Attachment 1

Proposed Technical Specification Changes

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
13. Steam Generator Water Level Low-Low					
a. Unit 1	17	14.2	1.5	>17% of span from 0% to 30% RTP* increasing linearly to > 40.0% of span from 30% to 100% RTP*	>15.3% of span from 0% to 30% RTP* increasing linearly to >38.3% of span from 30% to 100% RTP*
b. Unit 2	TBD* ~~17~~	TBD* ~~14.2~~	TBD* ~~1.5~~	36.8% ~~>17%~~ of narrow range span	35.1% ~~>15.3%~~ of narrow range span
14. Undervoltage - Reactor Coolant Pumps	8.57	0	1.0	>77% of bus voltage (5082 volts) with a 0.7s response time	>76% (5016 volts)
15. Underfrequency - Reactor Coolant Pumps	4.0	0	1.0	>56.4 Hz with a 0.2s response time	>55.9 Hz
16. Turbine Trip					
a. Stop Valve EH Pressure Low	N.A.	N.A.	N.A.	>550 psig	>500 psig
b. Turbine Stop Valve Closure	N.A.	N.A.	N.A.	>1% open	>1% open
17. Safety Injection Input from ESF	N.A.	N.A.	N.A.	N.A.	N.A.

*RTP = RATED THERMAL POWER

*TBD = TO BE DETERMINED

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
4. Steam Line Isolation					
a. Manual Initiation	N.A.	N.A.	N.A.	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays	N.A.	N.A.	N.A.	N.A.	N.A.
c. Containment Pressure-High-High	12.7	0.71	1.5	$\leq$ 3 psig	$\leq$ 3.2 psig
d. Steam Line Pressure - Low	4.6	1.31	1.5	$\geq$ 725 psig	$\geq$ 694 psig*
e. Steam Line Pressure-Negative Rate - High	8.0	0.5	0	$\leq$ 100 psi	$\leq$ 122.8 psi**
5. Feedwater Isolation					
a. Automatic Actuation Logic Actuation Relays	N.A.	N.A.	N.A.	N.A.	N.A.
b. Steam Generator Water Level-High-High (P-14)					
1. Unit 1	5.4	2.18	1.5	$\leq$ 82.4% of narrow range instrument span	$\leq$ 84.2% of narrow range instrument span
2. Unit 2	TBD* ~~9.7~~	TBD* ~~2.18~~	TBD* ~~1.5~~	$\leq$ 77.1% ~~78.1%~~ of narrow range instrument span	$\leq$ 78.9% ~~79.9%~~ of narrow range instrument span
c. T_{avg}-Low	4.0(6.0#)	1.12(0.71#)	1.2(0.8#)	$\geq$ 564°F	$\geq$ 562°F(561°F#)
d. Doghouse Water Level-High	1.0	0	0.5	11 inches above 577' floor level	12 inches above 577' floor level
e. Safety Injection	See Item 1. above for all Safety Injection Setpoints and Allowable Values.				

*TBD = TO BE DETERMINED

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
8. Auxiliary Feedwater (Continued)					
c. Steam Generator Water Level - Low-Low					
1) Unit 1	17	14.2	1.5	≥ 17% of span from 0% to 30% RTP increasing linearly to ≥ 40.0% of span from 30% to 100% RTP	≥ 15.3% of span from 0% to 30% RTP increasing linearly to ≥ 38.3% of span from 30% to 100% RTP
2) Unit 2	TBD* ~~17~~	TBD* ~~14.2~~	TBD* ~~1.5~~	36.8% ≥ ~~17%~~ of narrow range span	35.1% ≥ ~~15.3%~~ of narrow range instrument span
d. Safety Injection	See Item 1. above for all Safety Injection Setpoints and Allowable Values.				
e. Loss-of-Offsite Power	N.A.	N.A.	N.A.	≥ 3500 V	≥ 3200 V
f. Trip of All Main Feedwater Pumps	N.A.	N.A.	N.A.	N.A.	N.A.
g. Auxiliary Feedwater Suction Pressure-Low					
1) CAPS 5220, 5221, 5222	N.A.	N.A.	N.A.	≥ 10.5 psig	≥ 9.5 psig
2) CAPS 5230, 5231, 5232	N.A.	N.A.	N.A.	≥ 6.2 psig	≥ 5.2 psig
a. Unit 1	N.A.	N.A.	N.A.	≥ 6.2 psig	≥ 5.2 psig
b. Unit 2	N.A.	N.A.	N.A.	≥ 6.0 psig	≥ 5.0 psig
9. Containment Sump Recirculation					
a. Automatic Actuation Logic and Actuation Relays	N.A.	N.A.	N.A.	N.A.	N.A.
b. Refueling Water Storage Tank Level-Low Coincident With Safety Injection	N.A.	N.A.	N.A.	≥ 177.15 inches	≥ 162.4 inches
	See Item 1. above for all Safety Injection Setpoints and Allowable Values.				

*TBD = TO BE DETERMINED

Add

Steam Generator Water Level

or a feedwater system pipe break.

The Steam Generator Water Level Low-Low trip protects the reactor from loss of heat sink in the event of a sustained steam/feedwater flow mismatch resulting from loss of normal feedwater. The specified Setpoint provides allowances for starting delays of the Auxiliary Feedwater System, as well as errors in the level instrumentation.

Undervoltage and Underfrequency - Reactor Coolant Pump Busses

The Undervoltage and Underfrequency Reactor Coolant Pump Bus trips provide core protection against DNB as a result of complete loss of forced coolant flow. The specified Setpoints assure a Reactor trip signal is generated before the Low Flow Trip Setpoint is reached. Time delays are incorporated in the Underfrequency and Undervoltage trips to prevent spurious Reactor trips from momentary electrical power transients. For undervoltage, the delay is set so that the time required for a signal to reach the Reactor trip breakers following the simultaneous trip of two or more reactor coolant pump bus circuit breakers shall not exceed 1.2 seconds. For underfrequency, the delay is set so that the time required for a signal to reach the Reactor trip breakers after the Underfrequency Trip Setpoint is reached shall not exceed 0.3 second. On decreasing power the Undervoltage and Underfrequency Reactor Coolant Pump Bus trips are automatically blocked by P-7 (a power level of approximately 10% of RATED THERMAL POWER; with a turbine impulse chamber pressure at approximately 10% of full power equivalent); and on increasing power, reinstated automatically by P-7.

Turbine Trip

A Turbine trip initiates a Reactor trip. On decreasing power the Reactor trip from the Turbine trip is automatically blocked by P-9 (a power level of approximately 69% of RATED THERMAL POWER); and on increasing power, reinstated automatically by P-9.

Safety Injection Input from ESF

If a Reactor trip has not already been generated by the Reactor Trip System instrumentation, the ESF automatic actuation logic channels will initiate a Reactor trip upon any signal which initiates a Safety Injection. The ESF instrumentation channels which initiate a Safety Injection signal are shown in Table 3.3-3.

Attachment 2

Discussion, No Significant Hazards Analysis and
Environmental Impact Statement

DISCUSSION, NO SIGNIFICANT HAZARDS ANALYSIS AND ENVIRONMENTAL IMPACT STATEMENT

The proposed amendment would:

(1) Change the Total Allowance, Z, Sensor Error, Trip Setpoint and Allowable Value for Item 13.b., Table 2.2-1.

(2) Change the Total Allowance, Z, Sensor Error, Trip Setpoint and Alloewable Value for Items 5.6.2. and 8.c.2), Table 3.3-4.

The changes to the tables are needed for Unit 2 only.

Catawba Units 1 and 2 are equipped with Westinghouse Model D3 and Model D5 steam generators, respectively. A major difference in these models is the design of the moisture separator section. Two aspects of this design difference are of significance with respect to the proposed modification: the D5 has a higher recirculation rate than the D3, and the elevation of the lower deck plate in the D5 is higher than in the D3. See Figure 1. Due to these differences the lower instrument tap for the narrow range level instrumentation was located above the transition cone and lower deck plate on the D5 as opposed to below the transition cone in the downcomer region on the D3. This has resulted in significantly different operating characteristics. The proposed modification will relocate the D5 lower instrument tap to the same location as the D3. The old level instrumentment taps will be capped.

Steam generators exhibit a "shrink" or "swell" characteristic at low power levels (when feedwater temperature is low) when feedwater flow is initially increased or decreased, respectively. This makes plant control difficult and more susceptible to trips. The "shrink" and "swell" in the Model D3 is much less pronounced due to the location of the lower tap in the downcomer region. At the time that the level "swells", the recirculation flow rate increases thus creating a lower pressure at the lower instrument tap and significantly reducing the magnitude of the indicated level increase.

In order to determine the potential gain in operational control characteristics of the D5 steam generator if the lower instrument tap were relocated to the equivalent location as the D3, Duke and Westinghouse installed instrumentation on the Catawba 2C generator. One narrow range level channel was installed using the new lower tap location. A pitot tube was installed in another available location at the same elevation. The pitot tube static pressure connection was used to create another narrow range level channel which would be unaffected by the flow velocity in the downcomer. Transient data from these instruments and the currently installed narrow range level instrument clearly showed (1) that the shrink and swell is significantly reduced by the flow velocity feedback in the downcomer and (2) the indicated level when sensed in the downcomer and velocity compensated correlates extremely well with the current instrument configuration. Fee Figure 2.

Due to the higher elevation of the lower instrument tap on the D5, a more restrictive instrumentation range is available to the operator. Steam generators experience a significant shrink following a reactor trip from power. Emergency procedures require the operator to establish indicated level in the safety grade

narrow range instrumentation prior to throttling auxiliary feedwater flow below design values. Due to the wider span of narrow range level available on the model D3, if indicated level does fall off-scale it is generally recovered very quickly. On the model D5 it typically takes 10 minutes before indicated narrow range level is recovered. This creates a high potential for post-trip over cooling and depressurization. Transient data has shown that the modified D5 level instrumentation will perform similarly to the D3 in terms of post-trip response. See Figure 3.

The present span between the high-high level and low-low level trips on the D5 is physically bounded by the elevation of the top of the moisture separator swirl vanes and the elevation of the lower instrument tap, respectively. By relocating the lower tap, the low-low level trip setpoint can be reduced. The high-high level trip setpoint will be reduced by the equivalent error assigned to the maximum velocity in the downcomer. The operating level setpoint will be reduced to maintain the currently existing margin (36") between this setpoint and the high-high level trip. The low-low level trip setpoint will be set at the elevation of the lower deck plate. With this arrangement, the margin between operating level setpoint and low-low level trip setpoint will be increased from a current 42" to 58", a 38% increase. This will make the unit more tolerant to feedwater system malfunctions at power, thus reducing unnecessary trips and corresponding chalienges to safety systems.

Relocating the narrow range instrumentation lower sensing tap on the Westinghouse model D5 steam generator to the same elevation as the mode D3 steam generator will provide the following safety enhancements:

1. The effects of shrink and swell at low power levels will be greatly reduced, thus reducing the potential for reactor trips.

2. The time necessary to recover indicated level following a reactor trip will be greatly reduced, thus reducing the potential for an an over cooling event due to excessive auxiliary feedwater.

3. The margin to low-low level trip will be increased thus reducing the the potential for reactor trips at power.

Relocation of the level sensing tap to the downcomer region requires that the velocity induced error be accounted for in determination of trip and operating level setpoints. This can be accomplished without reducing any current margin to trip.

10 CFR 50.92 states that a proposed amendment involves no significant hazards considerations if operation in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

DISCUSSION, NO SIGNIFICANT HAZARDS ANALYSIS AND ENVIRONMENTAL IMPACT STATEMENT

There will not be a significant increase in the probability or consequences of an accident previously evaluated. The following FSAR Chapter 15 events have been preliminarily evaluated assuming the new set points shown in Attachment 1:

- Loss of External Load/Turbine Trip (FSAR Sections 15.2.2 & 15.2.3)
- Steam System Piping Failure (FSAR Section 15.1.5)
- Loss of Non-Emergency AC Power to the Station Auxiliaries (FSAR Section 15.2.6)
- Loss of Normal Feedwater Flow (FSAR Section 15.2.7)
- Feedwater System Pipe Break (FSAR Section 15.2.7)
- Feedwater System Malfunction Causing an Increase in Feedwater Flow (FSAR Section 15.1.2)
- Mass and Energy Release Analysis for Postulated Secondary System Pipe Ruptures Inside containment (FSAR Section 6.2.1.4)

The following events were re-analyzed because they are the events most sensitive to a reduction in the low-low level trip setpoints:

- Loss of Non-Emergency AC Power to the Station Auxiliaries (FSAR Section 15.2.6)
- Loss of Normal Feedwater Flow (FSAR Section 15.2.7)
- Feedwater System Pipe Break (FSAR Section 15.2.7)

Information concerning Reactor Trips as a result of Steam Generator water level can be found in FSAR sections 7.2.1.1.2 and 7.2.2.3.5. The evaluation of the above events concludes there is no significant increase in the probability or consequences of an accident previously evaluated.

The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. Relocating the level tap the D-5 steam generators should improve the operation of the steam generators. Since the steam generators will be operated the same as before the level tap modification, no new or different kind of accidents are created.

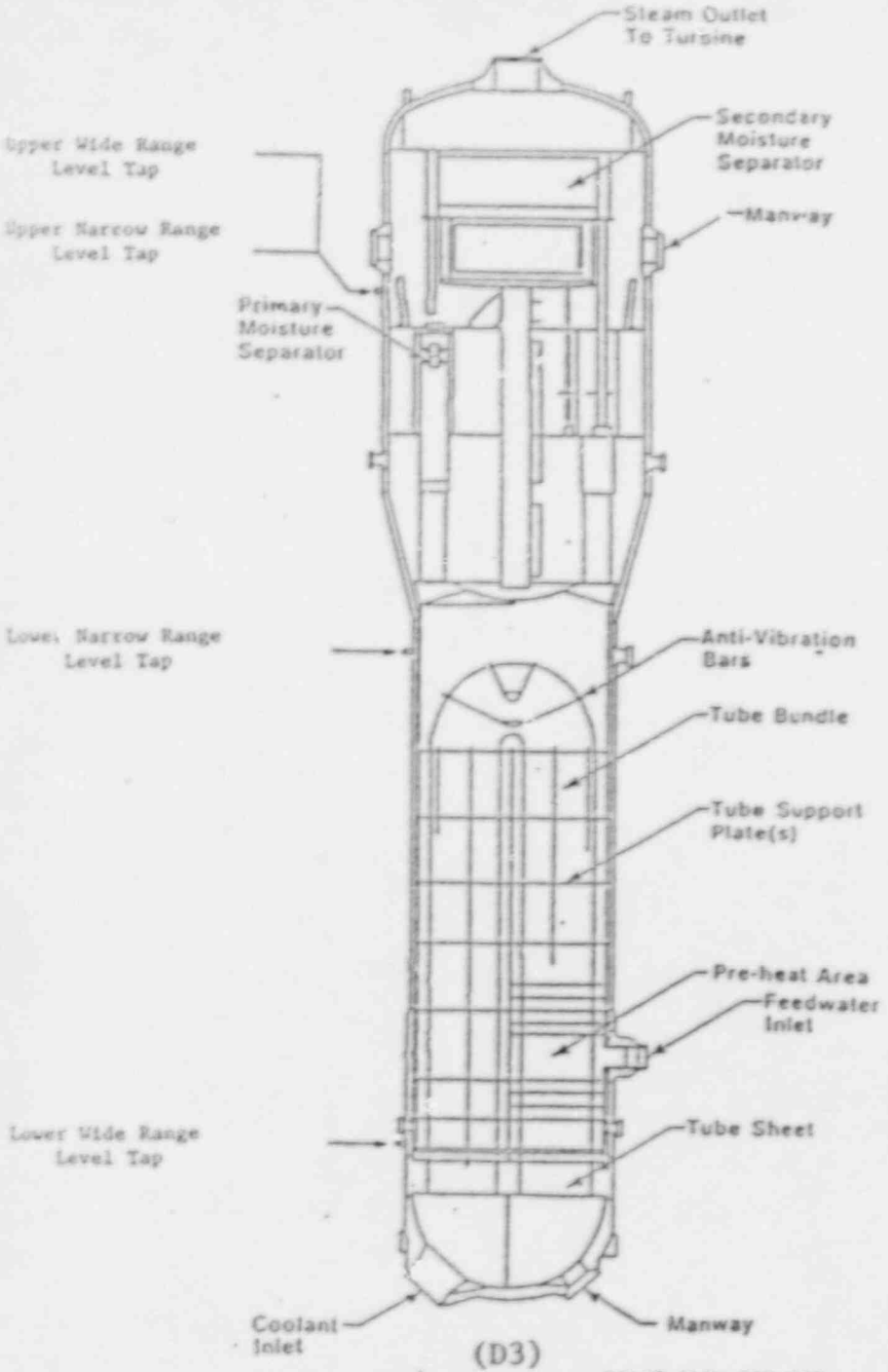
The movement of the steam generator level taps will not involve a significant reduction in any margins of safety. Furthermore, the modification will improve safety since the modified steam generators will be less susceptible to feedwater transients, thus reducing the potential for reactor and turbine trips and avoiding unnecessary transients on the primary and secondary systems.

Based on the above analysis, this amendment request does not involve Significant Hazards Considerations.

Environmental Impact

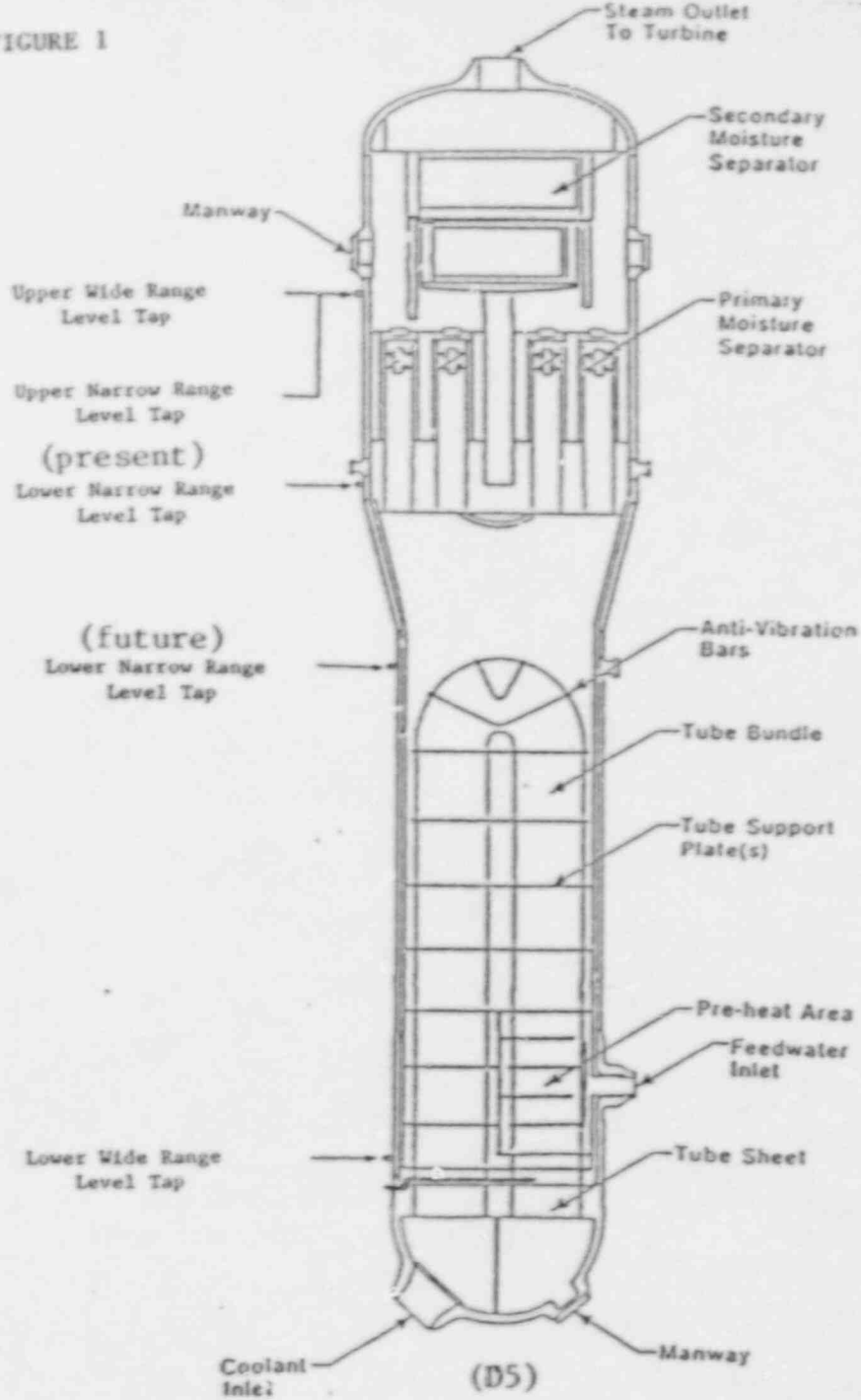
The proposed Technical Specification change has been reviewed against the criteria of 10CFR51.22 for the environmental considerations. As shown above, the proposed change does not involve a significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, nor increase individual or cumulative occupational radiation exposures. Based on the foregoing, the proposed Technical Specification change meets the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

FIGURE 1



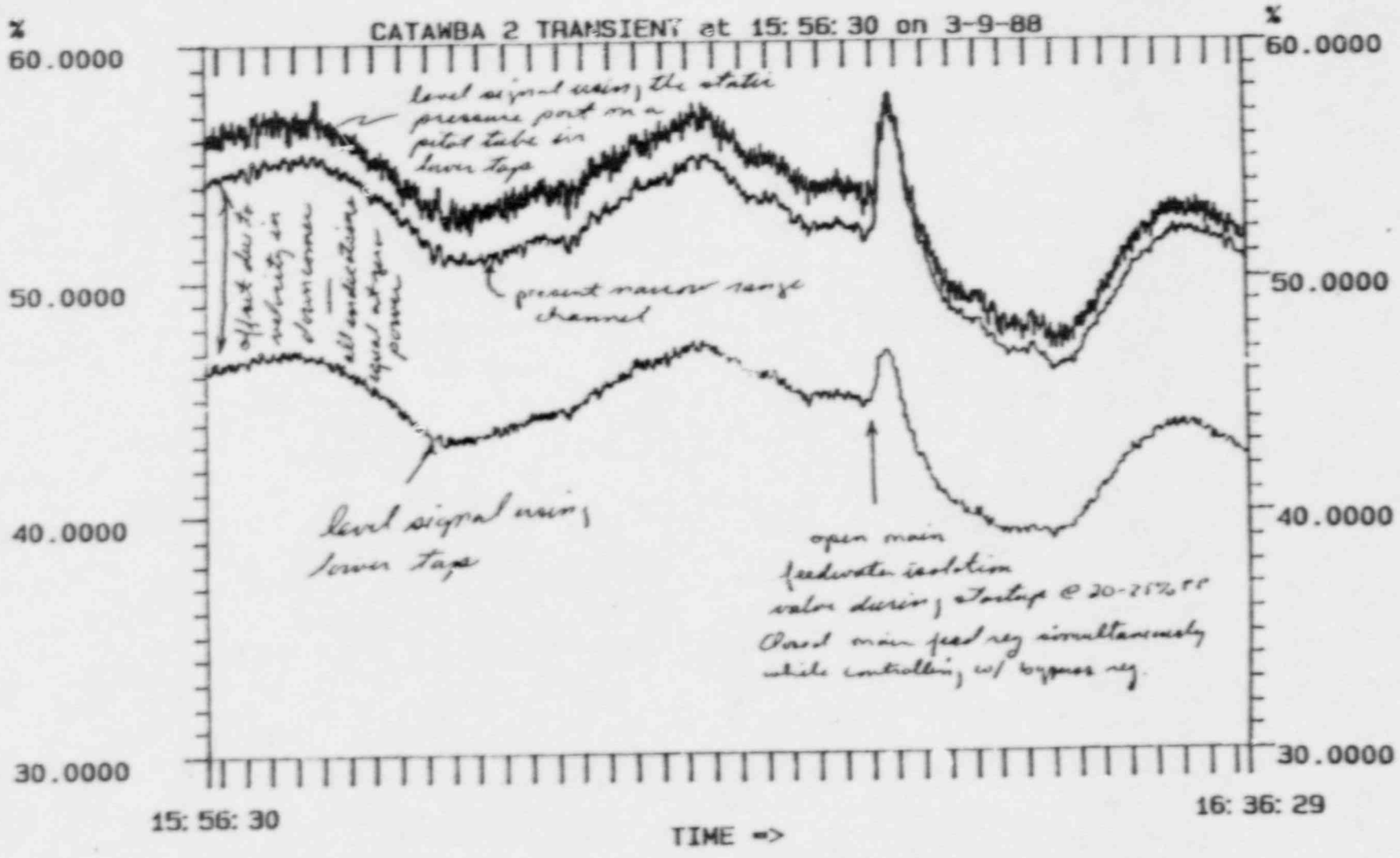
(D3)

SPLIT FLOW PREHEAT STEAM GENERATOR (UNIT 1) CATAWBA NUCLEAR STATION



(D5)

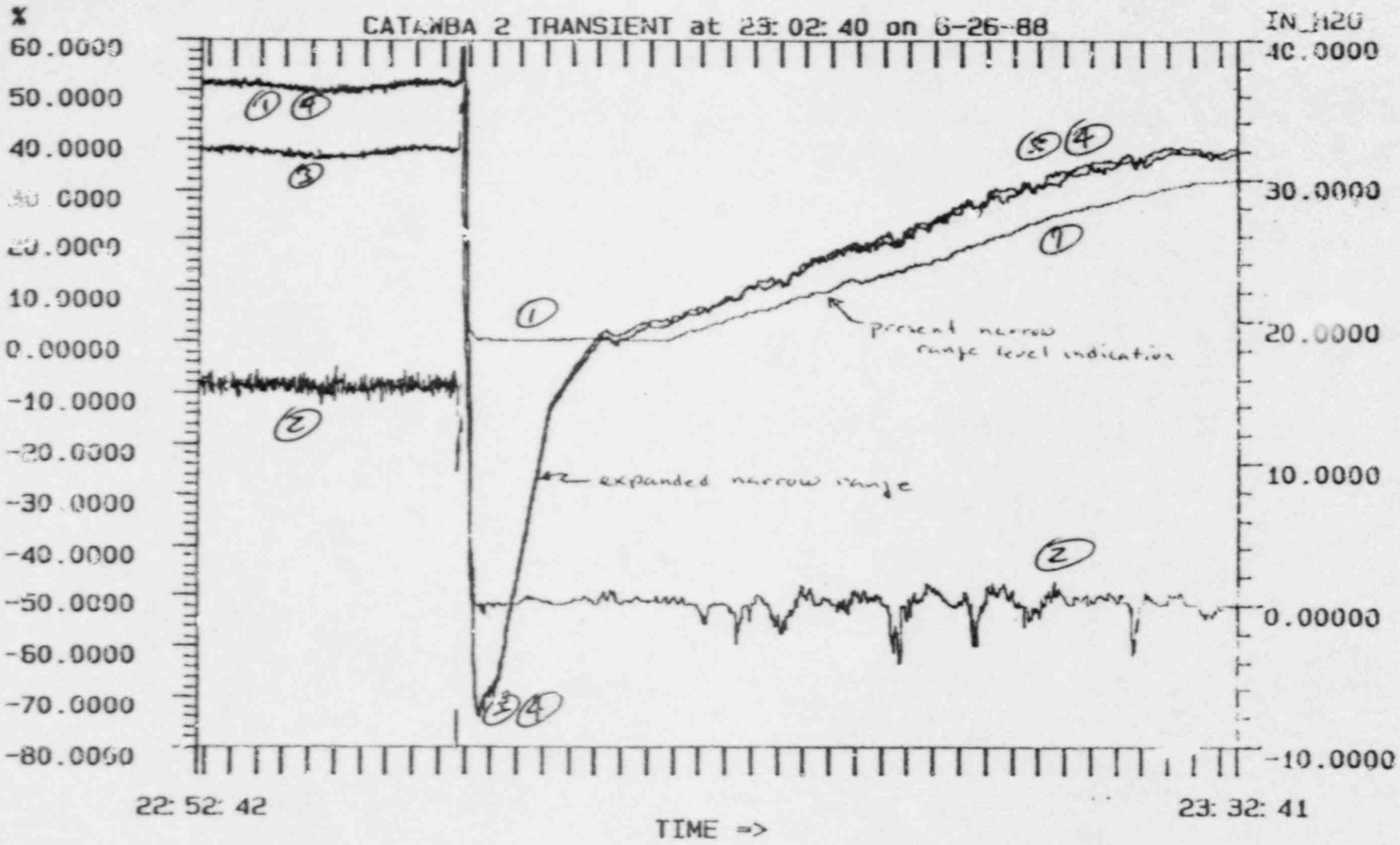
COUNTER FLOW STEAM GENERATOR (UNIT 2) CATAWBA NUCLEAR STATION



	MAX	MIN	PID	MESSAGE
———	57.7281	46.9219	A0458	S/G C NARROW RANGE LEVEL #1
———	47.3769	38.8456	A0464	S/G C NARROW RANGE LEVEL #2
———	57.3500	45.9500	A062?	S/G C NARROW RANGE LEVEL CH 3

< Manual Freeze >

FIGURE 2



	@TRIP	MAX	MIN	PID	MESSAGE
< (1)	52.1500	57.3500	0.00000	A0627	S/G C NARROW RANGE LEVEL CH 3
> (2)	11.0250	36.4125	-4.08750	A0470	S/G C NARROW RANGE LEVEL - VEL PRESS
< (3)	46.8081	47.1494	-74.2219	A0464	S/G C NARROW RANGE LEVEL #2
< (4)	56.5906	58.5244	-73.6531	A0458	S/G C NARROW RANGE LEVEL #1

Initiating point was D3410, VLV SM1 MAIN STEAM D ISOLATION

FIGURE 3