the remaining AC Sources, as well as the additional reliability afforded by the availability of CTG 11-1.

Insert 2 →

B.1

With one or both EDGs on both divisions inoperable, there may be no remaining standby AC source. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for a significant percentage of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown. (The immediate shutdown

Insert 2

The second Completion Time for Required Action A.6 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, an offsite circuit is inoperable, and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This situation could lead to a total of 10 days, since initial failure of the LCO, to restore the EDG. At this time, an offsite circuit could again become inoperable, the EDG restored OPERABLE, and an additional 72 hours (for a total of 13 days) allowed prior to complete restoration of the LCO. The 10 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and C are entered concurrently. The "AND" connector between the 7 day and 10 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive must be met.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time that the LCO was initially not met, instead of the time that Condition A was entered.

BASES

ACTIONS (continued)

could cause grid instability, which could result in a total loss of AC power.) Since any inadvertent unit generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Regulatory Guide 1.93 (Ref. 6), with both divisions with EDGs inoperable, operation may continue for a period that should not exceed 2 hours.

Inserts 3, 4 & 5 → B.1 and B.2

(F)

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. Furthermore, with one or both offsite circuits inoperable, the Fermi design and subsequent plant response is such that power operation is not justified, and a plant shutdown is required. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the EDGs are based on the recommendations of Regulatory Guide 1.9 (Ref. 3), Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10), as addressed in the UFSAR.

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of 3740 V is 90% of the nominal 4160 V output voltage. This value, which is

Insert 3

C.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable and Condition D for two offsite circuits inoperable, is entered.

C.2

Required Action C.2, which only applies if the division cannot be powered from an offsite source, is intended to provide assurance that an event with a coincident single failure of the associated EDG does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has no offsite power.

The Completion Time for Required Action C.2 is intended to allow time for the operator to evaluate and repair any discovered inoperabilities. This Completion Time also allows an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. The division has no offsite power supplying its loads and

b. A required feature on the other division is inoperable.

If, at any time during the existence of this Condition (one offsite circuit inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering no offsite power to one 4160 V ESF bus of the onsite Class 1E Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with any other ESF bus that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before the unit is subjected to transients associated with shutdown.

The remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection may have been lost for the required feature's function; however, function is not lost. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

Insert 3 (continued)

C.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition C for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this condition, however, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

The second Completion Time for Required Action C.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an EDG is inoperable, and that EDG is subsequently returned OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 10 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, an EDG could again become inoperable, the circuit restored OPERABLE, and an additional 72 hours (for a total of 13 days) allowed prior to complete restoration of the LCO. The 10 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and C are entered concurrently. The "AND" connector between the 7 day and 10 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met. As in Required Action C.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time that Condition A was entered.

Insert 4

D.1 and D.2

Required Action D.1 addresses actions to be taken in the event of inoperability of redundant required features concurrent with inoperability of two offsite circuits. Required Action D.1 reduces the vulnerability to a loss of function. The Completion Time for taking these actions is reduced to 12 hours from that allowed with one division without offsite power (Required Action C.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety divisions are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are designed with redundant safety related divisions, (i.e., single division systems are not included in the list). Redundant required features failures consist of any of these features that are inoperable because any inoperability is on a division redundant to a division with inoperable offsite circuits.

The Completion Time for Required Action D.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable and

b. A required feature is inoperable.

If, at any time during the existence of this Condition (two offsite circuits inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more EDGs inoperable. However, two factors tend to decrease the severity of this degradation level:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Regulatory Guide 1.93 (Ref. 6), with the available offsite AC sources two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition C.

Insert 5

E.1 and E.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition E are modified by a Note to indicate that when Condition E is entered with no AC source to any ESF bus, ACTIONS for LCO 3.8.7, "Distribution Systems - Operating," must be immediately entered. This allows Condition E to provide requirements for the loss of the offsite circuit and one EDG without regard to whether a division is de-energized. LCO 3.8.7 provides the appropriate restrictions for a de-energized division.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 12 hours. In Condition E, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition D (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

SURVEILLANCE REQUIREMENTS (continued)

specified in ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the EDG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations found in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.7

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

To minimize the mechanical stress and wear on moving parts that do not get lubricated when the engine is not running, these SRs have been modified by a Note (Note 1 for SR 3.8.1.2 and the Note for SR 3.8.1.7) to indicate that all EDG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup prior to loading.

BASES

SURVEILLANCE REQUIREMENTS (continued)

For the purposes of SR 3.8.1.2 testing, the EDGs are started anywhere from standby to hot conditions by using one of the following signals:

- Manual,
- Simulated loss-of-offsite power by itself,
- Simulated loss-of-offsite power in conjunction with an ESF actuation test signal, or
- An ESF actuation test signal by itself.

In order to reduce stress and wear on diesel engines, the EDG manufacturer recommends a modified start in which the starting speed of EDGs is limited, warmup is limited to this lower speed, and the EDGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 2, which is only allowed to satisfy SR 3.8.1.2 but are not applicable when performing SR 3.8.1.7.

SR 3.8.1.7 requires that, at a 184 day Frequency, the EDG starts from standby conditions and achieves required voltage and frequency within 10 seconds. Standby conditions for an EDG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations. The 10 second start requirement supports the assumptions in the design basis LOCA analysis of UFSAR, Section 6.3 (Ref. 12). The 10 second start requirement is not applicable to SR 3.8.1.2.

Since SR 3.8.1.7 does require a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. In addition to the SR requirements, the time for the EDG to reach steady state operation, unless the modified EDG start method is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The normal 31 day Frequency for SR 3.8.1.2 is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance provides assurance that the EDGs are capable of synchronizing and accepting greater than or equal to the equivalent of the maximum expected accident loads without the risk of overloading the EDG. The EDG is tested at approximately 90% of its continuous load rating, which provides margin to excessive EDG loading, while demonstrating the EDG capability to carry loads near the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the EDG is connected to the offsite source.

Although no power factor requirements are established by this SR, the EDG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while 1.0 is an operational limitation to ensure circulating currents are minimized. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain EDG OPERABILITY.

The normal 31 day Frequency for this Surveillance is consistent with Regulatory Guide 1.9 (Ref. 3).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients (e.g., because of changing bus loads) do not invalidate this test. Similarly, momentary power factor transients outside the normal range do not invalidate the test.

Note 3 indicates that this Surveillance should be conducted on only one EDG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of EDG operation at full load.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during EDG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. It is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the

BASES

SURVEILLANCE REQUIREMENTS (continued)

controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that pumps operate automatically in order to maintain an adequate volume of fuel oil in the day tank during or following EDG testing. As such, a 31 day Frequency is appropriate, since proper operation of fuel transfer systems is an inherent part of EDG OPERABILITY.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Each EDG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the EDG load response characteristics and capability to reject the largest single load while maintaining a specified margin to the overspeed trip. The largest single load for each EDG is a residual heat removal pump (1684 kW). This Surveillance may be accomplished by:

a. Tripping the EDG output breaker with the EDG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

b. Tripping its associated single largest post-accident load with the EDG solely supplying the bus.

As required by IEEE-308 (Ref. 14), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. This represents 66.75 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9)..

SR 3.8.1.9

This Surveillance demonstrates the EDG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The EDG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the EDG experiences following a full load rejection and verifies that the EDG does not trip upon loss of the load. These acceptance criteria provide EDG damage protection. While the EDG is not expected to experience this transient during an event, and continues to be available, this response ensures that the EDG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

SR 3.8.1.10

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the EDG, including automatic start of the EDG cooling water pump. It further demonstrates the capability of the EDG to automatically achieve the required voltage and frequency within the specified time.

The EDG auto-start time of 10 seconds is derived from requirements of the accident analysis for responding to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate

BASES

SURVEILLANCE REQUIREMENTS (continued)

that all starting transients have decayed and stability has been achieved.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the EDG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the EDG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note allowing EDG starts to be preceded by an engine prelube period. The reason for the Note is to minimize wear and tear on the EDGs during testing.

SR 3.8.1.11

This Surveillance demonstrates that the EDG (including its associated cooling water pump) automatically starts and achieves the required minimum voltage and frequency within the specified time (10 seconds) from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

The Frequency of 18 months takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these

BASES

SURVEILLANCE REQUIREMENTS (continued)

components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

This SR is modified by a Note allowing EDG starts to be preceded by an engine prelube period. The reason for the Note is to minimize wear and tear on the EDGs during testing.

SR 3.8.1.12

This Surveillance demonstrates that EDG non-critical protective functions (e.g., high jacket water temperature) are bypassed on an actual or simulated emergency start (LOCA or loss of offsite power) signal. The non-critical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The EDG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the EDG.

The 18 month Frequency is based on engineering judgment, takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.1.13

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per 18 months that the EDGs can start and run continuously at full load capability for an interval of not less than 24 hours- 22 hours of which is at a load equivalent to the continuous rating of the EDG, and 2 hours of which is at a load equivalent to 110% of the continuous duty rating of the EDG. Fermi-2 has taken an exception to this requirement and performs the 22 hour run at approximately 90% of the continuous rating (2500 kW-

BASES

SURVEILLANCE REQUIREMENTS (continued)

2600 kW), and performs the 2 hour run at approximately the continuous rating (2800 kW-2900 kW). The EDG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelube and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

Although no power factor requirements are established by this SR, the EDG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. A load band is provided to avoid routine overloading of the EDG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain EDG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This Surveillance has been modified by a Note. The Note states that momentary transients due to changing bus loads do not invalidate this test.

SR 3.8.1.14

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the minimum required voltage and frequency within 10 seconds and maintain a steady state voltage and frequency range. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The requirement that the diesel has operated for at least 2 hours near full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Routine overloads may result in more frequent teardown inspections in accordance with

BASES

SURVEILLANCE REQUIREMENTS (continued)

vendor recommendations in order to maintain EDG OPERABILITY. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all EDG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.15

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and load transfer from the EDG to the offsite source can be made and that the EDG can be returned to standby status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the EDG to restart and reload if a subsequent loss of offsite power occurs. The EDG is considered to be in standby status when the EDG is shutdown with the output breaker open, the load sequence timers are reset, and is able to restart and reload on a subsequent bus under voltage.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration plant conditions desired to perform the Surveillance.

SR 3.8.1.16

Under accident conditions with loss of offsite power loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the EDGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.17

In the event of a DBA coincident with a loss of offsite power, the EDGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates EDG operation, as discussed in the Bases for SR 3.8.1.10, during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the EDG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

This SR is modified by a Note allowing EDG starts to be preceded by an engine prelube period. The reason for the Note is to minimize wear and tear on the EDGs during testing.

SR 3.8.1.18

This Surveillance demonstrates that the EDG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the EDGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note allowing EDG starts to be preceded by an engine prelube period. The reason for the Note is to minimize wear on the EDG during testing.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Sections 8.2 and 8.3.
3. Regulatory Guide 1.9.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93.
7. Generic Letter 84-15.
8. 10 CFR 50, Appendix A, GDC 18.
9. Regulatory Guide 1.108.
10. Regulatory Guide 1.137.
11. ANSI C84.1, 1982.
12. UFSAR, Section 6.3.
13. ASME Boiler and Pressure Vessel Code, Section XI.
14. IEEE Standard 308.