



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. DPR-40
OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION, UNIT NO. 1
DOCKET NO. 50-285

1.0 INTRODUCTION

By letter dated November 11, 1991, as supplemented June 25, 1992, Omaha Public Power District (OPPD) submitted a request for changes to the Fort Calhoun Station, Unit No. 1 Technical Specifications (TS). The requested changes would correct inconsistencies in TS 2.7 "Electrical Systems," and would provide further guidance on equipment necessary for the 161kv power supply. Additionally, administrative changes are incorporated for TS 2.7 and Table 2-10.

[The June 25, 1992, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.]

2.0 EVALUATION

2.1 Background Information

By letter dated November 15, 1989, OPPD submitted a proposed TS change request for the Fort Calhoun Nuclear Station, (FCNS) Unit 1. This proposed TS change request pertained to the action required for inoperability of the 161kv offsite power transmission line. The wording in the November 15, 1989 submittal for TS 2.7(2)n is as follows:

The 161KV transmission line may be out of service and unit operation may continue in the Power Operation Condition (Mode 1) if the 345kv system and both diesel generators are operable. During the time the 161kv power source is unavailable, the requirement for the performance of monthly surveillance tests on the diesel generators or any other test that could challenge the emergency actuation of the diesel generators is deferred until seven (7) days after restoring the 161kv power source.

At Fort Calhoun, the 161kv offsite power transmission line is the only power source to the house service transformers (station startup transformers) TIA-3 and TIA-4. The action statement pertaining to inoperability of these

9208100191 920803
PDR ADOCK 05000285
PDR

transformers is provided in TS 2.7(2)b. The wording for this specification at the time the above revised wording was proposed for TS 2.7(2)n is as follows:

House service transformers TIA-3 or TIA-4 (4.16kV) may be inoperable for up to one week. House service transformers TIA-3 and 4 (4.16kV) may be inoperable for up to 24 hours provided the operability of both diesel generators is demonstrated immediately, and the NRC is notified immediately and a report is submitted to the NRC as specified in Section 5.6 with an outline of the plans for prompt restoration of offsite power and the additional precautions to be taken while the transformers are out of service.

The above proposed requested change for TS 2.7(2)n appeared to allow continued plant operation far beyond the 24 hours allowed by TS 2.7(2)b. However, at the time the above proposed change was requested for TS 2.7(2)n, the licensee did not request a change to TS 2.7(2)b. This being the case, these two TS were not consistent in that the inoperability of the 161kV transmission line which provides input power to the two station service transformers is functionally equivalent to inoperability of the two station service transformers. These inoperability conditions are functionally equivalent since electrical power to the emergency safety buses can not be provided by the associated offsite power circuit path if either one of the two conditions exists. Thus, with equivalent functional degradation in the emergency power system, plant operating restrictions should be equivalent or at least consistent. Further, the proposed TS change permitted continued plant operation with the 161kV transmission line inoperable for an indefinite period of time and without notifying the NRC. This does not conform to General Design Criterion 17 during the time the 161kV transmission line is inoperable. These items formed the bases for the staff not accepting the proposed TS change. Thus, the staff in a Safety Evaluation dated January 30, 1990, which addressed the proposed change to TS 2.7(2)n concluded that this change was unacceptable.

In addition, the above Safety Evaluation contained suggestions relating to the proposed TS change request. These suggestions were that TS 2.7(2)n be eliminated and a revision for TS 2.7(2)b be considered. For TS 2.7(2)b, the staff offered the following wording taken from another plant of similar vintage for use as a guideline:

Start-up transformer 1-2 (2400V) may be inoperable for up to 24 hours provided the operability of both diesel generators is demonstrated immediately. Continued operation beyond 24 hours is permissible provided that a report is sent to the NRC immediately with an outline of the plans for prompt restoration of the start-up transformer and the additional precautions to be taken while the transformer is out of service.

2.2 Revised Technical Specification Proposals

By letters dated November 11, 1991, and June 25, 1992, OPPD provided submittals containing proposed revisions for TS Section 2.7 "Electrical Systems" addressing limiting conditions for operation for the FCNS. These

submittals contained proposed revisions to correct inconsistencies and to provide further guidance on equipment necessary for the 161kV power supply. Proposed revisions were provided for Subsections 2.7(1) "Minimum Requirements" and 2.7(2) "Modification of Minimum Requirements." These two subsections are provided below in comparative text format which indicates the proposed wording revisions as well as the previous wording. As provided below, characters shown underlined indicate additions and characters shown deleted indicate removals.

Specification Subsection 2.7(1) - Minimum Requirements

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

- a. Unit auxiliary power transformers T~~1~~1A-1 or -2 (4,160 V).
- b. House service transformers T~~1~~1A-3 and 4 (4,160 V).
- c. 4,160 V engineered safety feature buses 1A3 and 1A4.
- d. 4,160 V/480 V Transformers T~~1~~1B-3A, T~~1~~1B-3B, T~~1~~1B-3C, T~~1~~1B-4A, T~~1~~1B-4B, T~~1~~1B-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 A~~1~~1-41A and A~~1~~1-41B.
- i. 120 V a-c ~~Four~~ instrument ~~and~~ buses A, B, C, and D (Panels AI-40A, B, C, and D).
- j. 120 V a-c instrument panels AI-42A and AI-42B.
- k. ~~Two~~ Station batteries No. 1 and 2 (EE-8A and EE-8B) including at least one battery charger on each 125 V d-c 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.

Specification Subsection 2.7(2) - Modification of Minimum Requirements

The minimum requirements may be modified to the extent that one of the following conditions will be allowed after the reactor coolant has been heated above 300°F ~~made critical~~. However, the reactor shall not be made critical unless all minimum requirements are met. If any of the provisions of these

exceptions are violated, the reactor shall be placed in a hot shutdown condition within the following 12 hours. If the violation is not corrected within an additional 12 24 hours, the reactor shall be placed in a cold shutdown condition within an additional 24 hours.

- a. Both unit auxiliary power transformers T1A-1 and -2 (4.16 kV) may be inoperable for up to 24 hours provided the operability of both diesel generators is demonstrated immediately.
- b. ~~House service transformers TIA 3 or TIA 4 (4.16 kV) may be inoperable for up to one week. House service transformers TIA 3 and 4 (4.16 kV) may be inoperable for up to 24 hours provided the operability of both diesel generators is demonstrated immediately, and the NRC is notified immediately and a report is submitted to the NRC as specified in Section 5.6 with an outline of the plans for prompt restoration of off site power and the additional precautions to be taken while the transformers are out of service.~~

Either house service transformer TIA-3 or TIA-4 (4.16 kV) may be inoperable for up to 7 days provided the operability of the diesel generator associated with the inoperable transformer is immediately verified. The NRC Operations Center shall be notified by telephone within 4 hours after transformer inoperability. Continued operation beyond 7 days is permissible, provided a special report is submitted to the NRC within 48 hours after transformer inoperability pursuant to Section 5.9.3 of the Technical Specifications. The special report will outline the plans for restoration of transformer operability and the additional precautions to be taken while the transformer is out of service.

- c. Both house service transformers TIA-3 and TIA-4 (4.16 kV) may be inoperable for up to 72 hours provided the operability of both diesel generators is immediately verified. The loss of the 161 kV incoming line renders both transformers inoperable. The NRC Operations Center shall be notified by telephone within 4 hours after transformer inoperability. Continued operation beyond 72 hours is permissible, provided a special report is submitted to the NRC within 48 hours after both transformers inoperability pursuant to Section 5.9.3 of the Technical Specifications. The special report will outline the plans for restoration of the transformers' operability and the additional precautions to be taken while the transformers are out of service.
- e. 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 engineered safeguards components associated with the operable bus.
- d. 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 engineered safeguards components associated with the operable transformers which are redundant to components on the inoperable transformer.

- e. 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 safeguards components associated with the operable bus, which are redundant to components on the inoperable bus.
- f. 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 safeguards components associated with the operable MCC's, which are redundant to components on the inoperable MCC. MCC 3C1 may be inoperable in excess of 3 hours if battery chargers No. 1 and No. 2 are operable.
- g. 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.
- h. 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.
- i. 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 the other diesel generator is started to verify operability, shutdown and controls are left in the automatic mode and there are no inoperable engineered safeguards components associated with the operable diesel generator.
- j. k. Island buses 1B3A-4A, 1B3B-4B, and 1B3C-4A may be inoperable for up to 8 hours provided there are no inoperable safeguards components associated with the operable bus which are redundant to components on the inoperable bus(es).
- k. l. Either one of the 125V d-c DG buses No. 1 or 2 (Panels EE-8F or and EE-8G) may be inoperable for up to 8 hours.
- l. m. Either one of the 125V d-c DG distribution panels AI-41A or and AI-41B may be inoperable for up to 8 hours.
- m. n. Either one of the 120V a-c AG instrument panels AI-42A or AI-42B may be inoperable for up to 8 hours.
- n. The 161 kV transmission line may be out of service and unit operation may continue or the reactor may be restarted from a hot shutdown condition if (i) operability of the remaining source is immediately verified and (ii) immediate notification is made by telephone or telegraph to the Director of the NRC Regional Office in Arlington, Texas of the loss and of the plans to restore the electric power system to its full capability.

2.3 Staff Evaluations for Revised Technical Specification Proposals

2.3.1 Specification Subsection 2.7(1)

As currently written Specification Subsection 2.7(1) applies above 300°F. However, the as written Specification Subsection 2.7(2) only applies after the reactor is critical. Thus, if the reactor is above 300°F but not yet critical and a listed system is declared inoperable, Specification 2.0.1 is invoked which requires the unit to be placed in hot shutdown within 6 hours. If the same system is declared inoperable at full power the modification to minimum requirements apply which contain an allowed outage time for the specific system and additionally allow 12 hours to place the unit in hot shutdown if the system outage time cannot be met. With this wording, more restrictive actions appear to be required for a somewhat less significant reactor state. To remove this, the related proposed revision to Specification Subsection 2.7(2) as it applies to Subsection 2.7(1) would allow the same modifications to minimum requirements above 300°F as allowed after criticality. However, the revised Specification Subsection 2.7(2) would not allow the reactor to be made critical unless all of the listed systems are operable. The related proposed wording revisions remove the apparent inconsistency. Further, the wording in Subsection 2.7(2) is being revised to add the word "coolant" and delete the word "up" so as to be more consistent with wording contained in Specification Section 2.5 "Steam and Feedwater Systems."

The proposed revisions for Specification Subsection 2.7(1) also included numerous administrative changes. Subsections 2.7(1)a, 2.7(1)b, 2.7(1)d, and 2.7(1)h contained typographical errors. These errors involved equipment designations for transformers and electrical panels. Equipment designation for transformers is corrected to "T1" and the designation for electrical panels is corrected to "AI." Specification Subsections 2.7(1)i, 2.7(1)j, and 2.7(1)k are revised to include specific equipment designations. All of these administrative changes are considered enhancement items and clarify the existing specification meanings.

The proposed wording revisions for Specification Subsection 2.7(1) remove inconsistencies and correct errors. Further, these revisions do not change the substantive meaning of the subsection but rather enhance and clarify its meaning. Thus, the staff concludes that the proposed wording revisions for Specification Subsection 2.7(1) are acceptable.

2.3.2 Specification Subsection 2.7(2)

As revised, Specification Subsection 2.7(2) would allow the modification of minimum requirements to apply after the reactor coolant is above 300°F as well as after the reactor has been made critical. However, the proposed revised specification subsection will not allow the reactor to be made critical unless all systems listed in Specification Subsection 2.7(1) are operable. In addition, the proposed revision clarifies the time limits contained in the action statement. The clarified time limits are consistent with the present specification and do not change the allowed outage time. The intent of action statements in both the revised and present specification subsection is to allow a total of 48 hours to

reach the cold shutdown condition. In addition Specification 2.0.1, which would be invoked if systems in excess of the modification to minimum requirements are inoperable, continues to allow a total of 42 hours to reach the cold shutdown condition. Thus, proposed revisions remove inconsistencies and clarify the actual meaning of the existing specification subsection.

Proposed revisions modify Specification Subsection 2.7(2)b. Specification Subsection 2.7(2)n is deleted in its entirety. Further, other proposed revisions define time limits and reporting requirements. These actions are consistent with the guidelines provided by the NRC staff in a Safety Evaluation Report dated January 30, 1991. (See the Background Information Section 2.1 provided above.)

Revised Specification Subsection 2.7(2)b allows operation for seven days with one house service transformer out-of-service and in this regard is consistent with the current specification subsection. In addition, the revised subsection requires verbally notifying the NRC Operations Center of the transformer inoperability within 4 hours. Added to a part of the specification subsection is a clause which permits operation beyond the 7 days provided OPPD submits a special report to the NRC pursuant to TS 5.9.3 within 48 hours detailing restoration plans and measures taken to prevent a plant trip and diesel generator inoperability while the transformer is out of service. Continued operation beyond 7 days would require NRC concurrence. Continued station operation with a house transformer out-of-service is considered desirable in that a unit shutdown would result in the loss of one of the 4.16kV safeguards buses. The loss of a 4.16kV safeguards bus would result in primary system transients and challenges to the diesel generator system. The proposed specification subsection also requires completion of operability verification for the diesel generator associated with the inoperable house service transformer. Operability verification is defined as performing actions to confirm that the last monthly surveillance test results for the appropriate diesel generator were satisfactory. This provides additional assurance that the plant can be safely shutdown. Demonstrating operability of the diesel generator surveillance test is not desirable for this plant situation, since this action requires the diesel to be taken out of the automatic mode. Thus, this would create a condition whereby one division of safeguards equipment would be without any automatic emergency response of its onsite emergency power system for the duration of the test. These proposed revisions add clarity to the specification subsection.

Proposed revisions delete Specification Subsection 2.7(2)n and address the loss of the 161kV offsite power supply in Specification Subsection 2.7(2)c. The present Specification Subsection 2.7(2)n allows reactor startup with the 161kV offsite transmission line out of service. This allowance is incorrect in that although the reactor could be taken to hot standby (critical), the main station generator could not be synchronized to the power grid or even supply house loads. This is because the disconnect switch DS-T1 located between the main generator output and the input to the main station output transformer is a manual/motor switch

with no synchronization capability. Thus, the 345kV bus must be de-energized before closing disconnect switch DS-T1. Removal of the 345kV bus would de-energize all four reactor coolant pump motors and thus result in a scram of the reactor. These proposed revisions remove inconsistencies and correct errors.

The proposed Specification Subsection 2.7(2)c allows station operation for 72 hours with both house service transformers out of service. This subsection also clearly indicates that both house service transformers can be rendered inoperable by the loss of the 161kV offsite power supply. As a result of a staff request, OPPD documented that since March 1989 there have been three forced outages for the 161kV offsite power supply during station operation. For each of these forced outages, successful fast transfers of each of the two 4.16kV emergency buses from one of the two house service transformers to one of the two unit auxiliary transformers were completed without the unit tripping or other incidents. This demonstrates that continued station operation can occur, without incident, even if the 161kV offsite supply is lost. Further, if both house service transformers are rendered inoperable, the operability of both diesel generators is required to be verified. For such a plant situation, requiring operability verification for both diesel generators is consistent with the present specification requirement. However, as previously indicated in this report, demonstrating diesel generator operability by performing surveillance testing concurrent with both house service transformers inoperable is not desirable since this testing requires that the diesels be taken out of the automatic mode. Thus, this results in a condition whereby a division of safeguards equipment is without automatic emergency response of its onsite emergency power system for the duration of a diesel generator surveillance test.

Specification Subsection 2.7(2)c also contains a reporting requirement specifying that if both house service transformers are inoperable then verbal notification of this must be provided to the NRC Operations Center within 4 hours. Further, for this plant situation, if station operation is to continue beyond 72 hours a special report, pursuant to TS 5.9.3, detailing restoration plans and additional measures to be taken while the transformers are out of service must be provided to the NRC within 48 hours. In addition, continued plant operation beyond 72 hours requires NRC concurrence. Continued operation is a preferred course of action rather than shutdown since a turbine generator trip concurrent with inoperable house service transformers results in emergency and non-emergency buses losing electrical power. This electrical power loss challenges systems such as the diesel generators and auxiliary feedwater systems, requires natural circulation cooling of fuel to remove decay heat, and requires decay heat removal from the steam generators by way of the main steam safety valves due to loss of the condenser. For this situation, the plant cannot establish the normal hot shutdown configuration until the 345kV power source is backfed by way of the main station output transformer to the necessary electrical buses so that condenser and reactor coolant pump operations can be reestablished. On the bases of its review of the proposed revisions as provided above,

the staff concludes that these revisions for Specification Subsection 2.7(2) correct errors, remove inconsistencies, do not involve significant hazards considerations, are consistent with the staff guidance provided in the previous Safety Evaluation Report dated January 30, 1990, and as such are acceptable.

2.3.3 Administrative Change Proposals

The comparative text for Specification Subsection 2.7(2) shows numerous and various administrative change proposals. These proposals are addressed in the paragraphs provided below.

Specification Subsection 2.7(2)d is revised to provide consistent wording and to clarify that either bus 1A3 or 1A4 may be inoperable. Specification Subsection 2.7(2)e contains typographical errors, in that, the equipment designation for transformers is shown as "TI" and is corrected to "T1." This subsection as revised provides clarity to indicate what components are allowed to be inoperable. Redundant components are not necessarily powered by the corresponding redundant transformer in the other electrical division. For example, if transformer T1B-3A is inoperable then charging pump CH-1A is inoperable. The corresponding transformer in the other electrical division is T1B-4A. However, this transformer does not supply power to any charging pump motor. Thus, the revision proposals clarify that components redundant to those powered by the inoperable transformer cannot be inoperable for any reason.

Specification Subsection 2.7(2)f is revised to clarify that only one of the 480V buses may be inoperable at any given time and to clarify that components redundant to those powered by the inoperable bus cannot be inoperable for any reason. Specification Subsection 2.7(2)g is revised to clarify that either group of Motor Control Centers may be inoperable. However, this subsection maintains the additional requirement that the redundant set of components must be operable.

Specification Subsection 2.7(2)h, 2.7(2)i, and 2.7(2)j are revised to add equipment designations. Specification Subsection 2.7(2)k is revised to add equipment designations and to clarify that components redundant to those powered by the inoperable bus cannot be inoperable for any reason.

Specification Subsection 2.7(2)l and 2.7(2)m are revised to add equipment designations and to indicate that either one or its redundant system may be inoperable. The inclusion of the word "and" in these subsections is incorrect and as such is deleted. Specification Subsection 2.7(2)n is revised to provide consistent wording and to clarify that either AC instrument panel AI-42A or AI-42B are allowed to be inoperable.

In addition to the above administrative change proposals, there are others contained in the basis written for Specification Subsection 2.7 "Electrical Systems." These additional change proposals are addressed below.

A correction is provided to the example contained in the basis which discusses the results of losing bus 1A3. In the normal electrical lineup 4.16kV bus 1A3 powers 480V bus 1B3A and 480V island bus 1B3A-4A. Thus, the loss of bus 1A3 would result in the loss of two, not one, high pressure safety injection (HPSI) pumps and one containment spray (CS) pump and leave one, not two, HPSI pump and two, not one, CS pumps available. This correction does not affect the number of pumps assumed to be available in a design basis accident.

The rating of the battery chargers is revised from "200" to "400" amperes to reflect an increase in rating as a result of a modification.

The discussion concerning the ability of the batteries to handle all loads following a design basis accident is generalized to reflect the requirements of the batteries and chargers as discussed in Section 8.4.2 of the Updated Safety Analysis Report (USAR). The batteries are rated for 8 hours and cannot handle all loads indefinitely as might be implied by the present wording.

The word "channels" which appears between the words system and instrumentation in the phrase "reactor protective system channels instrumentation channels" is deleted as it is unnecessary. The word "avilible" is misspelled and is corrected to read "available."

References for FSAR (Final Safety Analysis Report) Sections 8.2.2, 8.3.1.2, and 8.4.1 are revised to reflect the updated version of this document which is designated as USAR.

Table 2-10 on page 2-98, Item 5, Containment Water Level Narrow Range (LT-559 & LT-600), contains a typographical error. The equipment identification for level transmitter "LT-559" is incorrect and is being corrected to read "LT-599."

Table 2-10 Note (c) contains a typographical error. Note (c) incorrectly states, "With hot channels inoperable,.." and is being corrected to read "With both channels inoperable,.."

Table 2-10 Note (i) is being revised to add the words "per core quadrant" to clarify that the number of Core Exit Thermocouples required by NUREG-0337 are four per core quadrant and not a total of four in the entire core. In addition, the word "channels" is revised to read "Core Exit Thermocouples." These changes are consistent with an interpretation of this specification from a memorandum from NRR to Region IV dated December 11, 1990. (TAC No. 75596)

Table 2-10 Notes (g) and (h) are being revised to reflect the guidance discussed on Note (i) for consistent wording.

Specification 5.9.3 is being revised to add a reference to TS 2.7(2).

Based on review and evaluation of the administrative change proposals as identified and described above, the staff concludes that these proposals correct error, remove inconsistencies, provide clarity, and do not alter

specification substantive meanings. Thus, we conclude that these administrative change proposals are acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Nebraska State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (56 FR 64658). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Frank Ashe
Steve Bloom

Date: August 3, 1992