



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

MAR 7 1980

Docket Nos. 50-327/328

Mr. H. G. Parris
Manager of Power
Tennessee Valley Authority
500A Chestnut Street Tower II
Chattanooga, Tennessee 37401

Dear Mr. Parris:

SUBJECT: EMERGENCY OPERATING INSTRUCTIONS
(Sequoyah Nuclear Plant, Units 1 and 2)

We have reviewed your emergency operating instruction EOI-1, Revision 8, dated February 9, 1980. As a result of our review we have prepared the enclosed comments and questions.

We wish to point out four major deficiencies we found in this procedure:

1. You have not provided a diagnostic instruction (an E-0 type procedure) to direct the operator to the emergency procedure appropriate to the symptoms. This approach was approved by the NRC in its review of the Westinghouse guidelines for non-UHI plants.
2. The format is confusing in that it intermixes cautions, notes, and action steps such that a logical, stepwise progression of action is not presented.
3. It is obvious that the procedure was originally written to cover a large LOCA. Then additional instructions, notes and cautions were added to cover other LOCA's such as a very small LOCA that is within the capability of the charging pumps, a small LOCA that stabilizes above the secondary system steam pressure, and inadequate core cooling. These additions are not well organized and lead to a very complex and confusing procedure.
4. You often fail to include the numerical values of parameters at which action must be taken for adequate control of the plant.

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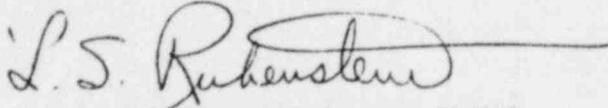
Mr. H. G. Parris

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MAR 7 1980

It is our position that you provide an E-0 type procedure as approved by the NRC staff in its review of the Westinghouse guidelines for non-UHI plants. Also, please provide a revised version of EOI-1 that reflects the enclosed comments and questions. To maintain the schedule your response is needed by March 21, 1980.

Sincerely,

A handwritten signature in cursive script that reads "L. S. Rubenstein". The signature is written in dark ink and includes a long horizontal flourish extending to the right.

L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
Comments

ccs w/enclosure:
See next page

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ENCLOSURE

General Comment

1. We wish to audit a variety of the Sequoyah emergency operating instructions (EOI) and abnormal operating instructions (AOI). Therefore, as you complete the individual EOI's and AOI's please send them to us so we can have a complete set on file for our audit function. Also, send us an up-to-date version of the Piping and Instrumentation Drawings (PID's) for the emergency core cooling system, containment spray system and auxiliary feedwater system so that we can have a better understanding of the procedure.
2. An E-0 procedure is required to direct the operator to the appropriate emergency procedure according to the symptoms. The applicant should use the format and philosophy embodied in the Westinghouse guidelines that have been approved by NRC.
3. There are too many notes and cautions at the beginning of the Subsequent Actions in the LOCA procedure. An operator will not review these at the time of an accident and will go directly to the action steps. Combine the notes and cautions into action steps as possible. For example, the caution on maintaining steam generator and pressurizer water levels should be action steps.
4. EOI-1, as a whole is very confusing. It is obvious that the procedure was originally written to cover a large LOCA. Then additional instructions, notes and cautions were added to cover a very small LOCA that is within the capability of the charging pumps, a small LOCA that stabilizes above the secondary system steam pressure, and inadequate core cooling. These additions are not well organized. Serious consideration should be given to reorganizing EOI-1 to guide the operator in a more straightforward fashion for the various types of LOCA's.
5. What instructions govern the implementation of the emergency plan? Reference to this instruction should be made in EOI-0 or EOI-1.
6. This procedure does not address pressure/temperature limitations for the primary system at low temperatures and high pressures. Guidance must be provided to the operator in this area.

Specific Comments

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| Page 2, I.B.I | Pressurizer level may not decrease in certain accidents. Include this warning at this point in the procedure. |
| Page 3 | Note following I.C.18. Change this Note to include the full considerations of the Westinghouse Note concerning LOCA in PZR steam space. |
| Page 3, II.F | What is the "accident signal"? If this is SI signal, use correct and consistent terminology. |
| Page 4 | Immediate Operator Action:

The following Immediate Actions appear in the <u>W</u> generic LOCA guidelines, but do not appear in the Immediate Actions in the Sequoyah LOCA procedure: |

- a. Verify that bus voltages indicate that buses are energized and all intended loads are being powered,
- b. Verify that Service and Component Cooling Water pumps have started.
- c. Verify that heat is being removed from the primary system thru the steam generators by noting that:
 - i. Auto steam dump to the condenser is occurring,
 - ii. Reactor coolant average temperature is decreasing towards the programmed no-load temperature.

- Page 4, III.A The procedure does not tell the operator to accomplish these steps if they do not occur automatically.
- Page 4, III.B.1 How much SIS flow is "proper"? Such terminology should be made more specific.
- Page 4, III.C Provide your analysis that shows that 1300 psig is the correct pressure for stopping RC pumps.
- Page 5, IV Maintaining steam generator level and pressurizer level and performing SI-268 are all steps in the procedure. They should not be put forth as notes or cautions.
- The Note concerning Step Z is unnecessary. See General Comment 3.
- If, under the second CAUTION, the operator moved to step P, does he then continue with Step Q or does he return to Step A?
- Page 6 Second Note: Rather than referring to Immediate Actions, state the correct pressure at this point.
- Page 6 Third Note: Identify the computer program to be used.
- Page 6 Fifth Note: Generic W guidelines list the Boric Acid Storage Tank level as being a post-accident monitoring instrument. This tank level is not listed in the procedure note on PAM equipment. Justify not having this tank level included in the PAM equipment. Also, although PAM instruments may be the primary ones used, the use of other operable instruments should not be denied.
- Page 6 RWST Level: The caution at the bottom of page 6 tells the operator to re-evaluate the symptoms, if required, but does not indicate where to go to do this. Also, are the terms "safeguard pumps" and "RHR recirculation sump" consistent with official terminology?

- Page 7 PORV Isolation Valves: Step IV.A should also require the operator to close the PORV isolation valves.
- Page 7 CCW and ERCW: Steps IV.B and IV.C are Immediate Actions.
- Page 7 PZR Spray Valves: Add a step which verifies that all pressurizer spray line valves are closed.
- Page 7 Control Room Ventilation: Change the word "from" in Step IV.E.1 to "due to". Add the word "that" between "check" and "equipment", and "is" between "cover" and "in place" in Step IV.E.2.
- Page 7 ECCS Pumps: What is the operator to do if the ECCS pumps exceed the red line amps? Provide guidance to the operator.
- Page 7 UHI Isolation Valves: Move Step IV.H higher in the sequence of Subsequent Actions.
- Page 7, IV.I The securing of safety injection is a major step. It should not be included under a CAUTION.
- Page 8 SI Pump Reinitiation: Modify the first caution statement in Step IV.I.7 by replacing "the value for SI termination" by "40 F". Indicate to the operator where he should go for guidance in reevaluating this event.
- Page 8 SI Pump Added Subcooling: What should be the subcooled margin for third, fourth and subsequent SI pump restarts?
- Page 9 Adequate Subcooling: The description in Step IV.I.11 of how the operator should seek to increase the minimum subcooling from 40 F to 50 F is not clear. There is no motivation given for the 50 F subcooling or how it differs from the 40 F subcooling. Indicate to the operator that 50 F subcooling is the "preferred" minimum subcooling and that the operator should cool down the primary system if necessary to achieve that minimum margin.
- Place the last sentence in Step IV.I.11 ("If 50 indicated subcooling cannot be...") directly after the second paragraph which begins, "If 50 F subcooling is not present."
- Page 9 Pump Restart: Step IV.I.12 refers the operator to Step IV.I.17 if subcooled conditions cannot be maintained with the SI pumps off; but Step IV.I.17 is written as if the pumps were never turned off due to achieving adequate subcooling.
- Page 9 Gas Condition I: Step IV.I.13 is superfluous since Step III.D already informs plant personnel of a Gas Condition I.
- Page 9 CAUTION: For clarity, the first sentence should read as follows: "If steam dump is necessary, reduce the S/G pressure to 864 psig (200 psi below the lowest steam safety valve setpoint) and maintain..." This comment also applies to Page 11.

- Page 9 Plant Cooldown: Step IV.I.12 requires the operator, as needed, to bring the plant to cold shutdown using normal cool-down procedures. Since normal equipment may not be available, provide a reference for the operator to the shutdown procedure using only safety grade equipment (as required by BTP 5-1).
- Page 9 Unload Diesels: The diesel generators at Sequoyah, at the instruction of the manufacturer, should not be run unloaded for one hour. Modify Step IV.I.15 to reflect the limitations of running unloaded as noted by the diesel generator manufacturer.
- Also, do not leave the D/G's removed from service. Add an instruction to set them up for re-start "in accordance with SOI....".
- Page 10 Recovery: What is the purpose for including these two statements at this point in the procedure?
- Page 10, Step 17 NOTE: The term "previously given" requires the operator to search through this procedure. Either repeat the specific instruction or tell the operator exactly where the instruction can be found.
- Page 10 Low Head SI Pump Termination: Step IV.I.17 is not applicable during the piggyback mode employed during the recirculation phase. If mini-flow lines are available, what is the rationale for shutting off the low-head pumps?
- Page 10 Aux FW Flow to SG: The last note on page 10 dicusses regulating flow to the SG to maintain SG level. It also refers the operator to EOI-3, Steam Generator Tube Leak if SG level increases in an unexplained manner. This note should accompany the step that dictates the SG level to be maintained. See our comment relating to Page 5.
- Page 10, J.1 For clarity, rephrase to indicate that steam pressure will be equalized by opening an MSIV bypass valve. Provide the operator with guidance on the maximum allowable cooldown rate under accident conditions.
- Page 11 PAM Instrumentation: Step IV.J.2 has a caution to "use only PAM identified instrumentation for monitoring and evaluating plant conditions." This is too restrictive and other instrumentation should be used to help verify plant status, understanding that the information provided may be faulty.
- Page 11, IV.L What is the procedure used to verify that the accumulators have discharged?

- Page 11 Condensate Storage Tank Level: The first note on page 11 which concerns monitoring the condensate storage tank level should address the minimum level(s) at which to switch auxiliary feedwater pump suction to an alternate water supply. Is the switchover to ERCW single failure proof? At what level must the operator switch over to avoid aux FW pump cavitation? Identify the "alternate" sources.
- Page 11 Blackout: The last caution on page 11 directs the operator to "see Part B of this instruction." There does not appear to be a Part B. Should this be "EOI-1B, Page 20"?
- Page 11 RWST Level: The last note in page 11 directs the operator to take certain steps if the RWST low level alarm is not imminent. Include the RWST low level alarm setpoint in the note.
- Page 12
Item 2 at top A checkoff list should be provided with this procedure to assure that all necessary equipment has been evaluated. The present listing is incomplete and would require excessive attention by the operator during the emergency.
- Page 13 Auto Switchover Valve Time: Step IV.Q.1 does not provide times for valves to go from full open to full closed.
- Page 13 SI Pump Flow Path: The caution on page 13 implies that if necessary "an adequate flow path" for the SI pumps must be provided if RCS repressurization occurs. Provide guidance to the operator as to what paths are acceptable.
- Page 15 Bottom CAUTION: The current procedure should reflect current equipment status. When equipment is changed, then change the procedure.
- Page 16 Hot Leg Recirculation: The last caution on page 16 indicates that Train A is the preferred path for hot leg recirculation since path B may cause cavitation problems. Justify that hot leg injection is single failure proof.

Also, define "extreme emergency".
- Page 16, IV.U Change this step to read: "If the ice in the ice condenser is depleted, containment pressure will rise. If it rises to 9.5 psig, place one train...."
- Page 17 Diesel Generator Loads: Step IV.Y.1 directs the operator to place one train of H₂ recombiners in service if H₂ concentration in the containment reaches 1/2% by volume. It cautions the operator however to not exceed 4000 kw on a diesel generator. Provide the operator with guidance on how to hookup the recombiners on the diesel if the added load would otherwise cause

the total load to exceed 4000 kw for a generator. This might entail giving the operator options on what equipment to strip from the diesels. Also, in EOI-1B, IV.A.2, the CAUTION states that the diesel generator may have a total load of 4400 kw for a two-hour period. This information should be included in IV.Y.1 of EOI-1.A.

- Page 18 Containment Air Samples: Modify Step IV.Y.2 to indicate the frequency with which containment air samples should be taken.
- Page 18, Z.1.c How does the operator know that use of containment pressure relief or H purge is "necessary"?
- Page 18, Z.2 Step Z.2 should be rewritten. Steps b and c seem to conflict in that one calls for maintaining pressure "as high as possible" while the other calls for a slow controlled depressurization. Also, if gas is burped through the hot leg while the RCP's are running, some gas may collect in the pump impeller and cause cavitation. There is no guidance on the rate of depressurization. There is no discussion of the use of the auxiliary spray line or of pressurizer heaters. Can RCP's be run (in Step a) while the bearing cooling water has been isolated (phase B containment isolation)? The caution after Step d gives no guidance on acceptable radiation levels.
- Page 19
Section VI Discussion of the event clearly outlines a large break LOCA. It should also address the other cases contained in this procedure, which include LOCA within capacity of charging pumps; LOCA which stabilizes above secondary steam pressure; and inadequate core cooling. The discussion should also include natural circulation cooling (both single-phase and two-phase) and removal of non-condensibles.
- Page 20 Station Blackout: The operator instructions to mitigate a station blackout are written for the time period after the ECCS is in the recirculation mode. Provide guidance for station blackout following a LOCA during the injection phase.
- Page 21 The CAUTION after instruction 4 on page 21 would seem to be more appropriate on page 20 immediately after instruction A.
- Page 21 Diesel Generator Loading: Provide guidance to the operator as to what he should do if he cannot load all of the required equipment on the diesel generator and still restrict the load on each of the diesels to less than 4000 kw (continuous).
- Page 22 Pressurizer Heaters on Diesels: Steps in emergency procedure EOI-1A require the operator to maintain primary system pressure, even with the SI pumps off. But procedure EOI-1B does not appear to load the heaters on the diesels in the event of loss of offsite power. Either modify EOI-1B or EOI-1A to rectify this discrepancy.

- Page 27 Caution on SG Levels: Rewrite the caution on page 27 to include the desired SG level requirements.
- Page 27 Steam Dump: In Appendix C, Step B.3 add a steam dump caution as it appears on page 9 concerning lowering of steam generator pressures.
- Page 27,
Step B.3 What is the desired rate of cooldown? Include it in this step?
- Page 28, B.1 In the second line, delete the "or" as it applies to feed-water flow.
- Page 30 The lower right hand block on Figure 2 refers to Block 1. Where is Block 1 (none of the blocks is numbered)?

Editorial Comments

- Page 21, IV.A.2 We suggest that the second sentence of this instruction be rewritten as follows: Start equipment as necessary to reestablish operation of safety equipment that was operating prior to blackout.
- Page 24, Item VI We suggest that Line 3 of this instruction be rewritten as follows: "required to reestablish operation of safety equipment that was operating prior to blackout."
- Page 27, A.3 Add the word "temperature" at the end of the third line.