Omaha Public Power District
444 South 16th Street Mall
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January 22, 2013
LIC-12-0178

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

References:
1. Docket No. 50-285
2. Letter from OPPD (D. J. Bannister) to NRC (Document Control Desk), Fort Calhoun Station (FCS) License Amendment Request (LAR) 12-01, *Proposed Change to Establish the Reactor Protective System (RPS) Actuation Circuits Limiting Condition for Operation (LCO)*, dated February 10, 2012 (LIC-12-0006) (ML12046A838)
3. Letter from NRC (L. E. Wilkins) to OPPD (David J. Bannister), Fort Calhoun Station, Unit No.1 - Request for Additional Information Regarding License Amendment Request to Establish the Reactor Protective System Actuation Circuits Limiting Condition for Operation (TAC ME8038), dated August 31, 2012 (NRC-12-0084) (ML12236A243)
4. Letter from OPPD (M. J. Prospero) to NRC (Document Control Desk), "Responses to Request for Additional Information Re: License Amendment Request for Fort Calhoun Station to Establish the Reactor Protective System Actuation Circuits Limiting Condition for Operation," dated October 1, 2012 (LIC-12-0136)(ML12276A043)
5. Email from NRC (L. E. Wilkins) to OPPD (B. R. Hansher), "Draft 2nd Round RAIs Fort Calhoun RPS Actuation Circuit RAI Responses (ME8038)," dated October 31, 2012
6. Email from NRC (L. E. Wilkins) to OPPD (D. L. Lippy), "FW: NRC Request for Additional Information re: LAR to Establish RPS Actuation Circuits LCO at FCS," dated December 17, 2012

SUBJECT: Responses to Second Request for Additional Information Re: License Amendment Request for Fort Calhoun Station to Establish the Reactor Protective System Actuation Circuits Limiting Condition for Operation (TAC ME8038)

The enclosure to this letter provides the Omaha Public Power District's (OPPD's) responses to the Nuclear Regulatory Commission's (NRC's) second request for additional information (RAI) transmitted in References 5 and 6 via email.

In Reference 2, and as supplemented in Reference 4, OPPD submitted a request for amendment to Renewed Facility Operating License No. DPR-40 for the Fort Calhoun Station, Unit No.1. The proposed amendment would establish the limiting condition for operation (LCO) requirements for the reactor protective system actuation circuits in Technical Specification 2.15,

"Instrumentation and Control Systems." The NRC staff reviewed the information provided in OPPD's application and determined that additional information was required in order to complete its review as delineated in References 3, 5 and 6.

There are no regulatory commitments being made in this letter. If you should have any questions, please contact Mr. Bill R. Hansher at 402-533-6894.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 22, 2013.

Louis P. Cortopassi
Site Vice President and CNO

LPC/TWS/BRH/dll

Enclosure: Responses to Request for Additional Information

Responses to Request for Additional Information
License Amendment Request for Fort Calhoun Station to Establish the Reactor Protective System Actuation Circuits Limiting Condition for Operation (TAC No. ME8038)

By letter dated February 10, 2012, as supplemented by letter dated October 1, 2012 (ADAMS Accession Nos. ML12046A838 and ML12276A043, respectively), the Omaha Public Power District (OPPD) submitted a request for an amendment to the Renewed Facility Operating License No. DPR-40 for the Fort Calhoun Station (FCS), Unit No. 1. The proposed amendment would establish the limiting condition for operation (LCO) requirements for the reactor protective system (RPS) actuation circuits in Technical Specification (TS) 2.15.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by the licensee and has determined that the following information is needed in order to complete its review. [Reference emails from NRC Project Manager to OPPD dated October 31, 2012, and December 17, 2012.]

1. Follow up question to RAIs #2 and #3 (NRC ADAMS Accession No. ML12236A243):

The LAR, Section 3.0, describes the applicability for the proposed Technical Specification (TS) modification. This description explains the applicability when the Reactor Protection System (RPS) initiation logic and the actuation logic are required to be operable considering operation of the control element assemblies (CEA) and the boron concentration. In the responses to items 2 and 3, FCS described the applicability of the proposed TS modification by correlating it to the STS and describing additional steps taken to cover the full range of operating modes.

a) Please explain and describe the relationship between the reactor coolant (Tcold) and Reactor Coolant System (RCS) temperature described in the applicability of the proposed TS modification.

OPPD Response to NRC RAI 1.a) - Follow-up question to RAIs #2 and #3:

In the proposed application, the Applicability section states that "By TS definition, Mode 4 is RCS less than 210 degrees F with a boron concentration of greater than or equal to shutdown boron concentration but less than refueling boron concentration, Mode 5 is RCS less than 210 degrees F with a boron concentration of greater than or equal to refueling boron concentration."

By TS definition, Operating Mode 4 is reactor coolant [temperature] T_{cold} is less than 210 degrees Fahrenheit (°F) and the reactor coolant is of greater than or equal to SHUTDOWN BORON CONCENTRATION but less than REFUELING BORON CONCENTRATION; and, Operating Mode 5 is RCS less than 210 °F with a boron concentration of greater than or equal to REFUELING BORON CONCENTRATION.

T_{cold} is used because the FCS TS use T_{cold} in the definition of operating mode 4 (i.e., Mode 4 is defined as RCS T_{cold} < 210 °F. Therefore, it is appropriate that any discussion about the mode of the plant above this temperature would also reference T_{cold}. Note that, from a practical perspective, at cold shutdown conditions, T_{cold} and average temperature (T_{ave}), which is used in STS, are approximately the same value when the plant is in Mode 4.

b) As discussed during the conference call held on October 25, 2012, please identify in Fort Calhoun's drawing of E-23866-411-003, "Reactor Protective System Functional Diagram," what constitutes a channel, initiation logic, three trip unit trip relays, and actuation logic.

OPPD Response to NRC RAI 1.b) - Follow-up Question to RAIs #2 and #3:

The FCS TS definition for instrument channel is "one of four independent measurement channels complete with the sensors, sensor power supply units, amplifiers, and trip modules provided for each safety parameter."

In reference to OPPD drawing E-23866-411-003 (Figure 7.2-2) in the Updated Safety Analysis Report (USAR), it can be seen that the manual trip channels are part of the RPS circuitry. Using the drawing as a point of reference, it can be seen that the RPS can be functionally divided into two distinct sections. The signal processing and logic section consists of instrument loops that provide four inputs (i.e., channels) to associated trip units for each monitored parameter along with the logic that combines the trip unit signals in a 2-out-of-4 combination using logic ladders. The second section of the RPS receives the output of the logic ladders and causes the M contactors to drop out when any of the logic ladders indicates that a 2-out-of-4 combination of the inputs reached a trip value. Since the input and logic section processes field signals to determine if an RPS trip should be generated, the four channels can be thought of as initiating channels. (A trip initiation logic channel consists of an M contactor and associated contacts, an interposing relay and interconnecting wiring.) Since the portion of the circuitry that connects the logic ladders to the M contactors causes the RPS to actuate a reactor trip, it can be considered as the actuation portion of the system. The manual trip channels are not processed through the logic ladders but act to de-energize the M contactors directly. Thus, they are considered to be part of the actuation portion of the RPS.

The LAR, Enclosure 2, Section 3.0, Coincidence Logic Matrices, states that: "The three trip unit trip relays from the four channels are used to make six logic matrices in the same fashion as the AB matrix." In the context of describing the logic matrices (or logic ladders as they are sometimes called), the term "trip unit trip relays" is referring to the three individual sealed trip relays contained within each of the trip units. In order to design a combinational logic that actuates for every possible combination of two channels, it is necessary to provide six logic matrices. Each of the four trip units associated with each trip function contributes three sets of contacts to the logic matrices. These contacts come from the "three trip unit trip relays."

2. Follow up question for RAI #4 (NRC ADAMS Accession No. ML12236A243):

In the response, Fort Calhoun explained operation of the manual trip channel and the basis to remove it from Table 2-2 and place it in the new TS modification. Please clarify operability requirements for the manual trip and how it relates to minimum operable channels described in the current TS. Further, please describe the operation of the actuation logic in case of a failed manual trip push button.

OPPD Response to NRC RAI 2 - Follow-up question for RAI #4:

The FCS TS Table 2-2 is based on the four independent channels for each trip function. The current TS 2.15(2) states that, if the minimum operable channel is reached, one (inoperable) channel is to be placed in the trip position. For initiating channels which consist of four independent inputs for each parameter, applying this requirement places the processing logic in a 1-out-of-2 configuration but

does not cause the RPS to actuate. Placing an inoperable manual trip channel in the tripped position would trip the reactor which is contrary to the intent of TS Table 2-2, line item 1, which clearly states that there is no minimum degree of redundancy required for manual trip channels. Clarification of this inconsistency is the main reason that the operability requirement for the manual trip channels is being moved to the new TS Section 2.15.2 which is focused on the actuation portion of the RPS.

The STS requirement for inoperability of a single manual trip channel is to open the associated reactor trip circuit breakers (RTCBs) within one hour. This does not cause a reactor trip at STS plants since clutch power supplies are supplied through alternate RTCBs. (Note that FCS does not have RTCBs but instead uses M contactors to control power to the clutch power supplies.) The STS requirement to open associated RTCBs is appropriate since there are four separate manual trip switches in the newer Combustion Engineering (CE) RPS design that work in a 2-out-of-2 logic to actuate the RPS. In contrast, the FCS RPS manual trip design makes use of only two switches either of which can cause an actuation of the RPS. Therefore, if an inoperable manual trip channel were to be placed in a tripped condition at FCS, the reactor would be shutdown. Again, this is not the intent of FCS TS Table 2-2, line item 1, which states that there is no "Minimum Degree of Redundancy" for the Manual Trip function.

3. Follow up question for RAI #6 (NRC ADAMS Accession No. ML12236A243):

In the response, Fort Calhoun explained that even though the LAR stated that changes were not made to the proposed TS modification, Fort Calhoun modified the text in the TS to clarify its intent. Please explain how the modification of the text does not change the functional intent of this TS requirement. In particular, please explain what system/component needs to be operable and the actions to be taken. For instance, if the RPS M2 contactor would fail to open, state what TS action would be entered.

OPPD Response to NRC RAI 3 - Follow-up Question for RAI #6:

Although the proposed LAR modified the text in the TS to clarify its intent, the modification of the text does not modify the functional intent of the TS requirements.

Technical Specification 2.15 currently states:

> "The operability, permissible bypass, and Test Maintenance and Inoperable bypass specifications of the plant instrument and control systems shall be in accordance with Tables 2-2 through 2-5."

TS 2.15 paragraphs (1) through (5) then provide required actions when those requirements are not met. Since the instruments for the Alternate Shutdown Panel and Auxiliary Feedwater Panel are listed in paragraph (5) and not in Tables 2-2 through 2-5, there is currently no statement that provides operability requirements for these components that shall be met delineated in the TS; only the required actions to be taken when not met (inoperable) is currently described. Therefore, the proposed change in the LAR provides the clarification stating that instruments for both the Alternate Shutdown Panel and the AFW Panel shall be operable. As a result, LCO 2.15(5) is renumbered to LCO 2.15.3 and its associated Table 2.6, Alternate Shutdown and Auxiliary Feedwater Panel Functions, is implemented; however, the functional intent is not modified.

Under the proposed LAR, the current TS 2.15 LCO is renumbered as follows:

- LCOs 2.15(1) through 2.15(4) are renumbered to 2.15.1(1) through 2.15.1(4), respectively;
- LCO 2.15(5) is renumbered to LCO 2.15.3 with a new associated Table 2-6; and
- A new LCO 2.15.2 is implemented for the RPS logic and trip initiation channels.

The fundamental change in the proposed LAR is the "literal perspective" in which the TS are written – not the intent:

The original TS 2.15(5) is written from an "IN-operability" perspective:

> "In the event that the number of operable channels of the listed Alternate Shutdown Panel or [i.e., EITHER] the Auxiliary Feedwater Panel instrumentation or control circuits falls below the required number of channels" (i.e., becomes IN-operable)… Therefore, BOTH must be OPERABLE in the original TS in order to become INOPERABLE. In other words: During operation, BOTH are OPERABLE, if Operations gets indication that one or the other becomes INOPERABLE, then action must be taken because BOTH must be OPERABLE… [Paraphrased: It only takes ONE (either alternate shutdown panel OR AFW panel) to fall below the required number of channels (be inoperable) to be in this LCO.]

The proposed revised TS 2.15.3 is written from an "OPERABILITY" perspective:

> "The alternate shutdown and [i.e., BOTH] auxiliary feedwater panel functions/instrumentation or control parameters in table 2-6 shall be operable." Therefore, BOTH must be OPERABLE in the proposed TS. In other words: During operation, BOTH are OPERABLE, if Operations gets indication that any one of them become INOPERABLE, then required actions (1) and (2) must be taken because BOTH must be OPERABLE… [Paraphrased: It only takes ONE (either alternate shutdown panel or AFW panel) to be inoperable to be in this LCO.]
>
> [Note: "BOTH" refers to the alternate shutdown and auxiliary feedwater panel instrumentation.]

Again, the proposed revised TS is written from an "OPERABILITY" perspective (i.e., both SHALL be OPERABLE) whereas the current TS is written from an IN-operability perspective (If one or the other becomes INOPERABLE, then… which implies that BOTH must be OPERABLE to begin with in order to become INOPERABLE). There currently is not a TS on what needs to be OPERABLE, per se, it simply states if this OR this becomes INOPERABLE, then take said action… so the proposed change simply rewords it to clearly state that BOTH shall be OPERABLE, then if they become inoperable, take specified action… which does not change the functional intent.

Under the proposed LAR, if the RPS M2 contactor would fail to open, TS 2.15.2 (Required Action (2)) would be entered.