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October 29, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

By letter dated April 30, 1985, Duke Power Company provided the results of an evaluation that was performed to provide additional justification for the additions to the generic Westinghouse Owners Group Emergency Response Guideline (Revision 1) ECA-1.2, "LOCA Outside Containment". These additions are specified in the Catawba Nuclear Station Emergency Procedure Guidelines. Additional justification was required in Section 13.5.2 of Supplement 4 of the Catawba Safety Evaluation Report.

In subsequent phone conversations with the NRC staff on June 11, 1985 and October 23, 1985, the April 30, 1985 submittal was discussed. As a result of these discussions the NRC staff concerns were clarified and the additional justification required to close out this item was determined. The attachment to this letter includes the additional justification and demonstrates that the operational guidance in the current Catawba Emergency Operating Procedures with regard to LOCAs outside containment is appropriate.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

ROS:slb

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator
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B021
1/1

cc: Robert Guild, Esq.
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NRC Resident Inspector
Catawba Nuclear Station

Justification For Initiating Feed and Bleed
For Mitigation of LOCAs Outside Containment
In the Catawba Emergency Procedure Guidelines

I. OVERVIEW OF THE LOCA OUTSIDE CONTAINMENT SCENARIO

A LOCA outside containment presents a unique plant safety concern in that the RCS inventory lost out the break does not accumulate in the containment sump. Therefore, as the ECCS pumps deplete the refueling water storage tank (RWST) an imminent loss of ECCS suction will occur. The normal transfer to the sump recirculation mode for long term cooling is not achievable.

The first mitigation action following the identification of a LOCA outside containment is to attempt to isolate the break. In addtion, for very small unisolable breaks outside containment, it may be possible to maintain the ECCS suction inventory by making up to the RWST at a flowrate that matches the break flowrate. Since the makeup flowrate that is available is limited, unisolable small breaks above a very small size will cause RWST depletion. The generic mitigation strategy for these scenarios is to initiate a plant cooldown and to limit depletion of the RWST by minimizing ECCS and containment spray flowrates.

II. JUSTIFICATION OF THE CURRENT CATAWBA EMERGENCY PROCEDURES

During the development of the Catawba plant-specific Emergency Procedure Guidelines, the limited guidance in the generic ERGs for mitigating LOCAs outside containment was identified as an item of concern. Three considerations resulted from the effort to determine if any additional guidance should be added to supplement the generic ERGs.

1. It is desirable to establish sufficient sump inventory in the containment to enable recirculation after the RWST depletes.

2. Depressurizing the RCS will reduce the leak rate outside containment.

3. The ice condenser is a large source of borated water in containment if it can be melted.

With these considerations in mind the guidance in the current Catawba Emergency Operating Procedures was developed. These procedures (included as Appendix A) specify the following guidance:

IF a LOCA outside containment is identified

THEN attempt to isolate it

AND

initiate makeup to the RWST

AND

determine if feed-and-bleed cooling should be initiated

The first two responses are the same as the generic guidance in the ERGs. The recommendation to determine if feed-and-bleed cooling should be initiated was based on all three of the considerations given above. Additional explicit criteria are specified to assist the operator in determining if feed-and-bleed should be initiated:

1. Insufficient RWST makeup is available and RWST depletion prior to reaching 200°F is imminent. This means that some operator action is necessary to prevent ICC.

2. Sump level is greater than 1.5 feet. This criterion requires the sump to already have sufficient level to enable alignment for recirculation. This implies that a concurrent LOCA inside containment exists.

3. The ECCS pumps have not been transferred to the sump recirculation mode. This confirms that RWST depletion is occurring.

4. RWST level is between 20% and 50%. The upper limit of 50% is required to ensure that the event has progressed sufficiently to allow break isolation actions to be taken and to estimate a projected time to reach 200°F. The lower limit of 20% is a check that enough RWST water exists to make the feed-and-bleed operation worthwhile.

The significant benefits of initiating feed and bleed under the conditions of concern are as follows:

1. RCS pressure will decrease and cause the leak rate outside of containment to decrease.

2. Mass and energy release into the containment will cause ice melt and increase the sump inventory available for recirculation.

The only potentially negative impact that has been identified with initiating feed and bleed under these conditions is an accelerated depletion of the remaining RWST inventory. This is not a concern for the current Catawba procedures since a sump level greater than 1.5 ft is required prior to initiating feed and bleed. With a pre-existing sump inventory the water relieved through the PORVs is available for recirculation. Therefore, although the RWST may deplete at a faster rate, the available ECCS suction inventory is only being redistributed and not depleted.

Based on the arguments presented above, the use of feed-and-bleed to mitigate LOCAs outside containment as specified in the existing Catawba Emergency Procedure Guidelines is justified. Significant benefits have been identified and no negative impacts exist due to the initiation criteria explicitly specified in the procedure.

III. FURTHER EVALUATION OF LOCAs OUTSIDE CONTAINMENT

As discussed in the April 30, 1985 letter, analyses were performed to determine if broader utilization of feed-and-bleed for mitigation of LOCAs outside containment could be justified. The results of these analyses indicated that for certian break sizes the initiation of feed-and-bleed would have a negative impact. As stated above this negative impact would result from a faster depletion of the remaining FWST inventory. This situation is easily understood if it is recognized that for a LOCA outside containment without a concurrent LOCA inside containment, the accumulation of the required 1.5 ft sump level will only result from the PORV relief and ice melt. This is a very substantial percentage of the remaining RWST inventory and it is lost in terms of available ECCS suction inventory. No methodology to discriminate between those break sizes with acceptable results and those with unacceptable results could be identified. Therefore, the existing feed-and-bleed initiation criteria in the Catawba procedures were not modified as a result of these analyses.

A different approach for mitigating LOCAs outside containment was discussed in the April 30, 1985 submittal. NRC review of this approach is not requested at this time. It is recommended that if the NRC decides to further evaluate operator guidelines for mitigation of LOCAs outside containment as part of the NRC review of the generic Emergency Response Guidelines, Revision 1, that the approach in the April 30, 1985 submittal be raised for discussion. Duke Power will follow any NRC/WOG interactions and then propose supplemental guidance based on the ice condenser containment design that will enhance the generic guidelines. Until such enhancements are justified, the existing Catawba procedures will be maintained.

CNS EP/1/A/5000/1C6	LOCA OUTSIDE CONTAINMENT	PAGE NO. 1 Retype #2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

___ 1. **Ensure Possible Leak Paths Isolated:**

- Ensure Following Valves: **CLOSED**
  - ND:
    - 1ND-2A, (ND Pump 1A Suct Frm Loop B)
    - 1ND-1B (ND Pump 1A Suct Frm Loop B)
    - 1ND-37A (ND Pump 1B Suct Frm Loop C)
    - 1ND-36B (ND Pump 1B Suct Frm Loop C)
    - 1ND-32A (ND Train 1A Hot Leg Inj Isol)
    - 1ND-65B (ND Train 1B Hot Leg Inj Isol)
    - 1ND-90 (ND Trn A Aux PZR Spray Isol)
    - 1ND-91 (ND Trn B Aux PZR Spray Isol)

NOTE **PWR DISCON** for 1NI-121A, 1NI-152B, 1NI-183B must be in the "ENABLE" position before they can be operated.

- NI:
  - 1NI-121A (NI Pump 1A To H-Legs B & C)
  - 1NI-152B (NI Pump 1B To H-Legs A & D)
  - 1NI-183B (ND Hdr A & B Hot Leg Inj Isol)

Form 34913 (8-82)

CNS EP/1/A/5000/1C6	LOCA OUTSIDE CONTAINMENT	PAGE NO. 2 Retype #2

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE PWR DISCON for 1NI-147B must be in the "ENABL" position before it can be operated.

___ 2. Ensure NI Pump Discharge Aligned to Miniflow Path In Preparation For Isolating NI Pump Cold Leg Injection Header.

- o Ensure Following Valves OPEN:
  - o 1NI-115A (NI Pump 1A Miniflow Isol)
  - o 1NI-144A (NI Pump 1B Miniflow Isol)
  - o 1NI-147B (NI Miniflow Hdr To FWST Isol)

___ 3. Attempt To Identify AND Isolate Possible Leak Paths.

a. Place PWR DISCONs for following valves to "ENABLE"

- o 1NI-173A (ND Hdr 1A To Cold Legs C & D)
- o 1NI-178B (ND Hdr 1B To Cold Legs A & B)
- o 1NI-162A (NI to C-Legs Inj Hdr Isol)

b. CLOSE AND RE-OPEN following valves in the order listed. Monitor NC pressure for increases during time each valve is closed.

1) 1NI-173A

2) 1NI-178B

3) 1NI-162A

CNS EP/1/A/5000/1C6	LOCA OUTSIDE CONTAINMENT	PAGE NO. 3 Retype #2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE The following valves are operated from the UHI Accumulator Hydraulic Service Panels (refer to OP/1/A/6200/10, UPPER HEAD INJECTION).

4) 1NI-243A (UHI Accum Isol)

5) 1NI-245A (UHI Accum Isol)

___ 4. **Ensure The PWR DISCON Switches For Following Valves In The "DISCON" Position:**

- o 1NI-173A
- o 1NI-178B
- o 1NI-162A
- o 1NI-147B.

___ 5. **Verify Leak Path Identified AND Isolated OR Under Control.**

a. Leak Path: IDENTIFIED

a. Continue attempts to identify leak path.

b. NC Pressure: INCREASING

b. IF leak CANNOT be isolated, THEN:

- o Initiate makeup to FWST referring to OP/1/A/6200/14, REFUELING WATER SYSTEM.

NOTE A feed and bleed of NC may decrease NC pressure and thus the Reactor Coolant leakage rate of inventory to outside containment. It may also result in melting of ice which will increase sump inventory.

c. Verify Containment Sump Level AND FWST are within ADEQUATE S/I INVENTORY region of Enclosure 1.

c. Consult plant engineering staff to determine need for establishing feed AND bleed of the NC to increase containment sump inventory.

- o IF feed and bleed of NC required, THEN refer to EP/1/A/5000/1E4, SGTR WITH CONTINUOUS NC SYSTEM LEAKAGE: SATURATED RECOVERY, Steps 44 thru 69.

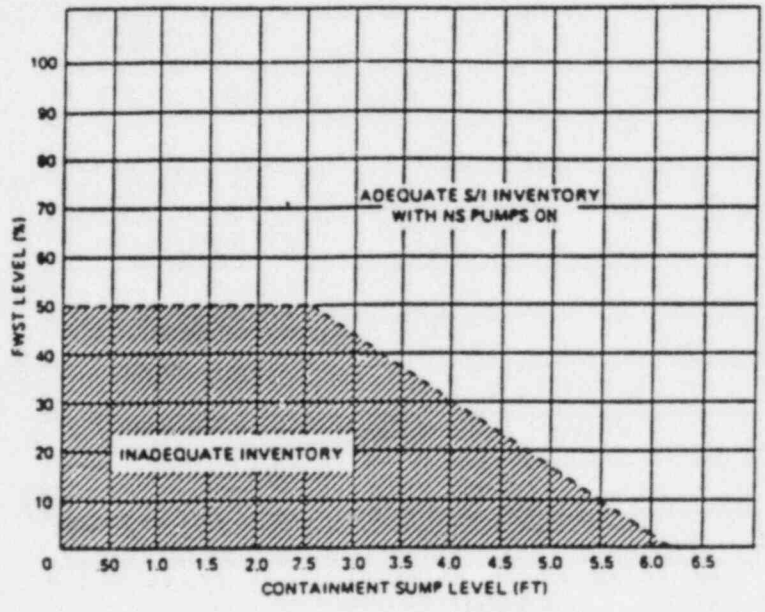
CNS EP/1/A/5000/1C6	LOCA OUTSIDE CONTAINMENT	PAGE NO. 4 Retype #2

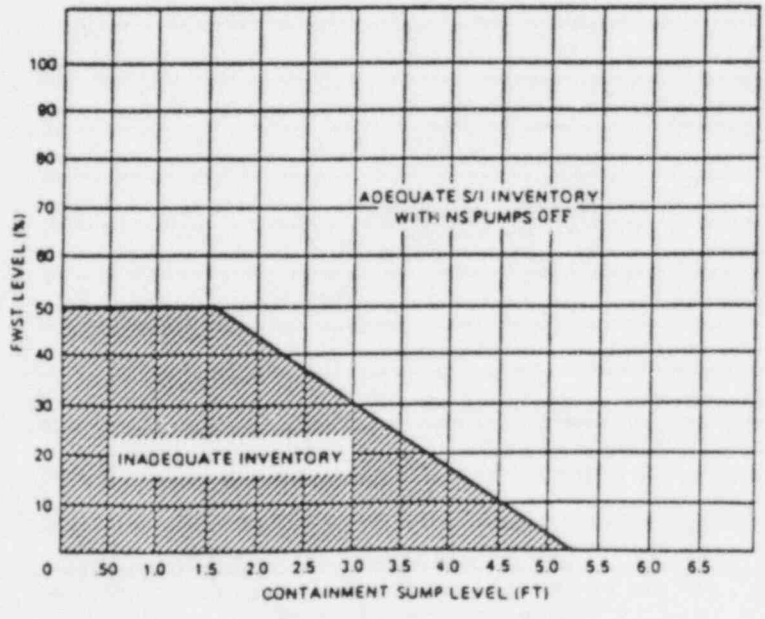
ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

d. Go to EP/1/A/5000/1C, HIGH ENERGY LINE BREAK INSIDE CONTAINMENT, Step 1.

-END-

CNS EP/1/A/5000/1C6	LOCA OUTSIDE CONTAINMENT S/I SUCTION INVENTORY ENCLOSURE 1	PAGE NO. 5 Retype #2





ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

___ 44. **Check Containment Status:**

****
CAUTION
****
After the NS pumps have been stopped, either the NS pump suction must be realigned to containment sump or NS Resets must be reset, to restart pumps.

a.	Containment pressure <15 psig.	a. Verify both NS pumps running AND go to Step 45.
b.	Containment pressure < 10 PSIG.	b. Ensure only one NS pump running AND go to Step 45.

NOTE NS pumps are stopped to conserve FWST water, making more water available for core cooling.

c. Stop both NS pumps.

___ 45. Check Containment Sump Level:

a.	Sump level < 1.5 ft.	a. Go to Step 46.

NOTE Auto swap is defeated to prevent cavitation of ND or NS Pump(s) if allowed to swap to the Containment Sump.

b. Depress "Defeat":

- o C-Leg Recirc FWST to Cont Sump Swap Train A
- o C-Leg Recirc FWST to Cont Sump Swap Train B

c. Verify enable lights dark.

___ 46. Evaluate FWST Depletion:

a. Determine need to makeup to FWST, based on SI flow (if any) AND time to reach <200°F.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
b. Initiate makeup to FWST, as required.	b. IF sufficient makeup flow to the FWST CANNOT be achieved, THEN consult TSC to determine need to go to Step 47 to establish feed AND bleed on NC System to increase containment sump inventory. The following criteria must be met to establish feed AND bleed. o Sump level > 1.5 ft. o NV and NI pumps on FWST o NS pumps off o FWST level: 20% - 50%

___ 47. DO NOT Proceed Unless Directed By Step 46.b "RESPONSE NOT OBTAINED".

NOTE Steps 48-67 initiate feed AND bleed cooling through the PZR PORV's in order to minimize FWST depletion out of the containment, AND to increase the containment sump level to allow cold leg recirculation.

___ 48. Ensure All NC Pumps Stopped.

___ 49. Check S/I Flow:

o At least 2 of the 4 NI and NV pumps running.	o Restore at least 2 NI and/or NV pumps.

___ 50. Establish Path From NC System To Containment By:

- o Opening 1 PZR PORV.
- o Opening Reactor Vessel Head Vent.

___ 51. Check NC System Pressure:

o NC pressure: Stable OR decreasing.	o Open an additional PZR PORV.