TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

October 17, 1979

Director of Nuclear Reactor Regulation
Attention: Mr. L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rubenstein:

In the Matter of the Application of) Docket Nos. 50-327
Tennessee Valley Authority) 50-328

S. A. Varga's letter to H. G. Parris dated August 17, 1979, requested that TVA develop emergency operating instructions and train operators to recognize and mitigate an Anticipated Transient Without Scram (ATWS) event. Enclosed is a draft revision to the Sequoyah Nuclear Plant Abnormal Operating Instruction (AOI-1) for Reactor Trip. This revision to AOI-1 incorporates specific indications which must be observed for reactor trip followed by mitigating operator actions in the event the trip does not occur. Operators are being trained to recognize and mitigate an ATWS event through the use of this operating instruction as part of TVA's operator training program.

Mr. Varga's letter indicated your review would include a site visit to determine the feasibility of implementing the proposed procedures through operator simulation of the steps. In view of Sequoyah's fuel loading date of November 15, 1979, it is necessary to schedule your site visit as soon as possible. Please get in touch with D. L. Lambert at FTS 854-2581 to make arrangements.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure

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A

ENCLOSURE

Savannah Nuclear Project

MAY 7 1979

ABNORMAL OPERATING INSTRUCTION

A01-1

REACTOR TRIP

Units 1 & 2

Prepared by: C. O. Brewer

Reviewed by: W. A. Quinn

Reviewed by: [signature]
Supervisor

PORC Review: 2/28/79
Date

Approved by: [signature]
for Superintendent

Date Approved: 2/28/79

DISTRIBUTION

1C	Plant Master File
	Superintendent
1U	Assistant Superintendent (Oper.)
	Assistant Superintendent (Maint.)
	Administrative Supervisor
1C	Maintenance Supervisor
	Assistant Maintenance Supervisor
	Results Supervisor
	Assistant Results Supv.
1C	Operations Supervisor
	Quality Assurance Supervisor
	Health Physicist
	Public Safety Services Supv.
	Chief Storekeeper
	Preop Test Program Coordinator
	Outage Director
	Chemical Engineer
	Radiochem Laboratory
	Instrument Shop
	Reactor Engineer
	Instrument Engineer
	Mechanical Engineer
	Staff Industrial Engineer
1C	Training Center Coordinator
	PSO - Chick Saunders Training Unit - SNP
	Public Safety Services - SNP
1C	Shift Engineer's Office
1C	Unit Control Room
	QA&A Supv. - SNP
	Health Physics Laboratory
1U	Chief, Nuclear Generation Branch
1U	P Proj Control Office File
1U	Superintendent, WNP-2
	Superintendent, WNP-1
	Superintendent, WNP-3
1C	EE Dept - WNP-2/3
	Supv., Scheduling, WNP-2/3
	NRC-Hall
	Power Security Officer, 604 PEB-C
	Nuclear Materials Coordinator
	Manager, GP-QA&A Staff
1U	P Proj Plant Mgr. Branch

Rev. No.	Date	Revised Pages
3	9/8/78	All
4	2/28/79	2

Rev. No.	Date	Revised Pages

The last page of this instruction is Number 2.

W-1
[illegible]
Page 1 of 1
Rev. 2

Reactor Trip Report

Charts, etc., to be attached to trip report has not been determined yet.

Walter M. Guinn

9/5/78

REACTOR TRIP

I. SYMPTOMS

A. The reactor may be tripped by one or more of the following:

1. Source range high flux (10^5 CPS, 1/2). Manual block above P-6.
2. Intermediate range high flux (25 percent power, 1/2). Manual block above P-10.
3. Power range high flux, low setpoint (25 percent, 2/4). Manual block above P-10.
4. Power range high flux, high setpoint (109 percent, 2/4).
5. Power range high neutron flux rate:
   a. Positive rate (5 percent of full power in 2 seconds, 2/4).
   b. Negative rate (5 percent of full power in 2 seconds, 2/4).
6. Overtemperature ΔT. (2/4)
7. Overpower ΔT. (2/4)
8. Low coolant flow, $\leq$ 90 percent (1/4 loops when above P-8 setpoint of 35 percent power. 2/4 loops when < 35 percent power but above P-7).
9. Undervoltage on 6900V unit RCP busses (4830 volts, 2/4) above P-7.
10. Underfrequency on 6900V unit RCP busses (56 HZ, 2/4) above P-7
11. High pressurizer pressure (2385 psig, 2/4)
12. Low pressurizer pressure (1865 psig, 2/4), above P-7.
13. Pressurizer high level (92 percent, 2/3), above P-7.
14. Steam Flow/Feedwater Flow mismatch coincident with low S/G level (Steam Flow > Fe dwater Flow $\geq$ 38% SG rated stream flow, 1/2 on one S/G and $\leq$ 25 percent level, 1/2 on next S/G).
15. Lo-lo S/G level ($\leq$ 17 percent 2/3 on any one S/G).
16. Safety Injection.
17. Turbine trip, above P-7.
18. Manual trip, 1/2.

II. AUTOMATIC ACTION

A. Turbine trip - reactor trip

B. Auxiliary feedwater pumps start on lo-lo steam generator level.

C. Generator breakers trip, 6900V unit boards auto transfer.

D. Automatic steam dump actuation.

E. Steam generator feedwater regulator, regulator bypass, and main feedwater isolation valves close at 554°F

III. IMMEDIATE OPERATOR ACTION

A. Verify reactor trip-rapid drop in nuclear power (10% initial power in 5 sec.).

1. Emergency borate 100 ppm for each rod not fully inserted.
Note: All rods in as indicated by IRPI and/or IRPI bottom lights

2. In the event a reactor trip signal is generated and the reactor trip breakers fail to open and allow the control rods to drop, the following actions shall be initiated immediately:

Note: An Anticipated Transient Without Scram (ATWS) has occured

a. Attempt to manually trip the breakers by placing the reactor trip switch in the TRIP position.

b. If the above does not trip the rods immediately dispatch someone to the 480-V unit boards A and B to trip the breakers powering the control rod drive MG sets. This must be done within 2 minutes.

c. If the control rods are not inserted by the above procedure, actuate safety injection.

B. Verify Turbine Trip - Turbine Steam Stop Valve closed. If not:

1. Use manual electrical trip switch

2. In the event of electrical Trip failure dispatch operator to the turbine front standard to manually trip with the trip lever.

C. Determine reactor coolant system status.

1. Auxiliary feedwater pumps running.

2. Pressurizer pressure and level within expected range. (1900-2235 psig). (24-60 percent level).

3. Tavg controlling to 547°F.

4. Containment pressure and temperature normal (-0.1 psid +0.3 psid) (85-100°F. upper compartment, 100-120°F. lower compartment).

5. Generator breakers open, 6.9-kV unit station service transferred.

6. Steam generator feedwater regulator, regulator bypass, and main isolation valves shut.

C. Announce, "Reactor Trip".

PRECAUTION: Automatic controls are not to be placed in manual unless it is apparent the automatic action has failed. If a control is placed on manual, it must be checked frequently for proper operation.

IV. SUBSEQUENT OPERATOR ACTION

A. If the reactor trip is a result of safety injection system actuation, refer to EOI-1, "Loss of Reactor Coolant"; EOI-2, "Loss of Secondary Coolant"; or EOI-3, "Steam Generator Tube Failure". If the trip is a result of a power blackout, refer to EOI-5, "Station Blackout".

B. Verify proper automatic actuation of the auxiliary feedwater system: (1) the two motor driven and one steam-driven feed pumps started, (2) level control valves open, (3) flow to each steam generator of 440 gpm or being modulated to maintain levels at 33 percent.

1. If only one (1) motor-driven auxiliary feedwater pump is operable to deliver water to the steam generators, the reactor coolant pumps should be stopped and MSIV's closed on loops without feedwater flow.

CAUTION: The reactor coolant pumps should be stopped only after it is certain that other auxiliary feedwater pumps cannot be placed in service and 1 minute after lo-lo level is reached in any steam generator.

2. Should any steam generator(s) have steam pressure indications abnormally low with respect to the other steam generator(s), auxiliary feedwater flow to the steam generator(s) having the abnormally low pressures should be diverted to the steam generator(s) having a high pressure.

CAUTION Be aware of 100 psi ΔP safety injection signal.

3. Auxiliary feedwater should be controlled to bring the steam generator levels back to the normal no-load value of 33 percent and to keep Tavg slightly above the no-load value of 547°F., (The temperature should not be allowed to go below 547°F). If the need for auxiliary feedwater is associated with an accident discussed in one of the detailed emergency instructions, the procedure in those instructions should be followed.

C. If the main feedwater system is available, manually operate the main feedwater system as required to maintain steam generator water at 33 percent level.

1. Transfer control of the main feedwater pumps and the feedwater control valves to manual.

2. Zero the feedwater control signal.

3. Manually reset the feedwater isolation. Open main feedwater isolation valve.

4. Vary feedwater pump speed and the feedwater regulator bypass valve position as required.

IV. SUBSEQUENT OPERATOR ACTION (Cont.)

C. 5. If Tavg cannot be maintained $\geq$ 547°F and/or level at 33% in steam generators with main feedwater pumps, transfer to auxiliary feedwater pump control.

CAUTION: Particular care must be taken to avoid feeding water to the steam generators too rapidly at zero load in order to avoid cooling the reactor coolant below 547°F. When core decay heat is low, rapid feeding of the steam generators can cause large reductions in reactor coolant system temperature.

CAUTION: Rapid feeding of water into one steam generator may result in pressure differences sufficient to initiate safety injection by steam line high ΔP.

D. The steam dump control should be transferred to the main steam header pressure control mode, and the set pressure adjusted to hold a steam pressure of 1005 psig.

NOTE: In order to conserve steam generator water, the set pressure should not be adjusted below 1005 psig even though the reactor coolant temperature may rise considerably above 547°F, until it is determined that the steam generator water levels in operable steam generators are no longer falling and are above 20 percent level span on the wide range level recorders.

E. Verify the containment ventilation system is normal. Three coolers operating in each compartment, upper and lower.

F. Transfer NR45 to SR and IR.

G. Verify normal pressurizer pressure of approximately 2235 psig. Maintain pressurizer level at 25 percent for zero load.

H. As main turbine speed approaches 1500 r/min, verify auto start of bearing lube oil pumps. As speed approaches zero, start bearing oil lift pumps and place turbine on turning gear when stopped.

I. Establish and maintain hot standby conditions. Refer to GOI-4, "Plant at Hot Standby with Xenon Present."

J. If an ATWS event has occurred, bring the unit to a cold shutdown condition consistent with technification specification 3.0.3.

K. When the cause of the reactor trip has been determined, complete the Reactor Trip Report, Appendix A.

IV. SUBSEQUENT OPERATOR ACTION (cont.)

L. If the cause of the reactor trip can be corrected, the plant may be returned to operation. Refer to GOI-2, "Plant Startup From Hot Standby to Minimum Load."

V. DISCUSSION

The reactor is tripped by deenergizing the control and shutdown rod drive mechanisms, thereby allowing the rods to drop, unimpeded, into the reactor core.

A reactor trip may be initiated automatically by the reactor protection system or manually by the operator from the control room.

REACTOR TRIP REPORT

Unit No.

Reactor Trip No. _____ Date _____

RT Actuated _____ Yes _____ no Time _____

CAUSE

Operator Error _____ Equipment Failure _____

Safety System _____ Other _____

PLANT CONDITIONS (Prior to Trip)

Rx Mode (1 thru 6) _____ Rx Pressure _____

Rx Power _____ % PRZ level _____

Steam Flow _____ Tavg _____

Feedwater Flow _____

PLANT EVOLUTION (Prior to Trip)

Starting Up _____ Shutting Down _____

Steady Operation _____ System Test _____

Power Change _____ Other _____

GENERATOR

Synchronized Yes _____ No _____

Output _____ MWe

NOTIFICATIONS

Chemistry Lab at _____

Health Physics Lab at _____

Operating Supervisor at _____

BRIEF DESCRIPTION OF TRIP

ATTACH THE FOLLOWING (charts, etc.)

Unit Operator _____

Assistant SE _____

Shift Engineer _____