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October 17, 1984

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:

A meeting was held on August 21, 1984 between representatives of Duke Power Company and the NRC staff to discuss safety-significant deviations in the Plant Specific Technical Guidelines from NRC-approved generic technical guidelines. The material presented by Duke Power at that meeting is included as Attachment 1. Further clarification of these deviations was presented in a letter dated August 29, 1984. During the meeting, unresolved deviations between the Westinghouse Emergency Response Guidelines (ERGs) and the Catawba Emergency Procedure Guidelines were identified. This letter states the Duke Power proposal for resolution of these items.

1) The absence of a steam generator tube rupture cooldown guideline using the blowdown system.

   Resolution: See Attachment 2 for a discussion of this item. Duke Power does not intend to include a cooldown guideline using blowdown.

2) The continuous venting of condensible voids vs. the controlled venting of voids which might contain hydrogen.

   Resolution: Duke Power will delete the guideline steps referring to condensible void venting and adopt the Westinghouse ERG approach on void removal by controlled venting.

3) The initiation of feed-and-bleed cooling during a LOCA outside containment to increase sump inventory and reduce unrecoverable inventory losses.

   Resolution: This method will remain a part of the guidelines pending final NRC approval. Additional justification of the appropriateness of feed-and-bleed initiation will be submitted to the NRC by April 1, 1984.

4) The postponement or omission of lower priority critical safety function restoration actions due to earlier entry into or exit from the inadequate or degraded core cooling guidelines.

   Resolution: Attachment 3 gives additional justification for this item. Duke Power proposes to continue using the higher setpoints.

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Duke Power understands that these are the only outstanding items concerning deviations of the Catawba Emergency Procedure Guidelines from the Westinghouse ERGs.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

HJL/glb

Attachments

cc: Mr. James P. O'Reilly, Regional Administrator
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Attachment 1

NRC - DUKE POWER MEETING

CATAWBA NUCLEAR STATION
DEVIATIONS FROM GENERIC EMERGENCY RESPONSE GUIDELINES

AGENDA

I. DISCUSSION OF UNRESOLVED DEVIATIONS

II. PLANT SPECIFIC DESIGN FEATURES

III. RVLIS UTILIZATION

IV. SETPOINTS

V. SSER ITEMS

AUGUST 21, 1984

I. DISCUSSION OF UNRESOLVED DEVIATIONS

DEVIATION 7

THE GENERIC GUIDELINE ES-3.2B, SGTR ALTERNATE COOLDOWN USING STEAM GENERATOR BLOWDOWN, HAS BEEN DELETED FROM THE EPGS SINCE THE CATAWBA BLOWDOWN SYSTEM CANNOT ACCOMMODATE THE FLUID VOLUME GENERATED USING THIS COOLDOWN APPROACH. THE GENERIC GUIDELINES INCLUDE THREE OPTIONS FOR COOLDOWN OF AN ISOLATED AND RUPTURED STEAM GENERATOR. ALL THREE OPTIONS ARE NOT REQUIRED TO BE AVAILABLE AT EACH PLANT, AND THE SELECTION OF WHICH OPTIONS ARE INCORPORATED INTO EMERGENCY PROCEDURES IS LEFT TO THE DISCRETION OF THE UTILITY BASED ON PLANT SPECIFIC DESIGN AND OPERATING PREFERENCE. THE REMAINING TWO OPTIONS ARE INCORPORATED INTO THE GUIDELINES ES-3.1, POST-SGTR COOLDOWN AND DEPRESSURIZATION, AND ES-3.2, SGTR ALTERNATE COOLDOWN USING BACKFILL.

THE FOLLOWING IS STATED IN THE ERG-BASIC SER (PP 3-16, 19)

3.2.3.1 Alternate SGTR Cooldown Guidelines ES-3.2(L)

Steam Generator Tube Rupture procedures instruct the operator to depressurize the ruptured steam generator by dumping steam to the condenser, if it is available, or to the atmosphere if the offsite doses are calculated to be below the 10 CFR 20 guidelines. If neither of these conditions is met, the operator is referred to alternate methods for depressurizing the ruptured steam generator. The low pressure guidelines also instruct the operator to utilize alternate methods if the ruptured steam generator is overfilled. The Westinghouse owners have developed two sets of guidelines for this purpose, only one of which would be developed into plant procedures. This determination of which guideline to use would be based on the specifics of the plant design, Plants with a small blowdown storage capacity would utilize Guidelines ES-3.2 A(H), ES-3.1A(L) "SGTR Alternate Cooldown By Backfilling RCS." Plants utilizing phosphate secondary chemistry would utilize Guideline E-3.2B(H), ES-3.1B(L) "SGTR Alternate Cooldown Using Steam Generator Blowdown."

3.2.3.4 Staff Conclusions Regarding the SGTR Guidelines

The staff concludes that the actions prescribed to treat SGTR are acceptable for implementation. The areas which require improvement are identified below. The staff will report on those items in an SER supplement.

DEVIATION 7 BASIS

- ES-3.2, SGTR ALTERNATE COOLDOWN USING BACKFILL, IS AVAILABLE TO PROVIDE THE ALTERNATE CAPABILITY TO COOL DOWN AND DEPRESSURIZE A RUPTURED STEAM GENERATOR
- CONSISTENT WITH THE NRC REVIEW OF ERG-BASIC
- STRONG INCENTIVE NOT TO INTRODUCE CONTAMINATED PRIMARY WATER INTO THE SECONDARY PLANT SYSTEMS
- CONTAINMENT ENTRY IS REQUIRED TO ALIGN BLOWDOWN TO THE STEAM GENERATOR DRAIN TANKS. THESE DRAIN TANKS ARE NOT NECESSARILY EMPTY
- BLOWDOWN CAN ONLY BE REMOTELY ALIGNED TO THE CONDENSER
- BLOWDOWN IS VERY LIMITED IN CAPACITY

OTHER COMMENTS

- WOG PROGRAM TO FURTHER ADDRESS THE ACCEPTABILITY OF POST-SGTR COOLDOWN AND DEPRESSURIZATION, PARTICULARLY THE UTILIZATION OF NON-SAFETY GRADE EQUIPMENT, THE TIMING OF OPERATOR ACTIONS, AND DOSE CONSEQUENCES
- STEAMING A RUPTURED STEAM GENERATOR IS EXPLICITLY AVOIDED WHENEVER POSSIBLE. STEAMING TO THE CONDENSER IS ATTEMPTED BEFORE STEAMING TO ATMOSPHERE
- THIS ITEM IS NOT IN FACT A DEVIATION

DEVIATION 10

THE EPGS INCLUDE AN ADDITIONAL GUIDELINE ECA-1.2, LOCA OUTSIDE CONTAINMENT, IN ORDER TO ADDRESS AN NRC REQUIREMENT FOR DEVELOPMENT OF SUCH A GUIDELINE AS STATED IN THE ERG-BASIC SER ON P. 4-4 (ITEM 3). ECA-1.2 DIRECTS THE OPERATOR TO ATTEMPT TO ISOLATE POTENTIAL CAUSES OF A LOCA OUTSIDE CONTAINMENT, AND TO INITIATE MAKEUP TO THE REFUELING WATER STORAGE TANK SINCE A LOSS OF ECCS SUCTION INVENTORY IS OCCURRING. ALSO, THE OPTION OF INITIATING FEED AND BLEED COOLING IS AVAILABLE AND THE DECISION TO DO SO IS LEFT TO THE DISCRETION OF STATION MANAGEMENT. THE BASIS FOR INITIATING FEED AND BLEED IS THE DESIRABILITY OF ACCUMULATING WATER IN THE CONTAINMENT SUMP TO ENABLE RECIRCULATION MODE UPON DEPLETION OF THE REFUELING WATER STORAGE TANK INVENTORY. IN ADDITION, BLEEDING OF REACTOR COOLANT SYSTEM INVENTORY WILL MELT ICE IN THE ICE CONDENSER WHICH WILL ALSO ACCUMULATE IN THE CONTAINMENT SUMP. INITIATING FEED AND BLEED COOLING IS ALSO INCLUDED AS AN OPTION FOR A SGTR WHICH HAS RESULTED IN A SIGNIFICANT DEPLETION OF ECCS SUCTION INVENTORY DUE TO A NON-ISOLABLE TUBE LEAK. THIS SCENARIO IS ALSO ESSENTIALLY A LOCA OUTSIDE CONTAINMENT.

DEVIATION 10 BASIS

- A LOCA OUTSIDE CONTAINMENT WILL POTENTIALLY DEPLETE THE REFUELING WATER STORAGE TANK INVENTORY AND THEREFORE IS AN EXTREME CHALLENGE TO LONG TERM CORE COOLING. THE CONTAINMENT SUMP MAY NOT BE AVAILABLE FOR RECIRCULATION.

- ALL MITIGATION OPTIONS SHOULD BE BROUGHT TO THE ATTENTION OF THE OPERATOR

- THE LARGE VOLUME OF ICE IN THE ICE CONDENSER IS A POTENTIAL SOURCE OF ECCS INJECTION INVENTORY WHICH IS NOT AN OPTION IN THE GENERIC PLANT WHICH IS THE BASIS FOR THE GENERIC GUIDELINES

- INITIATING FEED AND BLEED WILL DEPRESSURIZE THE RCS AND REDUCE THE DRIVING HEAD AND INVENTORY LOSS OUT THE BREAK

- MAKEUP TO THE REFUELING WATER STORAGE TANK IS ATTEMPTED PRIOR TO INITIATING FEED AND BLEED

- ADDITIONAL CRITERIA ARE USED TO ASSIST THE OPERATOR IN DECIDING IF FEED AND BLEED SHOULD BE INITIATED:
  - SUMP LEVEL GREATER THAN 1.5 FEET
  - ECCS ALIGNED IN INJECTION MODE
  - CONTAINMENT SPRAY PUMPS OFF
  - RWST LEVEL LESS THAN 50% AND GREATER THAN 20%

OTHER COMMENTS

- THE PRESSURIZER RELIEF TANK WILL RUPTURE DURING ANY F & B SEQUENCE WHICH LASTS MORE THAN A VERY SHORT TIME

- SOME FRACTION OF THE BLEED ENERGY WILL NOT RESULT IN ICE MELT AND WILL INSTEAD BE ABSORBED BY STRUCTURES, ETC. THE TOTAL PORV CAPACITY OF 600,000 LB/HR ENSURES THAT ICE MELT WILL OCCUR. (~2.7 inch diameter LOCA)

- THIS DEVIATION IS A REFINEMENT TO THE GENERIC GUIDELINES WHICH UTILIZES THE UNIQUE CAPABILITY TO MELT ICE IN ORDER TO ESTABLISH A CONTAINMENT SUMP INVENTORY AND ENABLE ALIGNMENT FOR RECIRCULATION MODE

DEVIATION 27

IN THE GENERIC ERG ECA-2, LOSS OF ALL AC POWER, STEP 3.c.2 DISABLES AUTOMATIC SEQUENCING OF LARGE LOADS PRIOR TO RESTORATION OF POWER TO THE EMERGENCY BUS. SUBSEQUENT LOADING OF LARGE LOADS IS PERFORMED MANUALLY. IN THE EPGs, AUTOMATIC SEQUENCER LOADING IS RESTORED FOR THE CASE WHERE A SAFETY INJECTION SIGNAL IS PRESENT. THIS DEVIATION HAS BEEN IMPLEMENTED IN ORDER TO LESSEN THE BURDEN OF MANUAL OPERATOR ACTIONS AND TO EXPEDITE THE LOADING PROCESS. ALTHOUGH UNLIKELY, THE POTENTIAL FOR AN OPERATOR ERROR IS ALSO PRECLUDED. NO REDUCTION IN RELIABILITY IS ASSOCIATED WITH THE CHANGE.

DEVIATION 27 BASIS

- AUTOMATIC SEQUENCER LOADING IS FASTER AND AN EXPEDITIOUS RECOVERY IS DESIRED IF A SAFETY INJECTION SIGNAL HAS OCCURRED
- UTILIZING THE SEQUENCER LESSENS THE BURDEN OF MANUAL OPERATOR ACTIONS
- ALTHOUGH UNLIKELY, THE POTENTIAL FOR OPERATOR ERROR DURING MANUAL LOADING IS AVOIDED.
- MANUAL LOADING IS PRESCRIBED AS A BACKUP IF SEQUENCER LOADING IS UNSUCCESSFUL
- LOADING OF ADDITIONAL LOADS OR UNLOADING SEQUENCER LOADED LOADS CAN BE PERFORMED BY THE OPERATOR AS REQUIRED
- NO REDUCTION IN RELIABILITY HAS BEEN IDENTIFIED
- ACCELERATED LOADING - PLANT SPECIFIC FEATURE
- SEQUENCER ALIGNS VALVES BEFORE STARTING ECCS PUMPS

DEVIATION 28

IN THE GENERIC ERG FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, DEPRESSURIZATION OF THE RCS BY OPENING PRESSURIZER PORVS IS NOT UNDERTAKEN UNLESS CORE EXIT THERMOCOUPLE TEMPERATURES ARE GREATER THAN 1200°F. THE EPGS IMPLEMENT THIS ACTION IF CORE EXIT THERMOCOUPLE TEMPERATURES ARE GREATER THAN 700°F AND INCREASING. THIS MODIFICATION AVOIDS WAITING FOR THE CORE TO HEAT UP IF THE MITIGATION ACTIONS ALREADY PERFORMED HAVE NOT BEEN SUCCESSFUL. THIS DEVIATION CAN BE CONSIDERED AS AN ENHANCEMENT OF THE GENERIC GUIDELINES. THE LOSS OF INVENTORY IN THE FORM OF STEAM RELIEF THROUGH THE PRESSURIZER PORVS IS OFFSET BY THE INCREASE IN THE SAFETY INJECTION FLOWRATE RESULTING FROM THE RCS DEPRESSURIZATION.

DEVIATION 28 BASIS

- USE OF THE CRITERION "GREATER THAN 700F AND INCREASING" ENSURES THAT THE INADEQUATE CORE COOLING MITIGATION ACTIONS ALREADY IMPLEMENTED HAVE NOT BEEN SUCCESSFUL
- THE GENERIC GUIDELINES WILL RESULT IN WAITING FOR THE CORE EXIT THERMOCOUPLES TO INCREASE FROM 700F TO 1200F BEFORE INITIATING ADDITIONAL MITIGATING ACTIONS. SIGNIFICANT DEGRADATION OF THE CORE CAN OCCUR DURING THIS HEATUP PHASE
- THE INVENTORY LOST BY STEAM RELIEF THROUGH THE PORVS WILL BE OFFSET BY THE INCREASE IN SAFETY INJECTION FLOW DUE TO THE REDUCTION IN RCS PRESSURE. THE UHI ACCUMULATOR REPRESENTS AN ADDITIONAL SOURCE OF WATER WHICH IS NOT AVAILABLE IN THE GENERIC PLANT
- THE DUKE APPROACH IS INTENDED TO PREVENT PCTS FROM REACHING TEMPERATURES AT WHICH M-W REACTION WILL BE SIGNIFICANT. THESE TEMPERATURES ARE WELL BELOW THE 2200F LIMIT USED AS A LICENSING LIMIT

OTHER COMMENTS

- 600,000 LB/HR RELIEF CAPACITY THROUGH THE PORVS IS A VERY LARGE RELIEF CAPACITY. DEPRESSURIZATION SHOULD BE SUCCESSFUL DOWN TO VERY LOW PRESSURES
- CORE EXIT THERMOCOUPLE TEMPERATURE DOES NOT REFLECT THE CLADDING TEMPERATURES IN THE HOTTER PARTS OF THE CORE

DEVIATION 30

IN THE EPG FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, FOLLOWING INITIATION OF FEED AND BLEED COOLING, RCS TEMPERATURE IS MONITORED TO ASSESS THE SUCCESS OF CORE COOLING IN THIS MODE. THE NEED FOR ADDITIONAL OR LESS FEED AND/OR BLEED CAPACITY IS DETERMINED. THIS DEVIATION IS A REFINEMENT OF THE GENERIC GUIDANCE AND ENABLES BETTER CONTROL OF THE PLANT DURING FEED AND BLEED.

DEVIATION 30 BASIS

- IN THE GENERIC GUIDELINES A REDUCTION IN THE FEED AND BLEED CAPACITY (NUMBER OF PORVS OPEN AND NUMBER OF SAFETY INJECTION PUMPS OPERATING) IS ONLY UNDERTAKEN FOLLOWING RESTORATION OF FEEDWATER TO THE STEAM GENERATORS. IN THE BASIC ERGS THIS OCCURS SINCE ONE CANNOT PROCEED TO STEPS 22 AND 23 OF FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, WITHOUT MEETING THE CRITERION IN STEP 21

- THE EPGS INCLUDE A REFINEMENT WHICH IS ADDED TO STEP 17. THIS ADDITION ALLOWS THE OPERATOR TO REDUCE OR INCREASE THE FEED AND BLEED CAPACITY DEPENDING ON THE COOLDOWN RATE.
  - IF THE COOLDOWN RATE IS GREATER THAN 100F/HR AND THE CORE IS SUBCOOLED, THEN SI FLOW CAN BE REDUCED
  - IF THE COOLDOWN RATE IS GREATER THAN 100F/HR AND THE CORE IS SATURATED, THEN ONE PORV CAN BE CLOSED
  - IF THE COOLDOWN RATE IS NOT ADEQUATE, THEN ADDITIONAL FEED AND BLEED CAPACITY IS ADDED

- THE GENERIC GUIDELINES FOR RECOVERING FROM FEED AND BLEED FOLLOWING RESTORATION OF A HEAT SINK ARE UNAFFECTED BY THIS DEVIATION

- FEED AND BLEED COOLING IS DEPENDENT ON A NUMBER OF FACTORS SOME OF WHICH CAN BE CONTROLLED AND WILL RESULT IN A LESS SEVERE PLANT RESPONSE. (I.E. LESS SEVERE COOLDOWN RATE)

DEVIATION 31

In the EPG, FR-I.3, Response To Voids In Reactor Vessel, venting of the reactor vessel is permitted without the detailed precautions required for hydrogen venting if no symptoms of inadequate core cooling have been observed. If the void may contain a significant volume of hydrogen, then the generic venting precautions are followed. The dissolved hydrogen in the RCS would only increase the volumetric concentration in the containment by less than 0.1%, if it were continuously vented. It is therefore necessary for the core to undergo metal-water reaction of the cladding for a significant volume of hydrogen to be generated. In addition, the SPDS will alert the operator to containment hydrogen concentrations greater than 0.5%. For these reasons, continuously venting through the reactor vessel head vent is justified. Continuous venting is desirable and achievable without concern for excessive containment hydrogen concentrations.

DEVIATION 31 BASIS

- THE CONCERN IS THAT CONTINUOUS VENTING OF THE REACTOR VESSEL HEAD VENT MAY RESULT IN EXCESSIVE CONTAINMENT HYDROGEN CONCENTRATIONS.

- CONTINUOUS VENTING OF THE VESSEL HEAD IS ONLY USED IF THE HEAD VOID CANNOT CONTAIN A SIGNIFICANT VOLUME OF HYDROGEN

- A SOURCE OF ~~HYCROGEN~~ HYDROGEN MUST EXIST FOR HYDROGEN VENTING TO BE A CONCERN. THE DISSOLVED HYDROGEN IN THE RCS IS TOO LITTLE TO BE A CONCERN (LESS THAN 0.1% IF VENTED TO THE CONTAINMENT)

- ONLY IDENTIFIED SOURCE OF A LARGE VOLUME OF HYDROGEN IS A SEVERE INADEQUATE CORE COOLING EVENT WITH CLADDING TEMPERATURES WELL IN EXCESS OF 1000F

- THE EPGS PRECLUDE CONTINUOUS VESSEL HEAD VENTING IF ICC HAS OCCURRED. ICC SYMPTOMS ARE CONTINUOUSLY MONITORED BY THE SPDS AND THE SHIFT TECHNICAL ADVISOR AND WILL NOT GO UNDETECTED

- THE CONTAINMENT HYDROGEN CONCENTRATION IS CONTINUOUSLY MONITORED BY THE SPDS FOLLOWING AND LOCA EVENT. AN ALARM IS GENERATED IF THE CONCENTRATION EXCEEDS 0.5%

- CONTINUOUS VENTING IS DESIRED UNDER SOME CONDITIONS IN ORDER TO PROVIDE AN ADDITIONAL RCS ENERGY RELIEF PATH OR TO VENT A STEAM VOID. INTERRUPTION OF VENTING DUE TO NON-APPLICABLE HYDROGEN CONCERNS IS AN UNNECESSARY RESTRICTION

- GENERIC HYDROGEN VENTING GUIDELINES ARE USED IF THE ONLY REALISTIC SOURCE OF HYDROGEN, ICC, HAS OCCURRED

II. PLANT SPECIFIC DESIGN FEATURES

- UPPER HEAD INJECTION (UHI) ACCUMULATORS
- HYDROGEN IGNITERS
- ANNULUS VENTILATION SYSTEM
- CONTAINMENT AIR RETURN AND HYDROGEN SKIMMER FANS
- RHR AUXILIARY CONTAINMENT SPRAY
- OTHER UHI/IC PLANT DIFFERENCES
- STANDBY SHUTDOWN FACILITY (SSF)

- BORON INJECTION TANK (BIT) HAS BEEN REMOVED

UHI

SYSTEM DESCRIPTION

- PASSIVE INJECTION TANK WITH PRESSURIZED NITROGEN COVER GAS
- BEGINS TO INJECT AT APPROXIMATELY 1200 PSIG
- AUTOMATICALLY ISOLATED ON LOW LEVEL TO PREVENT NITROGEN INJECTION
- INCLUDED TO PROVIDE ACCEPTABLE PLANT RESPONSE TO LARGE BREAK LOCA

FUNCTION ONE

- VERIFY ISOLATION OF UHI IF INJECTION IS NOT DESIRABLE
- PERFORMED DURING INTENTIONAL DESPRESSURIZATIONS, AS IN A NORMAL SHUTDOWN
- ISOLATED ONLY IF RCS IS SUBCOOLED AND PRESSURE IS <1900 PSIG
- CONTAINED IN THE FOLLOWING GUIDELINES:
  - ES-0.2 NATURAL CIRCULATION COOLDOWN
  - ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION
  - ES-2.1 SI TERMINATION FOLLOWING EXCESSIVE COOLDOWN
  - E-3 STEAM GENERATOR TUBE RUPTURE
  - ECA-3.1 SGTR WITH CONTINUOUS RCS LEAKAGE: SUBCOOLED RECOVERY
  - ECA-3.2 SGTR WITH CONTINUOUS RCS LEAKAGE: SUBCOOLED RECOVERY
  - ECA-3.3 SGTR WITHOUT PRESSURIZER PRESSURE CONTROL
  - FR-P.1 RESPONSE TO IMMINENT PRESSURIZED THERMAL STOCK CONDITIONS

CHECK IF UHI SHOULD BE ISOLATED

a. NC system subcooling >0°F
   -AND-
   NC system pressure ≤ 1900 psig

a. IF either condition NOT met, THEN continue with Step 10 while monitoring NC system pressure and subcooling. IF these conditions are satisfied at any time, THEN gag and isolate UHI accumulator isolation valves.

b. Isolate and gag UHI accumulator isolation valves.

FUNCTION TWO

- VERIFY ISOLATION OF UHI AFTER IT HAS DUMPED TO PREVENT NITROGEN INJECTION
- PERFORMED WHEN UHI ISOLATION VALVES HAVE CLOSED OR SHOULD HAVE CLOSED
- CONTAINED IN THE FOLLOWING GUIDELINES:
  - E-0 SAFETY INJECTION
  - ECA-0 LOSS OF ALL AC POWER
  - ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION
  - FR-C.1 RESPONSE TO INADEQUATE CORE COOLING
  - FR-C.2 RESPONSE TO DEGRADED CORE COOLING

CHECK IF UHI ACCUMULATORS SHOULD BE ISOLATED	
a. NC system pressure <550 psig	a. GO TO Step 12. <u>WHEN</u> NC system pressure <550 psig, <u>THEN</u> do Step 11b.
b. Close all UHI accumulator isolation valves.	b. Vent an unisolated accumulator.

FUNCTION THREE

- VERIFY UHI AVAILABILITY TO INJECT
- PERFORMED WHEN ADDITIONAL INVENTORY IS OR MAY BE NEEDED
- CONTAINED IN THE SAME GUIDELINES AS FOR FUNCTION TWO

CHECK UHI AND COLD LEG ACCUMULATOR STATUS	
a. UHI isolation valves - OPEN	a. Manually open valves unless closed after accumulator discharge.
b. Cold leg accumulator pressure >100 psig	b. GO TO Step 5.
c. Power available to cold leg accumulator isolation valves	c. Restore power to valves.
d. Cold leg accumulator isolation valves - OPEN	d. Manually open valves.

HYDROGEN IGNITERS

- ARRAY OF GLOW PLUG IGNITION SOURCES DISTRIBUTED THROUGHOUT UPPER AND LOWER CONTAINMENT
- DESIGNED TO CONTINUOUSLY BURN OFF HYDROGEN PRIOR TO ACCUMULATION ~~TO~~ OF SIGNIFICANT CONCENTRATIONS
- USED IN ACCORDANCE WITH LICENSING COMMITMENTS, I.E., MANUALLY ENERGIZED AFTER SAFETY INJECTION AT THE FIRST SYMPTOMS OF A LOCA (IN E-1, HIGH ENERGY LINE BREAK INSIDE CONTAINMENT)
- ENERGIZED IN FUNCTION RESTORATION GUIDELINES
  - FR-C.1 RESPONSE TO INADEQUATE CORE COOLING
  - FR-C.2 RESPONSE TO DEGRADED CORE COOLING
  - FR-Z.1 RESPONSE TO HIGH CONTAINMENT PRESSURE

  ON HIGH HYDROGEN CONCENTRATION

Note: EHM system cannot be energized until Group 13 load sequencing is permitted.

ENERGIZE HYDROGEN MITIGATION SYSTEM

- Dispatch on operator to locally energize Emergency Hydrogen Mitigation (EHM) System.

ANNULUS VENTILATION SYSTEM

- REDUNDANT FILTER AND FAN SYSTEM AUTOMATICALLY ACTUATED ON SAFETY INJECTION
- FUNCTIONS TO MAINTAIN ANNULUS BETWEEN CONTAINMENT VESSEL AND REACTOR BUILDING WALL AT A NEGATIVE PRESSURE
- FILTERS AND RECIRCULATES AIR IN ANNULUS
- NEGATIVE PRESSURE, FILTERING, AND RECIRCULATION ACT TOGETHER TO REDUCE OFFSITE DOSES
- OPERATOR ACTION LIMITED TO VERIFICATION OF SYSTEM ACTUATION AND CORRECT OPERATION
- CONTAINED IN THE FOLLOWING GUIDELINES:
  - E-0 SAFETY INJECTION
  - E-1 HIGH ENERGY LINE BREAK INSIDE CONTAINMENT
  - FR-Z.1 RESPONSE TO HIGH CONTAINMENT PRESSURE
  - FR-Z.3 RESPONSE TO HIGH CONTAINMENT RADIATION

VERIFY VE SYSTEM IN OPERATION	• Manually actuate VE system.

CONTAINMENT AIR RETURN FANS

HYDROGEN SKIMMER FANS

- AIR RETURN FANS FUNCTION TO RECIRCULATE CONTAINMENT ATMOSPHERE FROM UPPER TO LOWER CONTAINMENT TO CONTINUE ENERGY REMOVAL VIA THE ICE CONDENSER
- HYDROGEN SKIMMER FANS DRAW AIR FROM ISOLATED REGIONS IN LOWER CONTAINMENT AND DISCHARGE TO UPPER CONTAINMENT NEAR THE RECOMBINERS TO PROMOTE MIXING AND PREVENT HIGH LOCAL HYDROGEN CONCENTRATIONS
- BOTH SYSTEMS ARE REDUNDANT AND ACTUATE ON HIGH-HIGH CONTAINMENT PRESSURE FOLLOWING A TIME DELAY
- OPERATOR ACTION LIMITED TO VERIFICATION OF SYSTEM ACTUATION AND CORRECT OPERATION
- CONTAINED IN THE FOLLOWING GUIDELINES:
  - E.0 SAFETY INJECTION
  - E-1 HIGH ENERGY LINE BREAK INSIDE CONTAINMENT
  - FR-Z.1 RESPONSE TO HIGH CONTAINMENT PRESSURE

VERIFY VX SYSTEM OPERATION	
a. 10 minute time delay expired	a. GO TO Step 8. WHEN 10 minute time delay expired, THEN do Steps 7b and c.
b. Containment air return fans - RUNNING	b. Manually start fans.
c. Hydrogen skimmer fans - RUNNING	c. Manually start fans.

RHR AUXILIARY CONTAINMENT SPRAY

- CAPABILITY TO SUPPLY ADDITIONAL FLOW FROM RHR HEAT EXCHANGER DISCHARGE TO CONTAINMENT SPRAY HEADERS
- INCLUDED TO PROVIDE ACCEPTABLE RESPONSE TO DESIGN BASIS CONTAINMENT PRESSURE TRANSIENT FOLLOWING ICE MELT
- USED IN ACCORDANCE WITH LICENSING COMMITTMENTS
  - ALIGNED ONLY AFTER TRANSFER TO COLD LEG RECIRCULATION HAS BEEN MADE
  - SUFFICIENT CORE COOLING MUST BE MAINTAINED DURING THE AUXILIARY SPRAY OPERATION
- CONTAINED IN THE FOLLOWING GUIDELINES:
  - ES-1.3 TRANSFER TO COLD LEG RECIRCULATION
  - FR-Z.1 RESPONSE TO HIGH CONTAINMENT PRESSURE

ALIGN ND SYSTEM FOR AUXILIARY CONTAINMENT SPRAY	
a. Containment pressure >1.2 psig	a. GO TO Step 10.
b. More than 50 minutes have elapsed since LOCA	b. Continue with Step 10 and WHEN 50 minutes have elapsed since LOCA, THEN return to step 8a.
c. Check for flow from at least one NI pump AND one NV pump.	c. IF both ND trains available, THEN GO TO Step 8d. IF NOT, THEN GO TO Step 10.
d. Close ND cold leg injection valve on one ND train.	
e. Open ND auxiliary containment spray valve on that ND train.	
SECURE ND AUXILIARY CONTAINMENT SPRAY	
a. Check containment pressure <1.2 psig	a. Continue to monitor containment pressure. WHEN pressure <1.2 psig, THEN complete Step 9.
b. Close the open ND auxiliary containment spray valve.	
c. Open ND cold leg injection valve on that train.	

OTHER UHI/IC PLANT DIFFERENCES

- LOWER POST-ACCIDENT CONTAINMENT PRESSURES
- ADDITIONAL SUMP INVENTORY DUE TO MELTED ICE
- LOWER CONTAINMENT SPRAY ACTUATION SETPOINTS
- LOWER COLD LEG ACCUMULATOR PRESSURE SETPOINTS
- CONTAINMENT PRESSURE CONTROL SYSTEM

STANDBY SHUTDOWN FACILITY (SSF)

- PROVIDES ALTERNATE RCP SEAL INJECTION CAPABILITY AND LIMITED ALTERNATE PLANT CONTROL CAPABILITY
- POWERED BY SEPARATE DIESEL GENERATOR
- EMERGENCY PROCEDURE USE LIMITED TO TAKING CREDIT FOR SEAL INJECTION DURING LOSS OF ALL AC POWER
- IF ALTERNATE SEAL INJECTION FLOW VERIFIED AND NO SYMPTOMS OF ANY OTHER LOSS OF RCS INVENTORY OBSERVED,* COOLDOWN AND DEPRESSURIZATION SEQUENCE IN ERGs (REV. 0 STEPS 14 AND 15) IS BYPASSED
- IF EITHER CONDITION IS NOT MET, COOLDOWN AND DEPRESSURIZATION IS PERFORMED AS IN GENERIC GUIDELINES.

* AS INDICATED BY A DECREASING PRESSURIZER LEVEL OR RVLIS INDICATION

SUMMARY

- PLANT SPECIFIC DESIGN FEATURES ARE USED IN ACCORDANCE WITH FSAR OR LICENSING COMMITMENTS
- PERFORMANCE OF PLANT SPECIFIC FEATURES IS COMPLEMENTARY TO GENERIC SYSTEMS
- OPERATOR ACTIONS CONCERNING PLANT SPECIFIC FEATURES ARE LIMITED TO:
  - VERIFICATION OF ACTUATION AND OPERATION OF AUTOMATIC SYSTEMS
  - PERFORMANCE OF LIMITED MANUAL ACTIONS BASED ON SPECIFIC CRITERIA

III. RVLIS UTILIZATION

- SYSTEM DESCRIPTION
  - TWO TRAINS
  - THREE RANGES
- RVLIS LOWER RANGE
  - VALID WITH ALL RCPS OFF
  - USED TO MONITOR CORE UNCOVERY
- RVLIS UPPER RANGE
  - VALID WITH ALL RCPS OFF
  - USED TO MONITOR VOID IN VESSEL HEAD AND TO CONTROL HEAD VENTING
- RVLIS DYNAMIC HEAD RANGE
  - VALID WITH ONE OR MORE RCPS ON
  - USED TO MONITOR RCS INVENTORY (VOID FRACTION)

<u>NRC CONCERN</u>

THE RVLIS UPPER RANGE IS NOT USED IF ANY REACTOR COOLANT PUMPS ARE RUNNING, ALTHOUGH SOME CAPABILITY TO DO SO EXISTS.

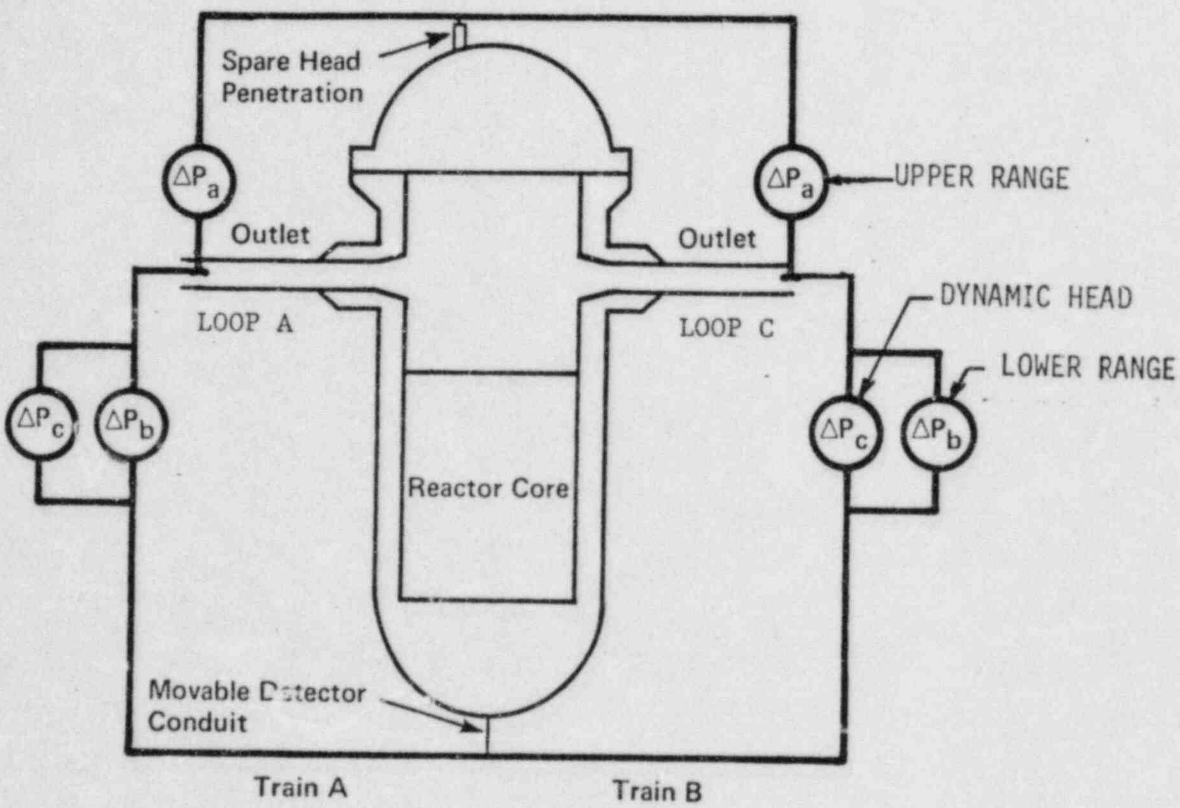

Figure 4.9-1. RVLIS System

BASIS FOR NOT USING RVLIS UR WITH RCPS ON

- THE RVLIS CHANNEL IS NOT VALID IF THE RCP IS ON IN THE LOOP WITH THE RVLIS TAP
  - CHANNEL A NOT VALID IF RCP A IS ON
  - CHANNEL B NOT VALID IF RCP C IS ON
- THE UR INDICATION VARIES DEPENDING ON THE NUMBER OF RCPS RUNNING AND TO SOME EXTENT ON THE COMBINATION OF PUMPS RUNNING
- THE DEPENDENCY OF THE RVLIS INDICATION ON THE RCP STATUS SIGNIFICANTLY COMPLICATES THE USE OF IT, IN PARTICULAR IN TERMS OF HUMAN FACTORS. THE USE OF THE RVLIS DHR ALSO DEPENDS ON THE RCP STATUS - HOWEVER ITS USE IN THAT MODE IS NECESSARY FOR ICC MITIGATION. (SEE NEXT PAGE)
- IT IS UNLIKELY THAT A PLANT TRANSIENT WILL EVOLVE INTO THE CONDITIONS OF CONCERN, I.E. RCPS RUNNING WITH A LARGE NONCONDENSIBLE VOID. THIS WOULD ONLY OCCUR DUE TO AN ICC EVENT. THE EPGS WILL NOT RESTART A REACTOR COOLANT PUMP IF A VESSEL HEAD VOID IS NONCONDENSIBLE. THE VOID IN THAT CASE WOULD BE VENTED PRIOR TO RCP RESTART.
- FOLLOWING AN ICC EVENT THE HEAD VOID WOULD NOT BE VENTED WITHOUT CONCURRENCE FROM THE TSC. UTILIZATION OF THE UR WITH RCPS ON COULD BE CONSIDERED AT THAT TIME
- LOW OPERATOR CONFIDENCE
- LITTLE OPERATIONAL EXPERIENCE WILL BE GAINED IN THE AREAS OF INTEREST
- THE EXISTING METHOD PROVIDES ALREADY FOR A LEVEL OR VOID FRACTION INDICATION UNDER ANY CONDITIONS

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6	CHECK RVLIS INDICATION	
	a. At least one NC pump - RUNNING	a. GO TO Step 6e.
	b. DHR RVLIS indication > setpoint from table below	b. IF DHR RVLIS indication not increasing, THEN GO TO Step 7. Otherwise wait until DHR RVLIS indication greater than the appropriate setpoint for the number of NC pumps running, and THEN return to guideline in effect.

Number of NC Pumps Running	Channel A with NC Pump A		Channel B with NC Pump C	
	Running	NOT Running	Running	NOT Running
4	>80%	--	>80%	---
3	>60%	>35%	>60%	>35%
2	>45%	>23%	>45%	>23%
1	>35%	>15%	>35%	>15%

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. DHR RVLIS indication - NOT DECREASING	c. GO TO Step 7.
	d. Return to guideline in effect.	
	e. LR RVLIS indication >~~50~~ 58%.	e. IF LR RVLIS indication not increasing, THEN GO TO Step 7. Otherwise wait until LR RVLIS >~~50~~ 58% and THEN return to guideline in effect.
	f. LR RVLIS indication - NOT DECREASING	f. GO TO Step 7.
	g. Return to guideline in effect.	
7	CHECK NC PUMP SUPPORT SYSTEMS - AVAILABLE	
	• Establish conditions per OP/1/A/6150/02A, REACTOR COOLANT PUMP OPERATION	• Try to establish support system availability.

IV SETPOINTS

- CORE EXIT THERMOCOUPLES
- RCS T-AVE
- T-COLD
- T-HOT
- RCS PRESSURE
- PRESSURIZER PRESSURE
- PRESSURIZER LEVEL
- RVLIS
- STEAM LINE PRESSURE
- STEAM GENERATOR LEVEL
- AUXILIARY FEEDWATER FLOWRATE
- CONTAINMENT PRESSURE
- HYDROGEN CONCENTRATION
- REFUELING WATER STORAGE TANK LEVEL
- CONTAINMENT SUMP LEVEL
- MISCELLANEOUS
- SUBCOOLING MARGIN

CORE EXIT THERMOCOUPLES

SETPOINT	USE	BASIS	DEVIATION
350	ICC TEMPERATURE CRITERION	ERG	NO
476	SGTR COOLDOWN TARGET	ERG	NO
488	SGTR COOLDOWN TARGET	ERG	NO
500	SGTR RAPID COOLDOWN TARGET	DUKE	YES*
502	SGTR COOLDOWN TARGET	ERG	NO
514	SGTR COOLDOWN TARGET	ERG	NO
526	SGTR COOLDOWN TARGET	ERG	NO
537	SGTR COOLDOWN TARGET	ERG	NO
700	ICC TEMPERATURE CRITERION	ERG	NO
1200	ICC TEMPERATURE CRITERION	ERG	NO

* A TEMPERATURE OF 500°F WAS SELECTED TO PROVIDE AMPLE RCS SUB-COOLING WHEN PRESSURE WAS DECREASED TO BELOW THE STEAM LINE SAFETY VALVE LIFT SETPOINTS. THIS VALUE IS COMPARABLE TO THE ERG TARGET OF 507°F (NO-LOAD TEMPERATURE - 50°F).

RCS LOOP TEMPERATURES

SETPOINT	USE	BASIS	DEVIATION
	T-AVE		
557	NO-LOAD RCS T-AVE	ERG	NO
564	LOW T-AVE FEEDWATER ISOLATION	ERG	NO
	T-COLD		
250	STATUS TREE PTS CRITERION	DUKE	YES*
300	COLD OVERPRESSURE CRITERION	ERG	NO
300	LOW TEMPERATURE CRITICALITY	ERG	NO
350	LOW TEMPERATURE ECCS LOCK OUT	ERG	NO
400	EXCESSIVE COOLDOWN CRITERION	DUKE	N/A ***
457	STATUS TREE PTS CRITERION	DUKE	YES**
	T-HOT		
200	INDICATION OF COLD SHUTDOWN	ERG	NO
350	RHR INITIAION	ERG	NO
550	P-11 BLOCKING TARGET	ERG	NO
557	HIGH SAFETY VALVE T-SAT	ERG	NO

* ADDITIONAL MARGIN PROVIDED TO ACCOUNT FOR INABILITY TO MEASURE DOWNCOMER FLUID TEMPERATURE

** ADDITIONAL MARGIN PROVIDED TO GIVE WARNING OF ENTRY INTO OVER-COOLING TRANSIENT

*** N/A FOR ERG REV 1, CONSISTENT WITH REV 0

RCS PRESSURES

SETPOINT	USE	BASIS	DEVIATION
100	CLA LOW PRESSURE ISOLATION	UHI/IC	NO
150	LOW PRESSURE ECCS ISOLATION	DUKE	N/A
195	RHR PUMP SHUTOFF PRESSURE	ERG	NO
385	RHR INITIATION PRESSURE	ERG	NO
400	PORV LOW SETPOINT	ERG	NO
550	CLA SHUTOFF PRESSURE	UHI/IC	NO
550	UHI LOW PRESSURE ISOLATION	UHI/IC	N/A
1000	CLA MAXIMUM ISOLATION PRESSURE	UHI/IC	NO
1500	CHARGING/SI MINIFLOW CLOSURE	DUKE	N/A
1500	UHI SHUTOFF PRESSURE	UHI/IC	N/A
1520	SI PUMP SHUTOFF PRESSURE	ERG	NO
1900	UHI MAXIMUM ISOLATION PRESSURE	UHI/IC	N/A
2000	CHARGING/SI MINIFLOW OPENING	DUKE	N/A

PRESSURIZER PRESSURE

SETPOINT	USE	BASIS	DEVIATION
1845	LOW PRESSURE REACTOR TRIP	ERG	NO
1900	P-11 BLOCKING TARGET	ERG	NO
1955	P-11 SETPOINT	ERG	NO
2135	PORV SETPOINT IN FR-S.1	ERG	NO
2135	UPPER LIMIT FOR REPRESSURIZATION	DUKE	YES*
~~2335~~ 2235	NO-LOAD PRESSURE	ERG	NO
2260	SPRAY ACTUATION SETPOINT	ERG	NO
2315	PORV RESEAT PRESSURE	ERG	NO
2335	PORV LIFT PRESSURE	ERG	NO
2400	FAILURE OF PRESSURE CONTROL	DUKE	N/A
2400	HIGH PRESSURE MINIFLOW ISOLATION	DUKE	N/A

* NO ADVERSE EFFECTS WILL RESULT FROM A REPRESSURIZATION TO NEAR NORMAL OPERATING PRESSURE. THIS SETPOINT PROVIDES MARGIN TO LIMIT THE REPRESSURIZATION TO BELOW THIS VALUE.

PRESSURIZER LEVEL

SETPOINT	USE	BASIS	DEVIATION
5	LEVEL ON SCALE LOW	ERG	NO
18	LOW LEVEL LETDOWN ISOLATION	ERG	NO
20	NATURAL CIRCULATION LOW TARGET	ERG	NO
25	NO-LOAD SETPOINT	ERG	NO
30	NATURAL CIRCULATION HIGH TARGET	ERG	NO
40	VOID COLLAPSE LOW TARGET	ERG	NO
50	VOID COLLAPSE COMPENSATION	DUKE	YES*
60	VOID COLLAPSE HIGH TARGET	ERG	NO
90	NATURAL CIRCULATION HIGH TARGET	ERG	NO
92	HIGH LEVEL REACTOR TRIP	ERG	NO
95	LEVEL ON SCALE HIGH	ERG	NO

* A DIFFERENT VALUE WAS USED AFTER A PLANT SPECIFIC CALCULATION

RVLIS

SETPOINT	USE	BASIS	DEVIATION
	LOWER RANGE		
43	MIDDLE OF CORE PLUS ERRORS	DUKE	YES
58	TOP OF CORE PLUS ERRORS	ERG	NO*
	UPPER RANGE		
72	TOP OF HOT LEG PLUS ERRORS	ERG	NO
97	UPPER RANGE FULL MINUS ERRORS	ERG	NO
	DYNAMIC HEAD RANGE		
15	INACTIVE 1 PUMP SETPOINT	DUKE	YES**
23	INACTIVE 2 PUMP SETPOINT	DUKE	YES**
35	INACTIVE 3 PUMP SETPOINT	DUKE	YES**
35	ACTIVE 1 PUMP SETPOINT	DUKE	YES**
45	ACTIVE 2 PUMP SETPOINT	DUKE	YES**
60	ACTIVE 3 PUMP SETPOINT	DUKE	YES**
80	ACTIVE 4 PUMP SETPOINT	DUKE	YES**

* WESTINGHOUSE USES TWO SETPOINTS, 12 FT AND 3½ FT. DUKE USES ONLY 12 FT TO VERIFY AN ADEQUATELY COVERED CORE.

** DUKE SETPOINTS ARE ADJUSTED TO APPROXIMATELY 25% VOID FRACTION TO PROVIDE ADDITIONAL INVENTORY IF RCP'S ARE TRIPPED

STEAM LINE PRESSURE

SETPOINT	USE	BASIS	DEVIATION
100	LOW PRESSURE ~~FO~~ FOR TD AFW PUMP	DUKE	N/A
385	RHR COOLING FOR RUPTURED SG	DUKE	N/A
500	TARGET FOR LOSS OF ALL AC COOLDOWN	UHI/IC	N/A
725	LOW STEAM PRESSURE SI SETPOINT	ERG	NO
1125	STEAM LINE PORV LIFT SETPOINT	ERG	NO
1175	LOWEST STEAM LINE SAFETY SETPOINT	ERG	NO
1230	HIGHEST STEAM LINE SAFETY SETPOINT	ERG	NO

STEAM GENERATOR LEVEL

SETPOINT	USE	BASIS	DEVIATION
	NARROW RANGE		
5	LEVEL ON SCALE LOW	ERG	NO
15	UPPER BAND FOR SGTR CONTROL	DUKE	N/A
38	NO-LOAD SETPOINT	ERG	NO
70	UPPER LIMIT FOR BACKFILL	DUKE	YES*
82.4	P-14 HIGH LEVEL SETPOINT	ERG	NO
95	LEVEL ON SCALE HIGH	ERG	NO
	WIDE RANGE		
3	LEVEL ON SCALE LOW	ERG	NO
10	MINIMUM USABLE HEAT SINK INDICATION	DUKE	N/A

* USED RESULT OF CALCULATION BASED ON PLANT-SPECIFIC INSTRUMENT ERRORS RATHER THAN AN ARBITRARY NUMBER.

AUXILIARY FEEDWATER FLOWRATE

SETPOINT	USE	BASIS	DEVIATION
25	MAXIMUM FLOW FOR ALL ~~SY'S~~ SG'S DEPRESSURIZED	ERG	NO
100	MAXIMUM FLOW TO DRY SG	ERG	NO
450	MINIMUM FLOW FOR HEAT REMOVAL	ERG	NO

CONTAINMENT PRESSURE

SETPOINT	USE	BASIS	DEVIATION
0.3	CPCS INTERLOCK SETPOINT	UHI/IC	N/A
1.2	HIGH PRESSURE SETPOINT	UHI/IC	N/A
3	HIGH-HIGH PRESSURE SETPOINT	UHI/IC	N/A
10	INDICATION OF ICE MELT	UHI/IC	N/A
15	CONTAINMENT DESIGN PRESSURE	ERG	NO

HYDROGEN CONCENTRATION

SETPOINT	USE	BASIS	DEVIATION
0.5	HYDROGEN MITIGATION LOW SETPOINT	ERG	NO
3	MAXIMUM VENTING CONCENTRATION	ERG	NO
3.5	MINIMUM PURGE CONCENTRATION	FSAR	N/A
6	HYDROGEN MITIGATION HIGH SETPOINT	ERG	NO
6	MAXIMUM RECOMBINER CONCENTRATION	ERG	NO

REFUELING WATER STORAGE TANK LEVEL

SETPOINT	USE	BASIS	DEVIATION
6	RWST EMPTY	ERG	NO
8	FEED-AND-BLEED SWAP OF HIGH-HEAD PUMPS	DUKE	N/A
11	LOW-LOW LEVEL SETPOINT	ERG	NO
20	MINIMUM FEED-AND-BLEED INVENTORY	DUKE	N/A
37	LOW LEVEL SETPOINT	ERG	NO
50	MAXIMUM FEED-AND-BLEED INVENTORY	DUKE	N/A

CONTAINMENT SUMP LEVEL

SETPOINT	USE	BASIS	DEVIATION
1.5	LOW FLOW AIR ENTRAINMENT LIMIT	DUKE	N/A
2.5	HIGH FLOW AIR ENTRAINMENT LIMIT	DUKE	N/A
13	HIGH SUMP LEVEL	DUKE	YES*

* PRELIMINARY LEVEL SELECTED TO AVOID FLOODING OF STEAM GENERATOR LEVEL TRANSMITTERS; FINAL LEVEL STILL UNDER EVALUATION

MICELLANEOUS

SETPOINT	USE	BASIS	DEVIATION
5% FP	SUBCRITICALITY STATUS TREE	ERG	NO
10^{-10} AMPS	P-6 SETPOINT	ERG	NO
100 PPM	BORON MARGIN FOR NATURAL CIRCULATION	DUKE	N/A
150 PPM	BORON MARGIN FOR STUCK ROD	ERG	NO
150 PPM	BORON MARGIN FOR BACKFILL	DUKE	N/A
75 ~~PPM~~ GPM	MINIMUM EMERGENCY BORATION FLOW	DUKE	N/A
50°F/HR	NATURAL CIRCULATION COOLDOWN RATE	ERG	NO
100°F/HR	MAXIMUM COOLDOWN RATE	ERG	NO
-0.2 DPM	SUBCRITICALITY STATUS TREE	ERG	NO
6"	HOTWELL LOW-LOW LEVEL	ERG	NO
-2FT	SPENT FUEL POOL LOW LEVEL	ERG	NO
60°F	BAT LOW TEMPERATURE ALARM	ERG	NO

SUBCOOLING MARGIN

UTILIZATION OF SUBCOOLING MARGIN SETPOINTS

- ENSURE RCS INVENTORY IS MAINTAINED IN A SUBCOOLED STATE INCLUDING INSTRUMENT ERRORS
  - VERIFIES ADEQUATE CORE COOLING
  - ENSURES THAT HEAT TRANSFER IS INDICATED BY TEMPERATURE CHANGE
- AVOID EXCESSIVE SUBCOOLING WHICH CAN AGGRAVATE A PRESSURIZED THERMAL SHOCK EVENT
- ENABLE EQUALIZATION OF RCS AND STEAM GENERATOR PRESSURE TO STOP LEAKAGE THROUGH A SGTR.
- REDUCE INVENTORY LOSS FROM THE RCS
- ESTABLISH A MARGIN TO REACHING SATURATION CONDITIONS PRIOR TO A DEPRESSURIZING ACTION
  - NATURAL CIRCULATION COOLDOWN
  - RCP RESTART WITH A VESSEL HEAD VOID
  - SAFETY INJECTION FLOW REDUCTION

SUBCOOLING MARGIN SETPOINTS

0°F - USED AS THE MINIMUM MARGIN THAN ENSURES RCS SUBCOOLING AND TO VERIFY ACCUMULATOR INJECTION NOT REQUIRED

0-5°F - USED AS A TARGET OPERATING BAND FOR MINIMIZING SUBCOOLING

20°F - USED TO CONTROL SAFETY INJECTION FLOW REDUCTION

30°F - USED TO LIMIT RCS PRESSURE FOLLOWING A SGTR WITHOUT PRESSURIZER PRESSURE CONTROL

50°F - USED AS A COMFORTABLE MARGIN TO SATURATION

100°F - USED AS A TARGET AND UPPER LIMIT FOLLOWING AN OVERCOOLING (PTS) EVENT

200°F - USED AS AN UPPER LIMIT DURING THE COOLDOWN FOLLOWING AN OVERCOOLING (PTS) EVENT

DEVIATION BASES

- 50°F (RATHER THAN 0°F) IS USED AN AN SI TERMINATION CRITERION FOR GUIDELINES IN WHICH RCS REPRESSURIZATION IS EXPECTED AND ACCEPTABLE. THIS SIMPLY REQUIRES THAT A MORE COMFORTABLE MARGIN IS ESTABLISHED.

- 100°F (RATHER THAN 10°F) IS USED AS AN RCS DEPRESSURIZATION TARGET FOR PTS EVENTS. THIS VALVE WILL AVOID POTENTIAL VOIDING IN THE RCS. THE RATHER SEVERE GENERIC GUIDANCE IS UNNECESSARY FOR THE CATAWBA VESSELS DUE TO GOOD WELD CHEMISTRY.

Attachment 2

Dose Comparison

The NRC concern with the absence of a blowdown guideline was the loss of a potential method for reducing doses. The blowdown guideline will not result in lower doses than the backfill guideline since, for backfill, all reactor coolant inventory is contained and processed within the normal Chemical and Volume Control System. In contrast, the blowdown guideline would introduc. contaminated reactor coolant into the balance-of-plant, with the potential for more difficulty in containing the contamination. Duke Power does not intend to include a cooldown guideline using blowdown.

Design Blowdown Capacity

Two options exist at Catawba for draining a steam generator through the blowdown system. First, the steam generator drain tanks and pump, while being properly shielded and having sufficient capacity, are only designed for 150°F and 200 psig. Therefore this system cannot be used for cooldown of a ruptured steam generator at elevated temperatures and pressures. Second, the normal blowdown path, while designed for full operating temperatures and pressures, is of limited storage capacity since it functions in a recirculation mode. Beyond the blowdown blowoff tank (3000 gallons) and the excess hotwell capacity (5000 gallons) leakage would be dumped to the turbine building sump. This is undesirable from a dose standpoint. Even if the available hotwell liquid volume was increased to create extra storage capacity, the volume of one steam generator above the U-tubes is over 30,000 gallons. This volume may have to be drained several times in the blowdown cooldown guideline. Therefore, Duke Power concludes that the Catawba plant design is not compatible with the steam generator tube rupture alternate cooldown approach using blowdown.

Attachment 3

The Catawba Emergency Procedure Guidelines lower range RVLIS ICC setpoints differ from the generic setpoints in two places only.

1. The Catawba Core Cooling Critical Safety Function (CSF) Status Tree RVLIS setpoints with all reactor coolant pumps off are 43%. This is derived by taking the indication for 6 feet of collapsed liquid level, 39%, and adding a 4% error allowance.

2. The RVLIS setpoint, corresponding to ERG FR-C.1 Step 6 and FR-C.2 Step 7, in the Catawba Emergency Procedure Guidelines is equivalent to a collapsed liquid level at the top of the core, 34%, plus the 4% error allowance.

The corresponding Westinghouse ERG setpoint in each case is 3½ feet above the bottom of the core plus errors. The NRC concerns to be resolved are (1) whether earlier entry into or exit from the core cooling guidelines because of the higher setpoint will cause the operator to postpone or omit necessary actions to respond to lower priority CSF Status Tree alarms and, (2) why the higher setpoints are conservative.

Omission or Postponement of Lower Priority Actions

The lower priority CSFs, in order, are Heat Sink, Reactor Coolant System Integrity, Containment Integrity, and Reactor Coolant System Inventory. Responses to each function during an inadequate core cooling scenario are discussed separately.

Heat Sink: The inadequate core cooling (ICC) guidelines provide the necessary guidance on the use of the steam generators to mitigate the ICC condition. In effect, the Heat Sink CSF is addressed within the ICC guidelines during ICC conditions.

Reactor Coolant System Integrity: ICC requires saturated core conditions. Pressurized thermal shock, which is the safety concern in this status tree, does not warrant concern when ICC symptoms exist. RCS pressure is already minimized to the extent achievable, and the need to restore core cooling far outweighs the effect of additional cooling of the reactor vessel. In addition, PTS is only a minimal safety concern at Catawba due to the excellent weld chemistry of the vessel.

Containment Integrity: All important means of maintaining containment integrity are automatically actuated. In addition, the operator verifies the actuation and operation of these automatic systems in the entry guideline, E-0, Reactor Trip or Safety Injection, prior to transferring to any ICC guideline.

Inventory: Only low priority alarms exist on this status tree. All are to be responded to at the operator's discretion and never require prompt attention. Therefore, the Inventory CSF is not affected or impacted by the Core Cooling Status Tree.

The Catawba Safety Parameter Display System (SPDS) and Status Trees keep the operator continuously aware of the alarm states of all critical safety functions. The operating philosophy is to concurrently implement the actions of lower priority Function Restoration Guidelines which do not hinder or conflict with the actions of the higher priority guideline in effect. In the context of core cooling, this would mean that if the RVLIS indication were exhibiting a sustained increase, as in reflood, the operator, while technically remaining in the ICC guideline until the top of the core setpoint was reached, would be free to also do any other actions (which would not hinder restoration of core cooling) to address other problems of which he was aware. In summary, based on this approach and the above justification, no important operator actions will be postponed or omitted due to using a more conservative Core Cooling Status Tree setpoint.

Conservative Nature Of The Higher Setpoints

The 6 feet setpoint (compared to the 3½ feet setpoint) provides for an increased likelihood that core mixture level, swelled by steam voids below the surface, is at or above the top of the core. Earlier diagnosis of core uncovery based on the higher setpoint will reduce the likelihood that a sustained partial core uncovery will go undetected. It is possible that the RVLIS increase during reflood could slow when the vessel mixture level exceeded the upper tap level of the instrument. If there were significant voiding below the mixture level, this might delay exit from the ICC guideline. However, as mentioned in the preceeding section, the operator can address other problems in other guidelines while awaiting the completion of reflood. Also, this situation is not unique to the Catawba guidelines since the Westinghouse ERGs, in all pumps-off RVLIS exits except the ones in question, also require a top of core collapsed level before leaving.

The top of the core setpoint, as mentioned above, is consistent with the other exit points in the generic ICC guidelines and ensures that any core recovery, initiated by the restoration of safety injection systems in the preceeding steps, will result in complete reflooding of the core prior to exiting the guideline. An example of the conservatism of this approach is demonstrated by the following scenario. Having identified symptoms of ICC, the operator is successful in partially reflooding the core by unisolating the UHI accumulator. Should UHI delivery result in reflooding the core to a level in excess of 3½ feet, the generic guidelines would allow the operator to exit. However, a sustained recovery from ICC is not ensured since the core remains substantially uncovered and there is no sustained delivery of injection water. ICC symptoms will eventually recur. The Catawba guidelines require the operator to continue ICC mitigation actions until the core is completely reflooded. This approach better indicates that a sustained core cooling condition has been achieved.