

U.S. Nuclear Regulatory Commission
LIC-93-0093

ATTACHMENT A

2.0 LIMITING CONDITIONS FOR OPERATION

2.7 Electrical Systems

Applicability

Applies to the availability of electrical power for the operation of plant components.

Objective

To define those conditions of electrical power availability necessary to provide for safe reactor operation and the continuing availability of engineered safety features.

Specifications

(1) Minimum Requirements

The reactor shall not be heated or maintained at temperatures above 300°F unless the following electrical systems are operable:

- a. Unit auxiliary power transformers T1A-1 or -2 (4,160 V).
- b. House service transformers T1A-3 and 4 (4,160 V).
- c. 4,160 V engineered safety feature buses 1A3 and 1A4.
- d. 4,160 V/480 V Transformers T1B-3A, T1B-3B, T1B-3C, T1B-4A, T1B-4B, T1B-4C.
- e. 480 V distribution buses 1B3A, 1B3A-4A, 1B4A, 1B3B, 1B3B-4B, 1B4B, 1B3C, 1B3C-4C, 1B4C.
- f. MCC No. 3A1, 3B1, 3A2, 3C1, 3C2, 4A1, 4A2, 4C1 and 4C2.
- g. 125 V d-c buses No. 1 and 2 (Panels EE-8F and EE-8G).
- h. 125 V d-c distribution panels AI-41A and AI-41B.
- i. 120V a-c instrument buses A, B, C and D (Panels AI-40A, B, C and D).
- j. 120V a-c instrument panels AI-42A and AI-42B.
- k. Station batteries No. 1 and 2 (EE-8A and EE-8B) including one battery charger on each 125V d-c bus No. 1 and 2 (EE-8F and EE-8G).
- l. ~~Both diesel generators, with a full engine base day tank and a minimum of 16,000 gallons of fuel in the underground storage tank.~~

Two emergency diesel generators (DG-1 and DG-2).

- m. One diesel fuel storage system containing a minimum volume of 16,000 gallons of diesel fuel in FO-1, and an additional 8,000 gallons of diesel fuel in FO-10.

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- d. Either one of the 4.16 kV engineered safeguards buses, 1A3 or 1A4 may be inoperable for up to 8 hours provided the operability of the diesel generator associated with the operable bus is demonstrated immediately and there are no inoperable required engineered safeguards components associated with the operable bus.
- e. One of each group of 4160 V/480 V Transformers (T1B-3A or 4A), (T1B-3B or 4B), and (T1B-3C or 4C) may be inoperable for up to 8 hours provided there are no inoperable required engineered safeguards components which are redundant to components on the inoperable transformer.
- f. One of the 480 V distribution buses connected to bus 1A3 or connected to bus 1A4 may be inoperable for up to 8 hours provided there are no inoperable required safeguards components which are redundant to components on the inoperable bus.
- g. Either Group of MCC No.'s (3A1, 3B1, 3A2, 3C1, 3C2,) or (4A1, 4A2, 4C1, 4C2) may be inoperable for up to 8 hours provided there are no inoperable required safeguards components which are redundant to components on the inoperable MCC. MCC 3C1 may be inoperable in excess of 8 hours if battery chargers No. 1 and No. 2 are operable.
- h. One of the four 120V a-c instrument buses (A, B, C or D) may be inoperable for 8 hours provided the reactor protective and engineered safeguards systems instrument channels supplied by the remaining three buses are all operable.
- i. Two battery chargers may be inoperable for up to 8 hours provided battery charger No. 1 (EE-8C) or No. 2 (EE-8D) is operable.
- j. Either one of the emergency diesel generators (DG-1 or DG-2) may be inoperable for up to seven days (total for both) during any month, provided there are no inoperable required engineered safeguards components associated with the operable diesel generator. If one diesel generator is inoperable, within 8 hours (regardless of when the inoperable diesel generator is restored to operability) EITHER:
 - (1) Start the other diesel generator to verify operability, OR
 - (2) Ensure the absence of common cause for the diesel generator inoperability for the other diesel generator.
- k. If inventory of diesel fuel in FO-1 is less than 16,000 gallons and/or FO-10 is less than 8,000 gallons, but the combined inventory in FO-1 and FO-10 is greater than a 6 day supply (21,350 gallons), then restore the required inventory within 48 hours.

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- kl. Island buses 1B3A-4A, 1B3B-4B, and 1B3C-4C may be inoperable for up to 8 hours provided there are no inoperable ~~required~~ safeguards components which are redundant to components on the inoperable bus(es).
- lm. Either one of the 125V d-c buses No. 1 or 2 (Panels EE-8F or EE-8G) may be inoperable for up to 8 hours.
- mn. Either one of the 125V d-c distribution panels AI-41A or AI-41B may be inoperable for up to 8 hours.
- no. Either one of the 120V a-c instrument panels AI-42A or AI-42B may be inoperable for up to 8 hours.

Basis

The electrical system equipment is arranged so that no single failure can inactivate enough engineered safeguards to jeopardize the plant safety. The 480V safeguards are arranged on nine bus sections. The 4.16kV safeguards are supplied from two buses.

The normal source of auxiliary power with the plant at power for the safeguards buses is from the house service power transformers being fed from the 161 kV incoming line with on-site emergency power from either one of two diesel generators and off-site standby power via the unit auxiliary transformers.⁽¹⁾ The loss of the 161kV incoming line renders the house service transformers (T1A-3 and T1A-4) inoperable in that the transformers cannot supply power to the 4.16kV safeguards buses 1A3 and 1A4. Inoperability of the house service transformer(s) or loss of the 161kV incoming line is not reportable pursuant to 10 CFR 50.72 criteria; however, the NRC will be promptly notified of these events via the NRC Operations Center.

The two emergency diesel generators on site do not require outside power for start up or operation.

Upon loss of normal and standby power sources, the 4.16 kV buses 1A3 and 1A4 are energized from the diesel generators. Bus load shedding, transfer to the diesel generator and pickup of critical loads are carried out automatically.⁽²⁾

When the turbine generator is out of service for an extended period, the generator can be isolated by opening motor operated disconnect switch DS-T1 in the bus between the generator and the main transformer, allowing the main transformer and the unit auxiliary power transformers (T1A-1 and T1A-2) to be returned to service.⁽³⁾ The auxiliary power transformers are not considered inoperable during these normal plant startup/shutdown realignments.

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Equipment served by 4.16 kV and 480 V auxiliary buses and MCC's is arranged so that loss of an entire 4.16 kV bus does not compromise safety of the plant during DBA conditions. For example, if 4.16 kV bus 1A3 is lost, two raw water pumps, one low pressure safety injection pump, two high pressure safety injection pumps, one auxiliary feedwater pump, two component cooling water pumps, one containment spray pump and two containment air fans are lost. This leaves two raw water pumps, one low pressure safety injection pump, one high pressure safety injection pump, one component cooling water pump, two containment spray pumps and two containment air fans which is more than sufficient to control containment pressure below the design value during the DBA.

~~The total fuel oil engine base tank capacity of 550 gallons on each diesel is considered more than adequate since approximately 5 hours running time (worse case loading) is available before transfer of fuel oil from the 18,000 gallon underground storage tank is mandatory. Two 13 gpm diesel oil transfer pumps per diesel, with each being fed from the diesel it is associated with, are available for transferring fuel oil from the storage tank to the day tanks. The 16,000 gallons in the storage tank in addition to the day tanks will provide diesel operation under the required loading conditions for a minimum of 7 days should only one diesel be in operation. It is considered incredible not to be able to secure fuel oil from one of several sources in the vicinity of the Omaha in less than three days under the worst of weather conditions.~~

Each diesel generator has sufficient capacity to start and run at design load required by engineered safety features equipment. The safety features operated from one diesel generator can adequately cool the core for any loss of coolant incident and also maintain the containment pressure within the design value. The engine base tank capacity of 550 gallons on each diesel provides 3 hours running time (worst case loading) before transfer of fuel oil from the 18,000 gallon capacity emergency diesel generator fuel oil storage tank FO-1 is mandatory. Two fuel oil transfer pumps per diesel, with each being powered from the associated diesel, are available for transferring fuel oil from FO-1 to the day tanks. The minimum diesel fuel oil inventory available to the diesel generators from the emergency diesel generator fuel oil storage tank FO-1 is maintained to assure the operation of either: 1) one diesel generator at full rated design capacity for at least 3.6 days, or 2) one diesel generator at post accident load conditions for a minimum of 4.5 days.

A minimum of 8,000 gallons of diesel fuel oil is reserved in the auxiliary boiler fuel oil storage tank FO-10 for transfer to the emergency diesel generator fuel oil storage tank in the event of an emergency to extend the fuel supply for diesel generator operation to 7 days. Methods of transfer of the fuel oil from this tank to FO-1 have been established and procedures have been developed so that the transfer can be made in a timely manner without adversely impacting diesel generator operation. Therefore, a minimum diesel fuel oil inventory available to the diesel generators from the total on-site diesel fuel oil storage capacity is maintained to assure the operation of one diesel generator at the required post accident loads for 7 days. The fuel inventory is allowed below the 7 day supply, but above a 6 day supply, for a period of 48 hours. This restriction allows

sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to initiating a plant shutdown as required by Specification 2.7(2). This period is acceptable based on the remaining capacity (more than 6 days), the fact that procedures are in place to obtain replenishment, and the low probability of an event during this brief period.

Additional supplies of diesel fuel oil are available in the Omaha area and from nearby terminals. Ample facilities exist to assure deliveries to the site within 24 hours.

One battery charger on each battery shall be operating so that the batteries will always be at full charge; this ensures that adequate d-c power will be available for all emergency uses. Each battery has one battery charger permanently connected with a third charger capable of being connected to either battery bus. The chargers are each rated for 400 amperes at 130 volts. Following a DBA the batteries and the charger will handle all required loads. Each of the reactor protective system instrumentation channels is supplied by one of the a-c instrument buses. The removal of one of the a-c instrument buses is permitted as the 2-of-4 logic may be manually changed to a 2-of-3 logic without compromising safety.

The engineered safeguards instrument channels use a-c instrument buses (one redundant bus for each channel) and d-c buses (one redundant bus for each logic circuit). The removal of one of the a-c instrument buses is permitted as the two of four logic automatically becomes a two of three logic.

Required engineered safeguards components, as described in Specification 2.7(2), refers to components required to be operable by other Limiting Conditions for Operation within these Technical Specifications. If no other LCO requires a particular ESF component to be operable, then its redundant component is also not required to be operable due to this specification. As an example, Specification 2.3 requires that safety injection pumps be operable prior to the reactor being made critical, and Specification 2.7 applies when the RCS is above 300°F. If the RCS is above 300°F but the reactor is not critical, then no safety injection pumps are required to be operable.

References

- (1) USAR Section 8.3.1.2
- (2) USAR Section 8.4.1
- (3) USAR Section 8.2.2

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ATTACHMENT B

DISCUSSION, JUSTIFICATION AND NO SIGNIFICANT HAZARDS CONSIDERATIONS

DISCUSSION AND JUSTIFICATION

The Omaha Public Power District proposes to revise the Fort Calhoun Station Unit No. 1 Technical Specification 2.7, "Electrical Systems." Currently, Specification 2.7 (1), "Minimum Requirements," states that a minimum of 16,000 gallons of fuel must be in the Emergency Diesel Generator (EDG) fuel oil storage tank FO-1.

In 1988 a concern was raised regarding the lack of a diesel generator fuel oil consumption calculation. The Design Basis Reconstitution Project located the original Gibbs and Hill (G&H) load model but not the calculation. This model was used with the engine fuel consumption rates to determine the amount of fuel oil required to operate either diesel for 7 days. Rerunning the original model indicated that more than 19,000 gallons (versus the 16,000 gallon Technical Specification requirement) would be necessary. This resulted in Fort Calhoun being unable to meet the requirement contained in the Updated Safety Analysis Report (USAR) and the Technical Specification basis to maintain sufficient on-site fuel oil to operate a diesel for 7 days. This discrepancy was reported to the NRC in Licensee Event Report 88-020 dated October 3, 1988 (LIC-88-870).

Based on a revised EDG bounding loading model, the diesel generator's operating time was calculated for two situations, the operating time available prior to transferring fuel from the underground storage tank (FO-1), and total operating time. The calculation assumes only 15,760 gallons of fuel are accessible from FO-1 when the 16,000 gallons required by Technical Specification 2.7(1) are maintained. This decrease in the amount of fuel available is due to the location of the fuel oil transfer pump's foot valve. In addition, the calculation assumes that one of the diesel generators is secured within 8.5 hours of accident initiation.

Engineering analysis has indicated that a minimum inventory of 24,520 gallons of fuel is required in order to ensure 7 days of operation of 1 diesel generator (and 8.5 hours of operation of the second diesel generator) at the loads necessary to support and maintain safe reactor shutdown in the most limiting accident case (Ref. ANSI/ANS-59.51-1989 Appendix B, "Alternate Calculation of Fuel Oil Storage Capacity"). This inventory is available on-site using the reserve of fuel stored in the auxiliary boiler fuel oil storage tank FO-10 and the inventory in the day and base tanks (850 gallons for each EDG). The auxiliary boiler is designed to heat plant work areas and support water treatment plant operation when the plant is shutdown.

OPPD has reviewed the design documents for storage tanks FO-1 and FO-10. This review has determined that the two tank vessels are nearly identical, with the only identified differences being the nameplate and current Critical Quality Element (CQE) classification. The capacity, foundation, construction materials, construction code, and initial pressurized leak testing are identical for both tanks. Based on the acceptance of storage tank FO-1 in the original licensing basis for FCS, storage tank FO-10 can be relied on as a source of fuel oil for replenishing storage tank FO-1 in the event of an accident.

The fuel oil transfer piping for the diesel driven auxiliary feedwater pump FW-54 will be modified to allow more timely transfer of fuel oil from storage tank FO-10 to storage tank FO-1 than presently possible. Although the transfer pump for FW-54 is a non-safety-related component, power can be supplied to the transfer pump from either of the two EDGs or from the generator connected to the diesel driver for FW-54. The transfer piping is non-CQE but is qualified to ANSI B31.1-1986 standards. To reduce the time required to connect FO-10 to FO-1, additional valves and piping will be added to the FW-54 fuel oil transfer piping system. Sufficient hose for the FW-54 fuel oil transfer piping system will be dedicated, tagged, and stored in an appropriate area. Periodically, the hose will be checked via a preventative maintenance task to ensure it is available for use. As a backup to the FW-54 fuel oil transfer piping system, a portable pump and sufficient hose will be procured and stored in an appropriate area. Periodically, the pump and hose will be checked via a preventative maintenance task to ensure they are available for use. The vendor and model number of the level indicators are the same for both FO-1 and FO-10, and they have similar maintenance requirements.

The 24,520 gallons of fuel oil necessary for 7 day EDG operation are provided by the 16,000 gallons of fuel oil in FO-1, less 240 gallons that cannot be utilized from FO-1, plus 1700 gallons of fuel oil in the day tanks and base tanks (850 gallons for each diesel), plus an additional 8000 gallons reserved from FO-10, less 240 gallons that cannot be utilized from FO-10, which actually provides a total of 25,220 gallons, 700 gallons more than required. Specifying 8000 gallons in FO-10 rather than 7300 gallons allows for minor inventory fluctuations in the emergency diesel generator day and base tanks.

Upon reaching the 16,000 gallon level in FO-10, additional fuel oil would be ordered from offsite sources as currently directed by FCS administrative procedures. At this point, the auxiliary boiler would be able to operate for approximately 53 hours without encroaching on the 8,000 gallons of fuel oil reserved for potential transfer to storage tank FO-1. Fuel oil is normally available within 24 hours from offsite sources, and the Technical Support Center, which would be activated in the event of an emergency, has procedures directing replenishment of the fuel oil supply.

Additional Changes

Specifications 2.7(2)d, 2.7(2)e, 2.7(2)f, 2.7(2)g, 2.7(2)j, and the basis are being revised to clarify that it is not permissible to have inoperable required engineered safeguards components which are redundant to components powered by inoperable electrical equipment. The word "required" is being added to clarify that if a Limiting Condition for Operation does not require an ESF component to be operable, then its redundant component is also not required to be operable due to this specification. As an example, Specification 2.3 requires that safety injection pumps be operable prior to the reactor being made critical. Specification 2.7 applies above 300 degrees F and requires that, for an electrical component to be inoperable, that there are no inoperable safeguards components associated with the operable electrical component. A literal interpretation would therefore require a safety injection pump to be operable above 300 degrees even though it is not required by Specification 2.3.

Basis of Specification 2.7

The Basis of Specification 2.7 is being revised to correctly state the capacity of the dedicated fuel oil storage system as 4.5 days supply (calculated using the formulas of ANSI/ANS-59.51-1989 Appendix B, "Alternate Calculation of Fuel Oil Storage Capacity"). It further states that sufficient fuel must be reserved to meet the design criteria of IEEE-308 and that, based on a minimum level of 16,000 gallons in the emergency diesel storage tank FO-1 and the base/day tank volume, a reserve of 8,000 gallons must be kept in the auxiliary boiler fuel oil storage tank FO-10 to meet the 7 days of operation fuel oil storage capacity requirements.

BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION:

The proposed changes do not involve significant hazards consideration because operation of Fort Calhoun Station Unit No. 1 would not:

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

The current configuration of the fuel oil supply system for the emergency diesel generators does not meet the capacity requirements of IEEE-308 as being capable of providing fuel for 7 days of diesel generator operation following the most severe accident. Allowing credit for the use of the auxiliary boiler fuel oil storage tank will enable the site to meet this criterion. As stated in the Basis of Specification 2.7, it is considered incredible not to be able to secure fuel oil from one of several sources in the vicinity of Omaha in less than three days. Crediting the reserve inventory in FO-10 increases the margin of safety.

Since no change in the EDG fuel oil storage and distribution system's configuration is required to achieve the inventory increase, nor does any fuel oil storage system contribute to any previously analyzed accident sequence, the proposed change does not increase the probability or consequences of previously analyzed accident sequences.

- (2) Create the possibility of a new or different kind of accident from any previously analyzed.

The crediting of the auxiliary boiler fuel oil storage tank reserve inventory as part of the on-site storage capacity for the emergency diesel generators does not create the possibility of a new accident.

OPPD has reviewed the design documents for storage tanks FO-1 and FO-10. The review has determined that the two tank vessels are nearly identical with the only difference being the nameplate and current CQE classification. The capacity, foundation, construction materials, construction code, and initial pressurized leak testing are identical for both tanks. Both tanks have been evaluated for seismic effects and it was concluded that they would remain intact following a design basis earthquake. Both tanks are buried to approximately the same depth and therefore would be equally resistant to impact from a tornado borne missile. The vendor and model numbers for the level indicators for both tanks are also the same.

Emergency Plan Implementing Procedure EPIP-RR-17A, "TSC Administrative Logistics Coordinator Actions," currently provides guidance for transfer of the fuel oil from the auxiliary boiler fuel oil storage tank to the emergency diesel fuel oil storage tank via the transfer pump for the diesel driven auxiliary feedwater pump, should the need arise.

Although the transfer pump for FW-54 is a non-safety-related component, power can be supplied to the transfer pump from either of the two EDG's or from the generator connected to the diesel driver for FW-54. The transfer piping is non-safety-related but is designed and installed to ANSI B31.1-1986 standards. The flow capacity of the transfer pump is 5 gpm. The consumption rate of one emergency diesel generator is less than 3 gpm at peak post accident loading conditions, therefore the transfer pump can provide adequate fuel transfer capabilities.

The tanks are not permanently interconnected, so that a failure of FO-10 or a transfer line would not affect FO-1. Therefore the proposed changes do not create the possibility of a new or different kind of accident from any previously analyzed.

- (3) Involve a significant reduction in the margin of safety.

The proposed changes increase the margin of safety by use of a supply of fuel oil reserved in the auxiliary boiler fuel oil storage tank to ensure that the 7 day on site fuel supply criteria is met. Therefore, the proposed changes do not involve a significant reduction in the margin of safety.

Therefore, based on the above considerations, it is OPPD's position that this proposed amendment does not involve significant hazards considerations as defined by 10 CFR 50.92 and the proposed changes will not result in a condition which significantly alters the impact of the Station on the environment. Thus, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and pursuant to 10 CFR 51.22(b) no environmental assessment need be prepared.