

June 20, 1985

Docket No. 50-285

Mr. R. L. Andrews  
Division Manager - Nuclear Production  
Omaha Public Power District  
1623 Harney Street  
Omaha, Nebraska 68102

Dear Mr. Andrews:

As you know, a Technical Specification Improvement Project (TSIP) is underway within the Commission. As a part of the TSIP, project managers were requested to provide input. Ed Tourigny, the NRR Project Manager for Fort Calhoun, undertook a review of the Fort Calhoun Technical Specifications Limiting Conditions for Operations (LCOs) to determine if all the current LCOs had action statements and applicable operating modes associated with them. As a result of his review, he concluded that some LCOs could be clarified to improve the quality of the Fort Calhoun Station LCOs. A copy of his study was provided to the TSIP for use in their program. A copy is enclosed for your information.

Sincerely,

Original signed by

Edward J. Butcher, Acting Chief  
Operating Reactors Branch No. 3  
Division of Licensing

Enclosure:  
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See next page

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THE FORT CALHOUN STATION  
LIMITING CONDITIONS FOR OPERATION REVIEW

March 1985

## Introduction

A review of the Fort Calhoun Technical Specification Limiting Conditions for Operation (LCOs) was undertaken to determine if all the current LCOs had action statements and applicable operating modes associated with them. The review assumed that the current LCOs were adequate, and no comparison to the Combustion Engineering Standard Technical Specifications was made. Current LCOs included all amendments issued through Amendment Number 85 which was issued on October 11, 1984. The LCOs associated with radiological effluents in air and water (LCOs 2.9(1) and (2)) were not reviewed because a major updating of these LCOs is currently taking place.

Action statements are associated with LCOs to enable the licensee to determine what action should be taken upon entering the LCO. The action ranges from correcting the situation within a specific time frame in that operating mode to placing the unit in cold shutdown within a specific time frame. The action statement part of the review was further subdivided into two parts. One part dealt with the action statement being addressed in the LCO itself. The other part dealt with the action statement being addressed in the general requirements LCO. Basically, the general requirements LCO contains action statements that are applicable to a specific LCO when an action statement is not addressed in that specific LCO or when the action statement associated with a specific LCO cannot be satisfied. It should be noted that, for purposes of this review, a LCO is different than an action statement. A LCO is a condition; an action statement is what the licensee must do if the condition cannot be satisfied.

Applicable operating modes are associated with LCOs to enable the licensee to determine what mode a given LCO is in effect. In the Fort Calhoun Station case, Table 1 illustrates the operating modes and their definitions. The Fort Calhoun Station operating modes are different from the operational modes contained in the Combustion Engineering Standard Technical Specifications.

## LCO Action Statements Review

Table 2 illustrates the LCOs that have action statements that are part of the LCO. Table 3 illustrates the LCOs that do not have action statements that are part of the LCO. It should be noted that only the LCO numbers are given in the Tables. The actual technical specifications must be referred to for the specific LCO language.

The following paragraphs contain problems that were found with the LCOs. In general, the problems are that the LCOs are really action statements. Possible improvements are illustrated.

- ° LCO 2.1.1(2) - RCS Operable Components - Hot Shutdown or  
 $300^{\circ}\text{F} \leq T_{\text{cold}} \leq 515^{\circ}\text{F}$

LCO 2.1.1.(2)(a) identifies the reactor coolant loops that shall be operable and LCO 2.1.1(2)(b) states that at least one of the loops shall be in operation. However, LCO 2.1.1(2)(c) contains an action statement dealing with an insufficient number of operable reactor coolant pumps. One improvement might be to delete LCO 2.1.1(2)(c) and the wording contained in this LCO 2.1.1.(2)(c) be made a part of LCOs 2.1.1(2)(a) and 2.1.1(2)(b).

- ° LCO 2.1.1(3) - RCS Operable Components - Cold Shutdown or  
 $210^{\circ}\text{F} \leq T_{\text{cold}} \leq 300^{\circ}\text{F}$

LCO 2.1.1(3)(b) states that at least one decay heat removal loop must be in operation. However, LCO 2.1.1(3)(c) contains an action statement- if no coolant loop is in operation. An improvement might be to delete LCO 2.1.1(3)(c) and the wording contained in this LCO be made a part of LCO 2.1.1(3)(b).

#### LCO 2.1.1(12) - RCS Pressure Isolation Valves

LCO 2.1.1(12)(a) requires demonstration of pressure isolation valve integrity. LCO 2.1.1(12)(b) provides conditions to remain in operation if the integrity of any valve cannot be demonstrated. However, LCO 2.1.1(12)(c) contains an action statement applicable if the first two LCOs cannot be met. An improvement might be to delete LCO 2.1.1(12)(c) and the wording contained in this LCO be made a part of the first two LCOs.

- ° LCO 2.1.2(1) through (5) - RCS Heatup and Cooldown Rate

LCOs 2.1.2(1) through 2.1.2(4) contain requirements for heatup and cooldown. However, LCO 2.1.2(5) contains an action statement if any one of the four requirements cannot be met. An improvement might be to delete LCO 2.1.2(5) and the wording contained in this LCO be made a part of the first four LCOs.

- ° LCO 2.1.2(6) - Change of Heatup and Cooldown Figures

No specific action statement is specified if this LCO is not met. In addition, applying the general requirements LCO may not be appropriate. An improvement might be to add a statement to state: "The provisions of Specification 2.0.1 are not applicable." Another improvement might be to add an action statement to comply with the specification within a certain time frame.

- ° LCO 2.1.3(1) through (5) - RCS Radioactivity

LCO 2.1.3(1) provides upper limits of coolant radioactivity. However, LCOs 2.1.3(2) through (5) provide action statements if the limits cannot be satisfied. An improvement might be to delete LCOs 2.1.3(2) through (5) and the action statements be made a part of LCO 2.1.3(1).

- ° LCO 2.1.4(1) and (2) - RCS Leakage Limits

LCOs 2.1.4(1) and (2) are action statements. An improvement for specification (1) might be to start off the specification with the words "The reactor coolant system leakage shall not exceed 1 gpm." An improvement for specification (2) might be to start off the specification with the words "The reactor coolant system leakage shall not exceed 10 gpm."



- ° LCO 2.1.5(1) through (5) - Maximum Reactor Coolant Oxygen and Halogens Concentrations

LCOs 2.1.5(1) through (5) are action statements. An improvement might be to state the specific LCO at the beginning of every specification. For example, the first sentence for specification (1) might read "The concentration of oxygen in the reactor coolant shall not exceed 0.1 ppm during power operation."

- ° LCO 2.1.8 - RCS Vents

LCO 2.1.8(1) contains operability requirements for the RCS Vents. However, LCOs 2.1.8(2) and 2.1.8(3) contain action statements if the operability requirements cannot be met. An improvement might be to delete LCOs 2.1.8(2) and 2.1.8(3) and make these action statements a part of LCO 2.1.8(1).

- ° Unnumbered LCO - Refueling Operations, Irradiated Fuel Movement After Shutdown

Page 2-38 of the technical specifications contains an unnumbered LCO. An improvement might be to number the LCO and add an action statement.

- ° LCO 2.11 - Containment Building Crane and Fuel Storage Building Crane

No action statements are specified if loads are carried over the RCS or Spent Fuel. In addition, applying the general requirements LCO may not be appropriate. An improvement might be to add the following statement to the LCO: "The provisions of Specification 2.0.1 are not applicable. When the requirements of this specification are not satisfied, immediately place the load in a safe condition."

- ° LCO 2.12(1) - Control Room Temperature

LCO 2.12(1) is an action statement. An improvement might be to start off the specification with the words "The control room air temperature shall not reach 120°F."

- ° LCO 2.12(2) - Control Room Thermometer

No action statement is specified if a thermometer is not in the control room. In addition, applying the general requirements LCO may not be appropriate. An improvement might be to add the following statement to the LCO: "The provisions of Specification 2.0.1 are not applicable. Place a thermometer in the control room within "X" hours when the specification is not met."

- ° LCO 2.12(3) - Plant Temperature Monitoring

This LCO requires plant temperature monitoring of areas containing safety related instrumentation. No action statement is specified if this LCO is not met. In addition, applying the general requirement LCO may not be appropriate. An improvement might be to add the following statement to the LCO: "The provisions of Specification 2.0.1 are not applicable. If this specification is not met, take action within "X" hours to meet this specification."

° LCO 2.16 - River Level

LCOs 2.16(1) and (2) are action statements. An improvement might be to state the specific LCO as follows: "Reactor operation is permissible when the Missouri River level is between 976 feet, 9 inches and 1009 feet."

° LCO 2.18 - Shock Suppressors (Snubbers)

These LCOs require shock suppressors to be operable, provide conditions for removing a snubber for surveillance, and provide conditions for adding, changing or deleting snubbers. However, LCO 2.18(2) is an action statement dealing with one or more inoperable snubbers. An improvement might be to delete this LCO and make this action statement a part of LCO 2.18(1).

° LCO 2.19 except 2.19(3), (4)b - Fire Protection System

These LCOs address requirements for fire detection instrumentation and fire suppression systems. These LCOs contain action statements but the action statements do not address shutting down the plant. One may argue that the general requirement LCO on plant shutdown is then applicable. It is not the intent to shut down the plant if these LCOs cannot be met. An improvement might be to add the following statement to these LCOs: "The provisions of specification 2.0.1 are not applicable."

° LCO 2.20 - Steam Generator Coolant Radioactivity

LCO 2.20(1) provides conditions for secondary system radioactivity. However, LCO 2.20(2) contains an action statement if LCO 2.20(1) cannot be met. An improvement might be to delete LCO 2.20(2) and make this statement a part of LCO 2.20(1).

LCO Applicable Operation Modes Review

Table 4 illustrates the LCOs where applicable operation modes are not stated or when it is unclear when the LCOs are in effect. It should be noted that only the LCO numbers are given in the table; the actual technical specifications must be referred to for the specific LCO language. The following paragraphs identify the problems in more detail. It should be noted that some LCOs specify "when the reactor is critical", "when fuel is in the reactor", "when the RCS is above 300°F", "during scheduled heat up and cooldowns," etc. instead of naming the actual modes. One may say that the modes are not specifically specified; however, these LCOs are not included in Table 4 because the operator still knows when these LCOs are applicable.

° LCO 2.1.1(7), LCO 2.1.1(9) through (12) - RCS Operable Components

LCOs 2.1.1(7), 2.1.1(9), and 2.1.1(10) deal with pressure testing. An improvement might be to add the following statement to these LCOs: "This specification is in effect at all times." LCO 2.1.1(11) deals with starting a non-operating reactor coolant pump. An improvement might be to add the following statement to this LCO: "This specification is in effect at all times." LCO 2.1.1(12) deals with RCS pressure isolation valves. An improvement might be to amend this LCO to specify when it is in effect.

° LCO 2.1.3 - Reactor Coolant Radioactivity

These LCOs deal with reactor coolant radioactivity. An improvement might be to amend these LCOs to include the operating modes that the LCOs are in effect.

° LCO 2.1.4 except 2.1.4(4), (5) - RCS Leakage Limits

These LCOs deal with reactor coolant system leakage. An improvement might be to amend these LCOs to include the operating modes that the LCOs are in effect.

° LCO 2.6(2) - Containment Internal Pressure

This LCO deals with containment internal pressure. An improvement might be to amend this LCO to include the operating modes that the LCO is in effect.

° LCO 2.11(2) - Loads Over Spent Fuel

This LCO deals with not allowing material to be carried over spent fuel located in the spent fuel pool. This LCO could be amended to specify that the LCO is in effect whenever there are spent fuel assemblies located in the spent fuel pool. Spent fuel is currently in the pool and will remain there for the foreseeable future. Therefore, no change is suggested from a practical point of view.

° LCO 2.12(1) - Control Room Air Temperature

This LCO deals with not allowing the temperature in the control room to exceed 120°F. An improvement might be to amend this LCO to specify that the LCO is in effect at all times.

° LCO 2.13(1) - Nuclear Detector Cooling System

This LCO deals with not allowing the concrete temperature to exceed 150°F. An improvement might be to amend this LCO to specify that the LCO is in effect whenever the reactor is in service. It should be noted that this is the same applicability used for the temperature detectors to be in service (LCO 2.13(2)). In addition, the term "reactor is in service" may lead to different interpretations. A further improvement might be to define this term.

° LCO 2.14 - ESF Instrumentation Settings

This LCO deals with the engineered safety features system initiation instrumentation settings. An improvement might be to amend the LCO to specify when the LCO is in effect on a channel basis.

° LCO 2.15 - Instrument Operating Requirements

This LCO references tables dealing with operability for reactor protection system channels, engineered safety features channels, isolation channels, and other safety feature channels. An improvement might be to amend the LCO to specify when the LCO is in effect on a channel basis.



° LCO 2.16 - River Level

These LCOs address plant operation based on river level. An improvement might be to amend the LCOs to include the operating modes that the LCOs are in effect.

° LCO 2.17 - Miscellaneous Radioactive Material Sources

This LCO addresses miscellaneous radioactive material sources. An improvement might be to amend this LCO <sup>to state that it</sup> is in effect at all times.

° LCO 2.19 - Fire Protection System

These LCOs deal with the fire detection and suppression systems. An improvement might be to amend the LCOs to state that these systems must be operable whenever equipment protected by these systems must be operable.

° LCO 2.20 - Steam Generator Coolant Radioactivity

These LCOs deal with steam generator coolant radioactivity. An improvement might be to amend these LCOs to include the operating modes that the LCOs are in effect.

Other Problems

° LCO 2.0.1(1), (2) - General Requirements LCO

The general requirements LCO contain action statements that must be used if (1) the action statement in a specific LCO cannot be met or (2) the specific LCO does not contain a specific action statement. The action statement is a three phased one: hot shutdown within 6 hours, subcritical and less than 300°F within the next 6 hours, and cold shutdown within the next 30 hours. The problem envisioned has to do with the phrase "subcritical and less than 300°F." The reactor must be subcritical in the hot shutdown condition. Therefore, repeating the subcritical requirement does not appear to be necessary for the second phase. The less than 300°F requirement does not have a temperature reference. Is it  $T_{cold}$ ,  $T_{avg}$ , or  $T_{hot}$ ? An improvement might be to modify this LCO to delete the second phase and replace the second phase with the words " $T_{cold} < 300^{\circ}\text{F}$  within the next 6 hours."

° Action Statements Timing Inconsistencies

Table 5 illustrates the results of an action statements timing review. It should be noted that only the LCO numbers are given in the table. The actual technical specifications must be referred to for the specific LCO language. The times required to reach hot standby, hot shutdown, and cold shutdown are varied throughout the LCOs. The times required to reach hot standby are 6 and 12 hours. The times required to reach hot shutdown are 2, 4, 6 and 12 hours. In addition, some LCOs do not specify the time to reach hot shutdown. The times required to reach cold shutdown are 12, 24, 30 and 36 hours. In addition, some LCOs do not specify the time to reach cold shutdown. It is not good practice to have so many varied times to reach the hot and cold shutdown conditions from an operator's point of view. An improvement might be to adopt a standardized set of times to place the reactor in hot standby, hot shutdown, and cold shutdown.

° Operating Mode "Dead Band"

There currently exists an operating mode "dead band" in the technical specifications. The cold shutdown condition is in effect when  $T_{cold}$  is less than 210°F. The hot shutdown condition is in effect when  $T_{avg}$  is greater than 515°F. The "dead band" is when the reactor coolant system (RCS) is at a temperature in between; the operator does not know explicitly what LCOs are in effect. One improvement might be to define a mode to cover this "dead band". Another improvement might be to define what LCOs are in effect when the RCS is in this "dead band".

Summary

As can be seen from the review contained in the previous pages, there is room for clarification in the Fort Calhoun Station LCOs. The objective is to have a specified and appropriate action statement for every LCO, and to know when a LCO is in effect. This is currently not the case and these inconsistencies can cause confusion and mistakes. The licensee may want to apply for technical specification changes to clarify the LCOs discussed in this review.

TABLE 1

Fort Calhoun Station Operating Modes

Power Operation Condition (Operating Mode 1)

The reactor is in the power operation condition when it is critical and the neutron flux power range instrumentation indicates greater than 2% of rated power.

Hot Standby Condition (Operating Mode 2)

The reactor is considered to be in a hot standby condition if the average temperature of the reactor coolant ( $T_{avg}$ ) is greater than 515°F, the reactor is critical, and the neutron flux power range instrumentation indicates less than 2% of rated power.

Hot Shutdown Condition (Operating Mode 3)

The reactor is in a hot shutdown condition if the average temperature of the reactor coolant ( $T_{avg}$ ) is greater than 515°F and the reactor is subcritical by at least the amount defined in Paragraph 2.10.2.

Cold Shutdown Condition (Operating Mode 4)

The reactor coolant  $T_{cold}$  less than 210°F and the reactor coolant is at shutdown boron concentration.

Refueling Shutdown Condition (Operating Mode 5)

The reactor coolant is at refueling boron concentration and  $T_{cold}$  is less than 210°F.

TABLE 2

Limiting Conditions for Operation that have Action Statements that are part of the LCO\*.

2.0.1(1)	2.4(1)
2.0.1(2)	2.4(2)
2.1.1(2)	2.7(2)
2.1.1(3)	2.8(1) through (12)
2.1.1(12)	2.10.2(1) through 2.10.2(9)
2.1.2(1) through (5)	2.10.3(2) through 2.10.3(4)
2.1.3(1) through (5)	2.10.4(1) through 2.10.4(5)
2.1.4(1) through (3)	2.12(1)
2.1.5(1) through (5)	2.12(4)
2.1.6(4)	2.15
2.1.6(5)	2.16(1)
2.1.7(1)	2.16(2)
2.1.8(1) through (3)	2.17
2.2(3)	2.18
2.3(2)	2.19(1) through (8)
	2.20
	2.21

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\*Note - It should be recognized that, if the action statement that is part of the LCO cannot be met, then the general action statement must be used unless otherwise noted.

TABLE 3

Limiting Conditions for Operation that do not have Action Statements that are part of the LCO, and therefore, the general requirements LCO must be used unless otherwise noted.

2.1.1(1)	2.5(1) through (4)
2.1.1(4) through (11)	2.6(1)
2.1.2(6)	2.6(2)
2.1.4(4)	2.7(1)
2.1.4(5)	2.10.1(1) through (4)
2.1.6(1) through (3)	2.10.3(1)
2.2(1)	2.11(1)
2.2(2)	2.11(2)
2.3(1)	2.12(2)
2.3(3)	2.12(3)
	2.13(1)
	2.13(2)
	2.14



TABLE 4

LCOs where applicable modes are not stated or when it is unclear when the LCOs are in effect.

2.1.1(7)  
2.1.1(9) through (12)  
2.1.3  
2.1.4 except 2.1.4(4), (5)  
2.6(2)  
2.11(2)  
2.12(1)  
2.13(1)  
2.14  
2.15  
2.16  
2.17  
2.19  
2.20

TABLE 5

Action Statements Timing Inconsistencies

<u>LCO NUMBER</u>	<u>ACTION STATEMENT TIMING</u>
LCO 2.0.1(1), (2)	hot shutdown within 6 hours, subcritical and $< 300^{\circ}\text{F}$ within the next 6 hours, and in at least cold shutdown within the following 30 hours
LCO 2.1.1(2)(c)	cold shutdown within the next 12 hours (reference mode is hot shutdown or $300^{\circ}\text{F} \leq T_{\text{cold}} \leq 515^{\circ}\text{F}$ )
LCO 2.1.1(12)(c)	cold shutdown condition within 24 hours
LCO 2.1.2(5)(c)	cold shutdown within 36 hours
LCO 2.1.3(3), (4)	at least hot shutdown within $T_{\text{avg}} < 536^{\circ}\text{F}$ within 6 hours if not fixed within specified time interval or greater than a certain concentration
LCO 2.1.4(1)	hot shutdown condition (no time specified) if not identified with 12 hours; cold shutdown condition (no time specified) if not identified within 24 hours
LCO 2.1.4(2)	hot shutdown condition within 12 hours; cold shutdown condition (no time specified)
LCO 2.1.4(3)	cold shutdown condition within the next 36 hours if not fixed within 4 hours
LCO 2.1.5(5)	hot shutdown condition within 12 hours thereafter if not fixed within 24 hours; cold shutdown condition within 24 hours thereafter if not fixed within 24 hours
LCO 2.1.6(4)	primary system must be depressurized and vented (no mode specified nor any time specified)
LCO 2.1.6.a, b	hot standby within the next 12 hours, if not fixed within 1 hour; cold shutdown within the following 24 hours
LCO 2.1.7(1)(a), b	hot shutdown within the following 12 hours if not fixed within 72 hours for (a) or 12 hours for (b)

LC0 2.1.8(2), (3)	hot standby within 12 hours if not fixed within 30 days for (2) or within 72 hours for (3); cold shutdown within the following 30 hours
LC0 2.2(3)	hot shutdown condition in 4 hours if not fixed during the specified time; cold shutdown shall be initiated (no time specified to reach cold shutdown) if not fixed within 48 hours
LC0 2.3(2)	hot shutdown condition within 12 hours if not fixed within the specified time; cold shutdown condition within 24 hours if not fixed within 48 hours
LC0 2.4(1)	hot shutdown condition within 12 hours if not fixed within seven days; cold shutdown condition within 24 hours if not fixed within 48 hours
LC0 2.4(2)	hot shutdown condition within 12 hours if not fixed within 24 hours; cold shutdown condition within 24 hours if not fixed within 48 hours
LC0 2.7(2)	hot shutdown condition within 12 hours if not fixed in the specified time; cold shutdown condition within 24 hours if not fixed within 24 hours
LC0 2.10.2(3)	hot shutdown within 6 hours if not fixed within 3 hours
LC0 2.10.2(4)	hot shutdown within the specified hours if not fixed within the specified hours
LC0 2.10.2(5)	hot shutdown within 6 hours if not fixed within one hour
LC0 2.10.2(7)c	hot shutdown within 6 hours if not fixed within 2 hours
LC0 2.10.2(9)a(iii)	hot shutdown within 6 hours if specification 2.10.4(1) cannot be met
LC0 2.10.2(9)c(ii)2	hot shutdown in 2 hours if power cannot be reduced to less than $10^{-1}\%$ within 15 minutes
LC0 2.10.4(1),(2),(3),(4)	hot standby within 6 hours if not fixed within specified times

LCO 2.12(1)	hot shutdown condition (no time specified) if not fixed within four hours
LCO 2.12(4)	cold shutdown condition within 24 hours if not fixed within seven days
LCO 2.15	hot shutdown within 12 hours; cold shutdown within 24 hours if not fixed within 24 hours
LCO 2.16	cold shutdown condition (no time specified)
LCO 2.19(4)b(111)	hot standby within 6 hours if not fixed within 24 hours; cold shutdown within 30 hours
LCO 2.20(2)	hot shutdown within 6 hours
LCO 2.21	hot shutdown within 12 hours if not fixed within specified times