From: "MILLER, D BRYAN" <dmill14@entergy.com>
To: "'N. Kaly Kalyanam'" <nxk@nrc.gov>
Date: Wed, Jul 26, 2000 4:32 PM
Subject: DRAFT - EFW RAI Response

Kaly,

Here is a draft response for the EFW RAI. It is on track to be signed by tomorrow around noon. I will fax you a copy of the signed off version shortly after I get it.

Bryan

<<Draft EFW RAI Response (7-26-00).doc>>

CC: "HOUSLEY, DENZEL" <dhous91@entergy.com>

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ATTACHMENT
DRAFT to W3F1-2000-0101
DRAFT

Response to Request for Additional Information Related to
Technical Specification Change Request NPF-38-206
Regarding the Emergency Feedwater System

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Response to Request for Additional Information Related to Technical Specification Change Request NPF-38-206 Regarding the Emergency Feedwater System

Reference: Enclosure Two to Waterford 3 letter dated January 31, 2000. Technical Specification Change Request NPF-38-206, Revision1.

NRC Request 1

Second paragraph of Answer #1

a. What is the meaning of "greater" in "greater than 13 minutes?" - how much greater than 13 minutes?

b. American National Standards Institute/American Nuclear Society (ANSI/ANS Standard ANSI/ANS-58.8-1984 shows a minimum of 10 minutes for Time Test #1 (Plant Condition 3, Loss of Off-site Power (LOOP)). Added to that would be a minimum of four minutes for Time Test #2 (PC 3, LOOP, one manipulation). Added to that would be one minute per additional operator manipulation. Added to that would be equipment process time. Assuming only one manipulation and no equipment process time, the result is already at 14 minutes. Please explain how you arrived at a time delay of from two to six minutes using the referenced standard.

c. How many isolation valves must be closed? How many operator manipulations per valve?

d. Describe process for reducing emergency feedwater (EFW) flow. How many operator manipulations are required?

Response (DRAFT)

a. The calculated value was 13.6 minutes.

Since the original calculation, the calculation of SG fill rate has been re-evaluated to determine more reasonable values for the assessment of operator actions. This re-evaluation reduced some of the conservatisms in the original evaluation and evaluated a generic bounding scenario. Instead of attempting to specify certain events and determining the maximum EFW flow rates, the re-evaluation determined SG fill rates over a range of SG operating pressures. Therefore, the results are not dependent upon a specific event, but provide conservative and bounding SG fill rates based on SG pressure.

The results of the re-evaluation provided SG fill rates for a range of SG pressures from atmospheric to 1000 psig. The shortest time to SG fill was determined to be 16.2 minutes from an Emergency Feedwater Actuation Signal (EFAS) for a SG pressure of 200 psig. Using this SG pressure, the High SG Level pre-trip alarm

would be reached in 7.0 minutes and the SG level would reach the main steam line nozzles at 16.2 minutes if no action was taken to terminate the EFW flow.

For the case of the loss of off-site power, the SG pressure would remain near normal operating pressures. Using a SG pressure of 1000 psig, the High SG Level pre-trip alarm would be reached in 10.7 minutes from EFAS and the SG level would reach the main steam line nozzles at 24.5 minutes if no action was taken to terminate the EFW flow.

The approach utilized in the re-evaluation was conservative to ensure that the considered events were appropriately bounded while maintaining a reasonable approach for determining operator action times. The re-evaluation included the following conservatisms:

- The EFW flow rate to one SG was based on three EFW pumps injecting through both parallel flow paths instead of just the one open flow path. With one parallel path isolated, the actual flow rate would be less.
- The EFW was assumed to be at its minimum temperature and increased to the SG saturation temperature.
- No credit was taken for initial SG level reducing below the EFAS actuation setpoint which would provide additional volume to fill before reaching the SG outlet nozzle.

b. The original value of two to six minutes was based on Table 2 of ANSI/ANS-58.8-1984 for one operator manipulation. Plant Condition 2 would result in a minimum operator action time delay of 2 minutes and Plant Conditions 4 and 5 would result in a value of 6 minutes.

The revised values for operator action time calculated from the re-evaluation of SG fill rates (see Response 1.a above) have been compared to the recommendations of ANSI/ANS-58.8-1984 and are provided in Figure 1. This comparison is based on one operator action in the control room to close the open isolation valve. An equipment process delay time of 30 seconds for the isolation valve to close is conservatively used.

Plant Condition 3 was chosen as a reasonable value to provide this comparison. Although Plant Conditions in ANSI/ANS-58.8-1984 are based upon the frequency of occurrence, allowance can be made for operator familiarity. The frequency of occurrence for the conditions evaluated in this response are considered very low, especially when postulating a loss of off-site power, feedwater line break (FWLB), or main steam line break (MSLB) concurrent with operation within the 72 hour action statement of the proposed Technical Specification (TS). Adequate training and procedural guidance is provided to plant operators to ensure that an overfill event does not occur. Additionally, several alarms and indications are available to the operator in addition to the credited High SG Level pre-trip alarm to alert the

control room operator to excess flow to a SG. These include SG Level alarms (EFAS), EFW high flow alarms, and SG level indications. Further, in the events discussed, the operator would be aware of the system degradation (i.e., inoperable accumulator) and would be able to anticipate the potential level control problem on the loss of instrument air.

Figure 1 provides a comparison to ANSI/ANS-58.8-1984 Figure 2 for the highest SG fill rate at 200 psig and the SG fill rate that is associated with 1000 psig. The Range for Operator Actions for these two cases is 1.7 minutes and 9.3 minutes, respectively. The figure shows that the guidelines in the ANSI/ANS standard are met. Accordingly, the times allow credit for manual operator action in these events.

c. One isolation valve must be closed. This would be performed by operator manipulation of one control switch in the main control room. This is the method credited in Response a and b above.

d. Reduction of EFW flow could be performed by securing an operating EFW pump. This would be performed by operator manipulation of one control switch in the main control room for each EFW pump, as necessary. The method provides an alternate method of preventing SG overfill.

NRC Request 2

Third paragraph of Answer #1

a. What is the meaning of "more" in more than 8 minutes?" - how much greater than eight minutes?

Response (DRAFT)

a. The calculated value was 8.3 minutes. This calculation of SG fill time has been replaced by the re-evaluation described in Response a of Request 1.

NRC Request 3

Should you plan to take exception to the time criteria of ANSI/ANS-58.8-1984, it is necessary to justify the exception by developing operator action times based on a task analysis and an independent data base. Please provide the justification for this exception.

Response (DRAFT)

No exception to the time criteria of ANSI/ANS-58.8-1984 is proposed.

NRC Request 4

Please provide a time criteria in accordance with the provisions of ANSI/ANS-58.8-1984 with the maximum EFW flow of 2300 gallons per minute to a single steam generator

during a main steam line break.

Response (DRAFT)

This scenario has been replaced by the re-evaluation described in Response 1 above. The EFW flow rate was dependent on the SG pressure. The EFW flow rate used at the pressure that resulted in the shortest time to overfill was 2536 gpm. A comparison to the time criteria of ANS/ANS-58-8-1984 for the re-evaluated SG fill rates is provided as part of Response 1.

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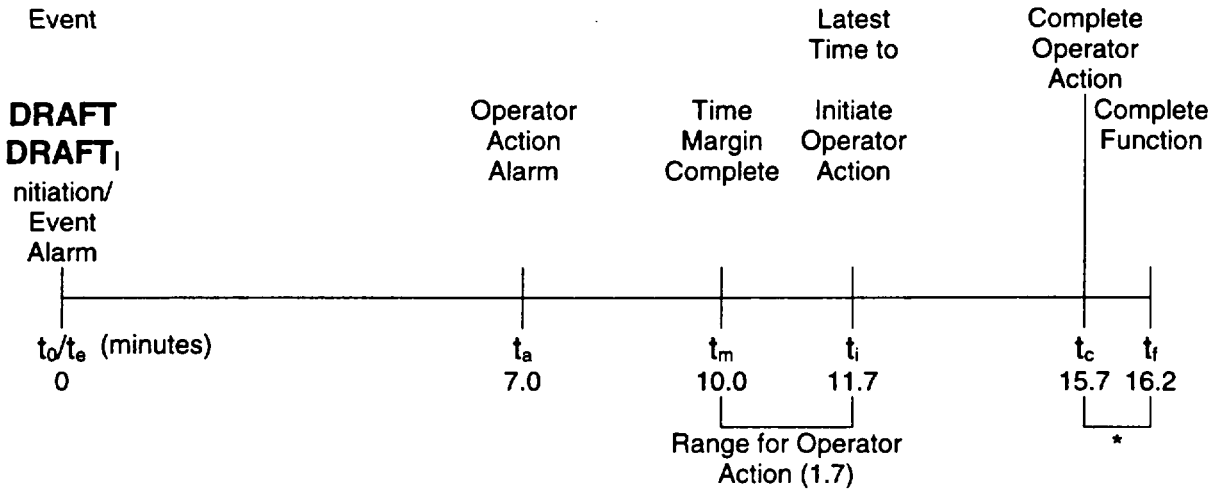
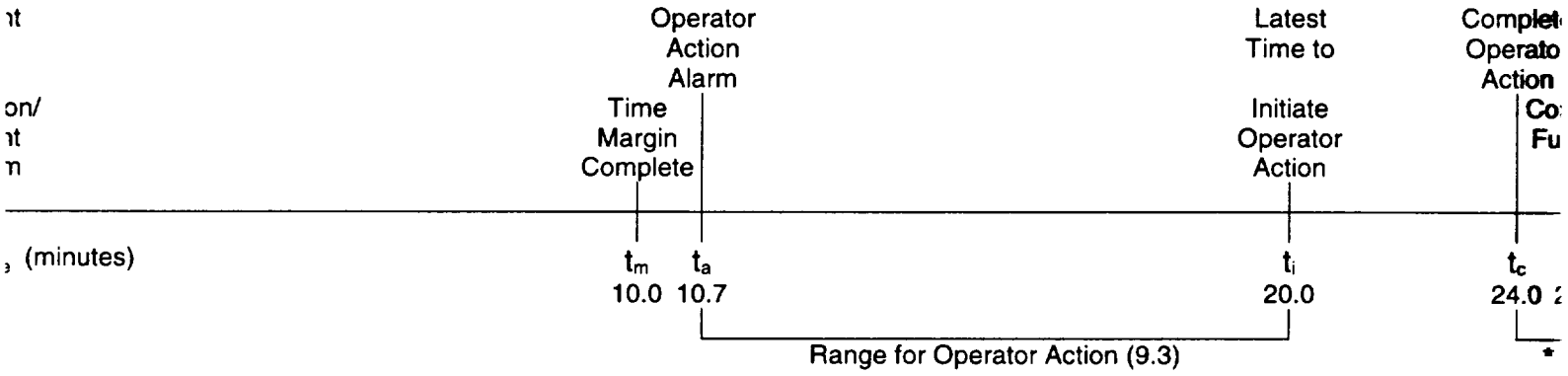
FIGURE 1 - Time Charts for Steam Generator Fill



Time Chart 1 - Steam Generator Fill with SG Pressure = 200psig



Time Chart 2 - Steam Generator Fill with SG Pressure = 1000psig

(* - Equipment Process Time Delay = 0.5 minutes)

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