January 26, 1989

Docket Nos. 50-259/260/296

Mr. Oliver D. Kingsley, Jr. Senior Vice President, Nuclear Power Tennessee Valley Authority 6N 38A Lookout Place 1101 Market Street Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

SUBJECT: TECHNICAL SPECIFICATIONS ON ANTICIPATED TRANSIENTS WITHOUT SCRAM (ATWS) - RECIRCULATION PUMP TRIP (RPT) (TAC 00436, 00437, 00438) (TS 252) BROWNS FERRY NUCLEAR PLANTS, UNITS 1, 2, AND 3

The Commission has issued the enclosed Amendment Nos.164,161, and 135to Facility Operating Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units 1, 2 and 3, respectively. These amendments are in response to your application dated August 4, 1988. These amendments incorporate Technical Specifications Limiting Conditions for Operation and Surveillance Requirements for the ATWS-RPT System.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

Sincerely,

Suzanne Black, Assistant Director
 for Projects
TVA Projects Division
Office of Nuclear Reactor Regulation\$

Enclosures: **DISTRIBUTION:** Amendment No. 1 44to Docket File GPA/CA RPierson 1. License No. DPR-33 NRC PDR ARM/LFMB FMcCoy 2. Amendment No.1()to Local PDR WLittle BFN Rdg. File 8902020416 890126 PDR ADOCK 050002 **Projects Reading FDaniels** License No. DPR-52 SVarga BGrimes Amendment No.1ろはの DCrutchfield 3. EJordan License No. DPR-68 AD/SP Reading DHagan Safety Evaluation 4. BDLiaw SBlack TMeek(12)WJones cc w/enclosures: MSimms GGears EButcher See next page ACRS(10) DMoran JRutberg GPA/PA OFFICIAL RECORD COPY :TVA:AD/P NAME :MSimms MV SB1ack niels:as :1/./5/88 **′88** ′8**6** OFFICIAL RECORD COPY

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-2-

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## TENNESSEE VALLEY AUTHORITY

## DOCKET NO. 50-259

### BROWNS FERRY NUCLEAR PLANT, UNIT 1

### AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 164 License No. DPR-33

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 4, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

- Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-33 is hereby amended to read as follows:
  - (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 164, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

uzanne Black

Suzanne Black, Assistant Director for Projects TVA Projects Division. Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: January 26, 1989

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## ATTACHMENT TO LICENSE AMENDMENT NO.164

# FACILITY OPERATING LICENSE NO. DPR-33

## DOCKET NO. 50-259

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages\* are provided to maintain document completeness.

REMOVE	INSERT
i ii	i i i*
v vi	v* vi
vii viii	vii viii*
-	3.2/4.2-6a 3.2/4.2-14*
3.2/4.2-14 3.2/4.2-15	3.2/4.2-15 3.2/4.2-39a
3.2/4.2-44	3.2/4.2-44 3.2/4.2-45
3.2/4.2-45 · 3.2/4.2-59	3.2/4.2-59 3.2/4.2-60
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### 3.2/4.2 Protective Instrumentation

### LIMITING CONDITIONS FOR OPERATION

#### SURVEILLANCE REQUIREMENTS

## 3.2.L ATWS/RPT

- 1. The ATWS/RPT System Instrumentation shall be OPERABLE during REACTOR POWER OPERATION in accordance with Table 3.2.L.
- The ATWS/RPT System Trip setpoints will be set in accordance with Table 3.2.L.
- 3. The actions required when the number of operable channels is less than the minimum OPERABLE channels per trip system is specified in Table 3.2.L.

#### 4.2.L ATWS/RPT

1. Each of the ATWS/RPT System Instrumentation channels shall be OPERABLE by performance of tests in Table 4.2.L.

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TABLE 3.2.B INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Operable <u>per Trip Sys(l)</u>	Function	Trip Level Setting	Action		Remarks
2	Instrument Channel – Reactor Low Water Level	≥ 470" above vessel zero.	Α .	١.	Below trip setting initiated HPCI.
2	Instrument Channel – Reactor Low Water Level	≥ 470" above vessel zero.	Α	۱.	Multiplier relays initiate RCIC.
2	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D, SW #1)	<u>&gt;</u> 378" above vessel zero.	Α	1.	Below trip setting initiates CSS.
					Multiplier relays initiate LPCI.
				2.	Multiplier relay from CSS initiates accident signal (1
2(16)	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D, SW #2)	<u>&gt;</u> 378" above vessel zero.	<b>A</b> .	۱.	Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.
1(16)	Instrument Channel – Reactor Low Water Level Permissive (LIS–3–184 & 185, SW #1)	≥ 544" above vessel zero.	A	1.	Below trip setting permissiv for initiating signals on A[
1	Instrument Channel – Reactor Low Water Level (LITS-3-52 and 62, SW #1)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	۱.	Below trip setting prevents inadvertent operation of containment spray during accident condition.

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TABLE 3.2.B (Continued)

BFN Unit	Minimum No. Operable Per <u>Trip Sys(l)</u>	Function			Desce ha
Ц	<u>1110 342(1)</u>	Function	<u>Trip Level Setting</u>	Action	Remarks
	2	Instrument Channel – Drywell High Pressure (PS-64-58 E-H)	l <u>≼</u> p <u>≺</u> 2.5 psig	Α.	<ol> <li>Below trip setting prevents inadvertent operation of containment spray during accident conditions.</li> </ol>
	2	Instrument Channel – Drywell High Pressure (PS-64-58 A-D, SW #2)	<u>&lt;</u> 2.5 psig	A	<ol> <li>Above trip setting in con- junction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI.</li> </ol>
					<ol> <li>Multiplier relay from CSS initiates accident signal. (15</li> </ol>
3.2/4.2	2	Instrument Channel – Drywell High Pressure (PS-64-58A-D, SW #1)	<u>∢</u> 2.5 psig	A	<ol> <li>Above trip setting in conjunction with low reactor pressure initiates LPCI.</li> </ol>
-15	2(16)	Instrument Channel - Drywell High Pressure (PS-64-57A-D)	<u>&lt;</u> 2.5 psig	Α.	<ol> <li>Above trip setting, in conjunction with low reactor water level, drywell high</li> </ol>
Amendment					pressure, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.

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	Antic Recirculati	Table 3.2 cipated Transient With ion Pump Test (RPT) Su	out Scram (ATWS) -	tion	
Minimum No. Channels operable per		Trip			Allowable Devendes
Trip Sys (1)	Function	<u>Setting</u>	Value	<u>Action</u>	<u>Remarks</u>
2	ATWS/RPT Logic Reactor Dome Pressure High	1118 psig	<u>≺</u> 1146.5 psig	(2)	Two out of two of the high reactor dome pressure channels or the
2	Reactor Vessel Level Low	483" above vessel zero	≥ 471.52" above vessel zero		low reactor vesse level channels in either trip system trips both reactor recirculation pumps.

- One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required (1)surveillance provided the other channels in that trip system are OPERABLE.
- Two trip systems exist, either of which will trip both recirculation pumps. Perform (2) Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

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SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

	SURVEIL	LANCE REQUIREMENTS FOR INSTROMENTAT	TON THAT INITIATE OR CONTROL THE CO	
BFN Unit	Function	Functional Test	Calibration	Instrument Check
Ч	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D)	(1)	once/3 months	once/day
	Instrument Channel – Reactor Low Water Level (LIS-3-184 & 185)	(1)	once/3 months	once/day
	Instrument Channel – Reactor Low Water Level (LITS-3-52 & 62)	(1)	once/3 months	once/day
	Instrument Channel – Drywell High Pressure (PS-64-58E-H)	(1)	once/3 months	none
3.2/4.	Instrument Channel – Drywell High Pressure (PS-64-58A-D)	(1)	once/3 months	none
.2-44	Instrument Channel – Drywell High Pressure (PS-64-57A-D)	(1)	once/3 months	none
Amen	Instrument Channel – Reactor Low Pressure (PS-3-74A & B)	(1)	once/3 months	none

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(PS-68-95) (PS-68-96)

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TABLE 4.2.B

	TABLE 4.2.B (Continued)	
SURVEILLANCE REQUIREMENTS	FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS	

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Reactor Low Pressure (PS-68-93 & 94)	(1)	once/3 months	none
Core Spray Auto Sequencing Timers (Normal Power)	(4)	once/operating cycle	none
Core Spray Auto Sequencing Timers (Diesel Power)	(4)	once/operating cycle	none
LPCI Auto Sequencing Timers (Normal Power)	(4)	once/operating cycle	none
LPCI Auto Sequencing Timers (Diesel Power)	(4)	once/operating cycle	none
RHRSW Al, B3, Cl, D3 Timers (Normal Power)	(4)	once/operating cycle	none
RHRSW Al, B3, Cl, D3 Timers (Diesel Power)	(4) 、	once/operating cycle	none
ADS Timer	(4)	once/operating cycle	no <b>ne</b>

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## NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K

- 1. Functional tests shall be performed once per month.
- 2. Functional tests shall be performed before each startup with a required frequency not to exceed once per week.
- 3. This instrumentation is excepted from the functional test definition. The functional test will consist of injecting a simulated electrical signal into the measurement channel.
- 4. Tested during logic system functional tests.
- 5. Refer to Table 4.1.B.
- 6. The logic system functional tests shall include a calibration once per operating cycle of time delay relays and timers necessary for proper functioning of the trip systems.
- 7. The functional test will consist of verifying continuity across the inhibit with a volt-ohmmeter.
- 8. Instrument checks shall be performed in accordance with the definition of instrument check (see Section 1.0, Definitions). An instrument check is not applicable to a particular setpoint, such as Upscale, but is a qualitative check that the instrument is behaving and/or indicating in an acceptable manner for the particular plant condition. Instrument check is included in this table for convenience and to indicate that an instrument check will be performed on the instrument. Instrument checks are not required when these instruments are not required to be operable or are tripped.
- 9. Calibration frequency shall be once/year.
- 10. Deleted
- 11. Portion of the logic is functionally tested during outage only.
- 12. The detector will be inserted during each operating cycle and the proper amount of travel into the core verified.
- 13. Functional test will consist of applying simulated inputs (see note 3). Local alarm lights representing upscale and downscale trips will be verified, but no rod block will be produced at this time. The inoperative trip will be initiated to produce a rod block (SRM and IRM inoperative also bypassed with the mode switch in RUN). The functions that cannot be verified to produce a rod block directly will be verified during the operating cycle.

3.2/4.2-59

BFN Unit l NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Continued)

- 14. (Deleted)
- 15. The flow bias comparator will be tested by putting one flow unit in "Test" (producing 1/2 scram) and adjusting the test input to obtain comparator rod block. The flow bias upscale will be verified by observing a local upscale trip light during operation and verified that it will produce a rod block during the operating cycle.
- 16. Performed during operating cycle. Portions of the logic is checked more frequently during functional tests of the functions that produce a rod block.
- 17. This calibration consists of removing the function from service and performing an electronic calibration of the channel.
- 18. Functional test is limited to the condition where secondary containment integrity is not required as specified in Sections 3.7.C.2 and 3.7.C.3.
- 19. Functional test is limited to the time where the SGTS is required to meet the requirements of Section 4.7.C.l.a.
- 20. Calibration of the comparator requires the inputs from both recirculation loops to be interrupted, thereby removing the flow bias signal to the APRM and RBM and scramming the reactor. This calibration can only be performed during an outage.
- 21. Logic test is limited to the time where actual operation of the equipment is permissible.
- 22. One channel of either the reactor zone or refueling zone Reactor Building Ventilation Radiation Monitoring System may be administratively bypassed for a period not to exceed 24 hours for functional testing and calibration.
- 23. (Deleted)
- 24. This instrument check consists of comparing the thermocouple readings for all valves for consistence and for nominal expected values (not required during refueling outages).
- 25. During each refueling outage, all acoustic monitoring channels shall be calibrated. This calibration includes verification of accelerometer response due to mechanical excitation in the vicinity of the sensor.

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BFN Unit 1

## NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Continued)

- 26. This instrument check consists of comparing the background signal levels for all valves for consistency and for nominal expected values (not required during refueling outages).
- 27. Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify operability of the trip and alarm functions.
- 28. Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the trip level setting.
- 29. The functional test frequency decreased to once/3 months to reduce challenges to relief valves per NUREG-0737, Item II.K.3.16.

BFN Unit 1 3.2/4.2-61

Function	Functional Test	Channel Calibration	Instrument Check
Reactor Vessel Water Level Low LS-3-58A-D	M(27)	R(28)	N/A
Reactor Vessel Dome Pressure High PS-3-204-D	M(27)	R(28)	N/A

# Table 4.2.L Anticipated Transient Without Scram (ATWS) -Recirculation Pump Test (RPT) Instrumentation Surveillance

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3.2/4.2-63a

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#### 3.2 BASES (Cont'd)

Trip setting of 100 mr/hr for the monitors in the refueling zone are based upon initiating normal ventilation isolation and SGTS operation so that none of the activity released during the refueling accident leaves the Reactor Building via the normal ventilation path but rather all the activity is processed by the SGTS.

Flow integrators and sump fill rate and pump out rate timers are used to determine leakage in the drywell. A system whereby the time interval to fill a known volume will be utilized to provide a backup. An air sampling system is also provided to detect leakage inside the primary containment (See Table 3.2.E).

For each parameter monitored, as listed in Table 3.2.F, there are two channels of instrumentation except as noted. By comparing readings between the two channels, a near continuous surveillance of instrument performance is available. Any deviation in readings will initiate an early recalibration, thereby maintaining the quality of the instrument readings.

Instrumentation is provided for isolating the control room and initiating a pressurizing system that processes outside air before supplying it to the control room. An accident signal that isolates primary containment will also automatically isolate the control room and initiate the emergency pressurization system. In addition, there are radiation monitors in the normal ventilation system that will isolate the control room and initiate the emergency pressurization system. Activity required to cause automatic actuation is about one mRem/hr.

Because of the constant surveillance and control exercised by TVA over the Tennessee Valley, flood levels of large magnitudes can be predicted in advance of their actual occurrence. In all cases, full advantage will be taken of advance warning to take appropriate action whenever reservoir levels above normal pool are predicted; however, the plant flood protection is always in place and does not depend in any way on advanced warning. Therefore, during flood conditions, the plant will be permitted to operate until water begins to run across the top of the pumping station at elevation 565. Seismically qualified, redundant level switches each powered from a separate division of power are provided at the pumping station to give main control room indication of this condition. At that time an orderly shutdown of the plant will be initiated, although surges even to a depth of several feet over the pumping station deck will not cause the loss of the main condenser circulating water pumps.

BFN Unit 1 3.2/4.2-69

#### 3.2 BASES (Cont'd)

The operability of the meteorological instrumentation ensures that sufficient meteorological data is available for estimating potential radiation dose to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public.

The operability of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for Browns Ferry Nuclear Plant. The instrumentation provided is consistent with specific portions of the recommendations of Regulatory Guide 1.12 "Instrumentation for Earthquakes."

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments will be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring the concentration of potentially explosive gas mixtures in the offgas holdup system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20 Appendix B, Table II, Column 2. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

ATWS/RPT, Anticipated Transients without Scram/Recirculation Pump Trip system provides a means of limiting the consequences of the unlikely occurrence of a failure to scram during an ATWS event. The response of the plant to this postulated event (ATWS/RPT) follows the BWR Owners Group Report by General Electric NEDE-31096-P-A and the accompanying NRC Staff Safety Evaluation Report.

ATWS/RPT utilizes the engineered safety feature (ESF) master/slave analog trip units (ATU) which consists of four level and four pressure channels total. The initiating logic consists of two independent trip systems each consisting of two reactor dome high pressure channels and two reactor vessel low level channels. A coincident trip of either two low levels or two high pressures in the same trip system causes initiation of ATWS/RPT. This signal from either trip system opens one of two EOC

Amendment No. 164

### 3.2 BASES (Cont'd)

- (end-of-cycle) breakers in series (the other system opens the other breaker) between the pump motor and the Motor Generator set driving each recirculation pump. Both systems are completely redundant such that only one trip system is necessary to perform the ATWS/RPT function. Power comes from the 250 VDC shutdown boards.

Setpoints for reactor dome high pressure and reactor vessel low level are such that a normal Reactor Protection System scram and accompanying recirculation pump trip would occur before or coincident with the trip by ATWS/RPT.

### 4.2 BASES

The instrumentation listed in Tables 4.2.A through 4.2.F will be functionally tested and calibrated at regularly scheduled intervals. The same design reliability goal as the Reactor Protection System of 0.99999 generally applies for all applications of (1-out-of-2) X (2) logic. Therefore, on-off sensors are tested once/3 months, and bistable trips associated with analog sensors and amplifiers are tested once/week.

BFN Unit 1 3.2/4.2-70a

Amendment No. 164



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

## TENNESSEE VALLEY AUTHORITY

### DOCKET NO. 50-260

## BROWNS FERRY NUCLEAR PLANT, UNIT 2

## AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 161 License No. DPR-52

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 4, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

- Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-52 is hereby amended to read as follows:
  - (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 161, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

 This license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

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Suzanne Black, Assistant Director for Projects TVA Projects Division Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: January 26, 1989

- 2 -

# ATTACHMENT TO LICENSE AMENDMENT NO. 161

# FACILITY OPERATING LICENSE NO. DPR-52

## DOCKET NO. 50-260

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages\* are provided to maintain document completeness.

REMOVE	INSERT
i ii	i ii*
v vi	v* vi vii
vii viii -	viii* 3.2/4.2-6a
3.2/4.2-14 3.2/4.2-15	3.2/4.2-14* 3.2/4.2-15 3.2/4.2-39a
- 3.2/4.2-44 3.2/4.2-45	3.2/4.2-44 3.2/4.2-45*
3.2/4.2-59 3.2/4.2-60	3.2/4.2-59 3.2/4.2-60
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## 3.2/4.2 Protective Instrumentation

#### LIMITING CONDITIONS FOR OPERATION

#### 3.2.L ATWS/RPT

- 1. The ATWS/RPT System Instrumentation shall be OPERABLE during REACTOR POWER OPERATION in accordance with Table 3.2.L.
- The ATWS/RPT System Trip setpoints will be set in accordance with Table 3.2.L.
- 3. The actions required when the number of operable channels is less than the minimum OPERABLE channels per trip system is specified in Table 3.2.L.

SURVEILLANCE REQUIREMENTS

- 4.2.L ATWS/RPT
- Each of the ATWS/RPT System Instrumentation channels shall be OPERABLE by performance of tests in Table 4.2.L.

TABLE 3.2.B INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

BFN Unit	Minimum No. Operable Per	Guratian	Trip Level Setting	Action	Remarks
	Trip Sys(1)	Function		ACCION	<u>Remarks</u>
N	2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	<ol> <li>Below trip setting initiated HPCI.</li> </ol>
	2	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D)	<u>&gt;</u> 470" above véssel zero.	A RCIC.	l. Multiplier relays initiate
	2	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D)	<u>&gt;</u> 378" above vessel zero.	A	<ol> <li>Below trip setting initiates CSS.</li> </ol>
					Multiplier relays initiate LPCI.
					<ol> <li>Multiplier relay from CSS initiates accident signal (15).</li> </ol>
3.2/4	2(16)	Instrument Channel – Reactor Low Water Level (LIS-3-58A-D)	<u>&gt;</u> 378" above vessel zero.	<b>A</b>	<ol> <li>Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.</li> </ol>
.2-14	1(16)	Instrument Channel – Reactor Low Water Level Permissive (LIS-3-184, 185)	≥ 544" above vessel zero.	Α	<ol> <li>Below trip setting permissive for initiating signals on ADS.</li> </ol>
Amendment No. 144	· 1	Instrument Channel – Reactor Low Water Level (LIS-3-52 and 62)	≥ 312 5/16" above vessel zer (2/3 core height)	o. A	<ol> <li>Below trip setting prevents inadvertent operation of containment spray during accident condition.</li> </ol>
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TABLE 3.2.B (Continued)

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BFN Unit	Minimum No. Operable Per <u>Trip Sys(l)</u>	Function	Trip Level Setting	Action	Remarks
Ν	2	Instrument Channel – Drywell High Pressure (PS-64-58 E-H)	1 <u>&lt;</u> p <u>&lt;</u> 2.5 psig	A	<ol> <li>Below trip setting prevents inadvertent operation of containment spray during accident conditions.</li> </ol>
	2	Instrument Channel – Drywell High Pressure (PS-64-58 A-D)	<u>&lt;</u> 2.5 psig	A	<ol> <li>Above trip setting in con- junction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI.</li> </ol>
			· .		<ol> <li>Multiplier relay from CSS initiates accident signal. (15)</li> </ol>
3.2/4.	2	Instrument Channel - Drywell High Pressure (PIS-64-58A-D)	⊻ 2.5 psig	A	<ol> <li>Above trip setting in conjunction with low reactor pressure initiates LPCI.</li> </ol>
.2-15	2(16)	Instrument Channel – Drywell High Pressure (PIS-64-57A-D)	<u>≺</u> 2.5 psig	A	<ol> <li>Above trip setting, in conjunction with low reactor water level, drywell high pressure, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.</li> </ol>
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### Table 3.2.L Anticipated Transient Without Scram (ATWS) -Recirculation Pump Test (RPT) Surveillance Instrumenation

#### Minimum No. Channels. Allowable Trip operable per Remarks Value Action Function Setting Trip Sys (1) Two out of two of (2) ATWS/RPT Logic the high reactor 1118 psig < 1146.5 psig 2 Reactor Dome dome pressure ά. Pressure High channels or the low reactor vessel > 471.52" above 483" above 2 **Reactor Vessel** level channels vessel zero vessel zero Level Low in either trip system trips both reactor recirculation pumps.

.2/4.2-39a

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(1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.

(2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

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### TABLE 4.2.B SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

BFN Unit

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Function	Functional Test	Calibration		Instrument Check
Instrument Channel Reactor Low Water Level	(1) (27)	Once/18 Months	(28)	, Once/day
(LIS-3-58A-D) Instrument Channel Reactor Low Water Level (LIS-3-184 & 185)	(1) (27)	Once/18 Months	(28)	Once/day
Instrument Channel Reactor Low Water Level (LIS-3-52 & 62)	(1) (27)	Once/18 Months	(28)	Once/day
Instrument Channel Drywell High Pressure () (PIS-64-58E-H)	(1) (27)	Once/18 Months	(28)	none
N Instrument Channel Drywell High Pressure N (PIS-64-58A-D)	(1) (27)	Once/18 Months	(28)	none
LA Instrument Channel Drywell High Pressure	· (1) (27) .	Once/18 Months	(28)	none
(PIS-64-57A-D) TO Instrument Channel Reactor Low Pressure (PIS-3-74A&B, PS-3-74A&B)	(1) (27)	Once/18 Months	(28)	noné

(PIS-68-95, PS-68-95) (PIS-68-96, PS-68-96)

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3.2/4.2-44

Amendment No.

#### TABLE 4.2.B (Continued) SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Un BF	Function	Functional Test	Calibration	Instrument Check
P P P P P P P P	Instrument Channel Reactor Low Pressure (PS-68-93 & 94)	(1)	Once/3 months	none
	Core Spray Auto Sequencing Timers (Normal Power)	(4)	Once/operating cycle	none
	Core Spray Auto Sequencing Timers (Diesel Power)	(4)	Once/operating cycle	none
	LPCI Auto Sequencing Timers (Normal Power)	(4)	Once/operating cycle	none
	LPCI Auto Sequencing Timers (Diesel Power)	(4)	Once/operating cycle	none
	RHRSW A1, B3, C1, D3 Timers (Normal Power)	(4)	Once/operating cycle	none
	RHRSW A1, B3, C1, D3 Timers (Diesel Power)	(4)	Once/operating cycle	none
	ADS Timer	(4)	Once/operating cycle	none

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Sec. 1. C

#### NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2. D AND 4.2.K

- 1. Functional tests shall be performed once per month.
- 2. Functional tests shall be performed before each startup with a required frequency not to exceed once per week.
- 3. This instrumentation is excepted from the functional test definition. The functional test will consist of injecting a simulated electrical signal into the measurement channel.
- 4. Tested during logic system functional tests.
- 5. Refer to Table 4.1.B.
- 6. The logic system functional tests shall include a calibration once per operating cycle of time delay relays and timers necessary for proper functioning of the trip systems.
- 7. The functional test will consist of verifying continuity across the inhibit with a volt-ohmmeter.
- 8. Instrument checks shall be performed in accordance with the definition of instrument check (see Section 1.0, Definitions). An instrument check is not applicable to a particular setpoint, such as Upscale, but is a qualitative check that the instrument is behaving and/or indicating in an acceptable manner for the particular plant condition. Instrument check is included in this table for convenience and to indicate that an instrument check will be performed on the instrument. Instrument checks are not required when these instruments are not required to be OPERABLE or are tripped.
- 9. Calibration frequency shall be once/year.
- 10. Deleted
- 11. Portion of the logic is functionally tested during outage only.
- 12. The detector will be inserted during each operating cycle and the proper amount of travel into the core verified.
- 13. Functional test will consist of applying simulated inputs (see note 3). Local alarm lights representing upscale and downscale trips will be verified, but no rod block will be produced at this time. The inoperative trip will be initiated to produce a rod block (SRM and IRM inoperative also bypassed with the mode switch in RUN). The functions that cannot be verified to produce a rod block directly will be verified during the operating cycle.

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BFN Unit 2

#### NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Cont'd)

- 14. (Deleted)
- 15. The flow bias comparator will be tested by putting one flow unit in "Test" (producing 1/2 scram) and adjusting the test input to obtain comparator rod block. The flow bias upscale will be verified by observing a local upscale trip light during operation and verified that it will produce a rod block during the operating cycle.
- 16. Performed during operating cycle. Portions of the logic is checked more frequently during functional tests of the functions that produce a rod block.
- 17. This calibration consists of removing the function from service and performing an electronic calibration of the channel.
- 18. Functional test is limited to the condition where secondary containment integrity is not required as specified in Sections 3.7.C.2 and 3.7.C.3.
- 19. Functional test is limited to the time where the SGTS is required to meet the requirements of Section 4.7.C.l.a.
- 20. Calibration of the comparator requires the inputs from both recirculation loops to be interrupted, thereby removing the flow bias signal to the APRM and RBM and scramming the reactor. This calibration can only be performed during an outage.
- 21. Logic test is limited to the time where actual operation of the equipmentis permissible.
- 22. One channel of either the reactor zone or refueling zone Reactor Building Ventilation Radiation Monitoring System may be administratively bypassed for a period not to exceed 24 hours for functional testing and calibration.
- 23. (Deleted)
- 24. This instrument check consists of comparing the thermocouple readings for all valves for consistence and for nominal expected values (not required during refueling outages).
- 25. During each refueling outage, all acoustic monitoring channels shall be calibrated. This calibration includes verification of accelerometer response due to mechanical excitation in the vicinity of the sensor.

3.2/4.2-60

BFN Unit 2 NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Cont'd)

- 26. This instrument check consists of comparing the background signal levels for all valves for consistency and for nominal expected values (not required during refueling outages).
- 27. Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify operability of the trip and alarm functions.
- 28. Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the trip level setting.
- 29. The functional test frequency decreased to once/3 months to reduce challenges to relief valves per NUREG-0737, Item II.K.3.16.
- 30. Calibration shall consist of an electronic calibration of the channel, not including the detector, for range decades above 10 R/hr and a one-point source check of the detector below 10 R/hr with an installed or portable gamma source.

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Table 4.2.L				
Anticipated Transient Without Scram (ATWS) -				
Recirculation Pump	Test (RPT) Instr	rumentation Surveillance		

E L

Function	Functional Test	Channel Calibration	Instrument Check
Reactor Vessel Water Level Low LS-3-58A-D	M(27)	R(28)	N/A
Reactor Vessel Dome Pressure High PS-3-204-D	M(27)	R(28)	N/A

BFN Unit 2

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**3.2/4.2-63a** Amendment No. 161

Trip setting of 100 mr/hr for the monitors in the refueling zone are based upon initiating normal ventilation isolation and SGTS operation so that none of the activity released during the refueling accident leaves the Reactor Building via the normal ventilation path but rather all the activity is processed by the SGTS.

Flow integrators and sump fill rate and pump out rate timers are used to determine leakage in the drywell. A system whereby the time interval to fill a known volume will be utilized to provide a backup. An air sampling system is also provided to detect leakage inside the primary containment (See Table 3.2.E).

For each parameter monitored, as listed in Table 3.2.F, there are two channels of instrumentation except as noted. By comparing readings between the two channels, a near continuous surveillance of instrument performance is available. Any deviation in readings will initiate an early recalibration, thereby maintaining the quality of the instrument readings.

Instrumentation is provided for isolating the control room and initiating a pressurizing system that processes outside air before supplying it to the control room. An accident signal that isolates primary containment will also automatically isolate the control room and initiate the emergency pressurization system. In addition, there are radiation monitors in the normal ventilation system that will isolate the control room and initiate the emergency pressurization system. Activity required to cause automatic actuation is about one mRem/hr.

Because of the constant surveillance and control exercised by TVA over the Tennessee Valley, flood levels of large magnitudes can be predicted in advance of their actual occurrence. In all cases, full advantage will be taken of advance warning to take appropriate action whenever reservoir levels above normal pool are predicted; however, the plant flood protection is always in place and does not depend in any way on advanced warning. Therefore, during flood conditions, the plant will be permitted to operate until water begins to run across the top of the pumping station at elevation 565. Seismically qualified, redundant level switches each powered from a separate division of power are provided at the pumping station to give main control room indication of this condition. At that time an orderly shutdown of the plant will be initiated, although surges even to a depth of several feet over the pumping station deck will not cause the loss of the main condenser circulating water pumps.

The operability of the meteorological instrumentation ensures that sufficient meteorological data is available for estimating potential radiation dose to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public.

F 1

The operability of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for Browns Ferry Nuclear Plant. The instrumentation provided is consistent with specific portions of the recommendations of Regulatory Guide 1.12 "Instrumentation for Earthquakes."

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments will be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring the concentration of potentially explosive gas mixtures in the offgas holdup system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60 63, and 64 of Appendix A to 10 CFR Part 50.

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20 Appendix B, Table II, Column 2. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

ATWS/RPT, Anticipated Transients without Scram/Recirculation Pump Trip system provides a means of limiting the consequences of the unlikely occurrence of a failure to scram during an ATWS event. The response of the plant to this postulated event (ATWS/RPT) follows the BWR Owners Group Report by General Electric NEDE-31096-P-A and the accompanying NRC Staff Safety Evaluation Report.

ATWS/RPT utilizes the engineered safety feature (ESF) master/slave analog trip units (ATU) which consists of four level and four pressure channels total. The initiating logic consists of two independent trip systems each consisting of two reactor dome high pressure channels and two reactor vessel low level channels. A coincident trip of either two low levels or two high pressures in the same trip system causes initiation of .ATWS/RPT. This signal from either trip system opens one of two EOC

BFN Unit 2 Amendment No. 161

(end-of-cycle) breakers in series (the other system opens the other breaker) between the pump motor and the Motor Generator set driving each recirculation pump. Both systems are completely redundant such that only one trip system is necessary to perform the ATWS/RPT function. Power comes from the 250 VDC shutdown boards.

Setpoints for reactor dome high pressure and reactor vessel low level are such that a normal Reactor Protection System scram and accompanying recirculation pump trip would occur before or coincident with the trip by ATWS/RPT.

#### 4.2 BASES

The instrumentation listed in Tables 4.2.A through 4.2.F will be functionally tested and calibrated at regularly scheduled intervals. The same design reliability goal as the Reactor Protection System of 0.99999 generally applies for all applications of  $(1-out-of-2) \times (2)$  logic. Therefore, on-off sensors are tested once/3 months, and bistable trips associated with analog sensors and amplifiers are tested once/week.



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

### TENNESSEE VALLEY AUTHORITY

#### DOCKET NO. 50-296

### BROWNS FERRY NUCLEAR PLANT, UNIT 3

#### AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No135 License No. DPR-68

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 4, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

- 2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-68 is hereby amended to read as follows:
  - (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 135, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Juzanne Black

Suzanne Black, Assistant Director for Projects TVA Projects Division Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: January 26, 1989

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## ATTACHMENT TO LICENSE AMENDMENT NO. 135

## FACILITY OPERATING LICENSE NO. DPR-68

## DOCKET NO. 50-296

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages\* are provided to maintain document completeness.

	REMOVE	INSERT
-	i ii v vi vii vii 3.2/4.2-14 3.2/4.2-15 3.2/4.2-15 3.2/4.2-43 3.2/4.2-44 3.2/4.2-58 3.2/4.2-59 3.2/4.2-60	i ii* v* vi vii 3.2/4.2-6a 3.2/4.2-14* 3.2/4.2-15 3.2/4.2-38a 3.2/4.2-43 3.2/4.2-43 3.2/4.2-58 3.2/4.2-58 3.2/4.2-59 3.2/4.2-60 3.2/4.2-62a
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## 3.2/4.2 Protective Instr\_\_\_ntation

### LIMITING CONDITIONS FOR OPERATION

#### 3.2.L ATWS/RPT

- 1. The ATWS/RPT System Instrumentation shall be OPERABLE during REACTOR POWER OPERATION in accordance with Table 3.2.L.
- 2. The ATWS/RPT System Trip setpoints will be set in accordance with Table 3.2.L.
- 3. The actions required when the number of operable channels is less than the minimum OPERABLE channels per trip system is specified in Table 3.2.L.

#### SURVEILLANCE REQUIREMENTS

#### 4.2.L ATWS/RPT

 Each of the ATWS/RPT System Instrumentation channels shall be OPERABLE by performance of tests in Table 4.2.L.

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BFN Unit 3	Operable	INSTRUMENTATION THAT	TABLE 3.2.B INITIATES OR CONTROLS THE CORE	AND CONTAINMEN	T COOLING SYSTEMS
- -	per Trip Sys(1) 2 2 2 2	Function Instrument Channel - Reactor Low Water Level Instrument Channel - Reactor Low Water Level Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #1)	<u>Trip Leve] Setting</u> ≥ 470" above vessel zero. ≥ 470" above vessel zero. ≥ 378" above vessel zero.	Action A A A	Remarks 1. Below trip setting initiated HPCI. 1. Multiplier relays initiate RCIC. 1. Below trip setting initiates CSS.
3.2/4.2-1	2(16) 1(16)	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #2) Instrument Channel - Reactor Low Water Level	≥ 378" above vessel zero. ≥ 544" above vessel zero.	A	<ul> <li>Multiplier relays initiate LPCI.</li> <li>Multiplier relay from CSS initiates accident signal (15).</li> <li>Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.</li> </ul>
<b>.</b>	1	Permissive (LIS-3-184 & 185, SW #1) Instrument Channel - Reactor Low Water Level (LITS-3-52 and 62, SW #1)	≥ 312 5/16" above vessel zero. (2/3 core height)		<ol> <li>Below trip setting permissive for initiating signals on ADS.</li> <li>Below trip setting prevents inadvertent operation of containment spray during accident condition.</li> </ol>
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TABLE 3.2.B (Continued)

BFN Unit 3	Minimum No. Operable Per <u>Trip Sys(1)</u>	Function		Action	Remarks
	2	Instrument Channel – Drywell High Pressure (PS-64-58 E-H)	1 <u>≺</u> p <u>≺</u> 2.5 psig	A	<ol> <li>Below trip setting prevents inadvertent operation of containment spray during accident conditions.</li> </ol>
	2	Instrument Channel – Drywell High Pressure (PS-64-58 A-D, SW #2)	<u>≺</u> 2.5 psig	A	<ol> <li>Above trip setting in con- junction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI.</li> <li>Multiplier relay from CSS initiates accident signal. (15)</li> </ol>
3.2/4.	2	Instrument Channel – Drywell High Pressure (PS-64-58A-D, SW #1)	<u>≺</u> 2.5 psig	A	<ol> <li>Above trip setting in conjunction with low reactor pressure initiates LPCI.</li> </ol>
•2-15 Ar	2(16)	Instrument Channel – Drywell High Pressure (PS-64-57A-D)	<u>≺</u> 2.5 psig	A	<ol> <li>Above trip setting, in conjunction with low reactor water level, drywell high pressure, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.</li> </ol>

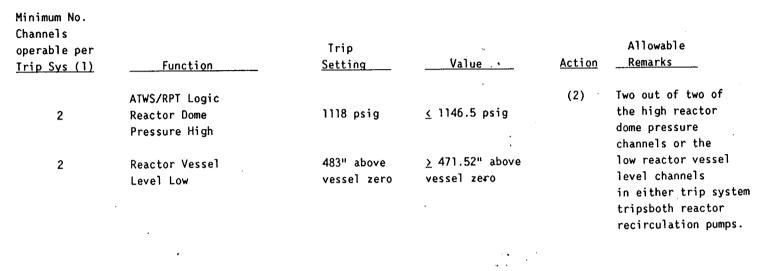
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#### Table 3.2.L Anticipated Transient Without Scram (ATWS) -Recirculation Pump Test (RPT) Surveillance Instrumenation



- (1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.
- (2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

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BFN	Function	Functional Test	Calibration	Instrument Check
	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	(1)	once/3 months	once/day
	Instrument Channel - Reactor Low Water Level (LIS-3-184 & 185)	(1)	once/3 months	once/d <b>ay</b>
	Instrument Channel – Reactor Low Water Level (LITS-3-52 & 62)	(1)	once/3 months	once/day
	Instrument Channel – Drywell High Pressure (PS-64-58E-H)	(1)	once/3 months	none
3.2/4.2-43	Instrument Channel – Drywell High Pressure (PS-64-58A-D)	(1)	once/3 months	none
	Instrument Channel – Drywell High Pressure (PS-64-57A-D)	(1)	once/3 months	none
	Instrument Channel - Reactor Low Pressure	(1)	once/3 months	none
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## TABLE 4.2.B (Cont'd) SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel – Reactor Low Pressure (PS-68-93 & 94)	(1)	once/3 months	none
Core Spray Auto Sequencing Timers (Normal Power)	(4)	cnce/operating cycle	none
Core Spray Auto Sequencing Timers (Diesel Power)	(4)	once/operating cycle	none
LPCI Auto Sequencing Timers (Normal Power)	(4)	once/operating cycle	none
LPCI Auto Sequencing Timers (Diesel Power)	(4)	once/operating cycle	none
RHRSW A3, B1, C3, D1 Timers (Normal Power)	(4)	once/operating cycle	none
RHRSW A3, B1, C3, D1 Timers (Diesel Power)	(4)	once/operating cycle	none
ADS Timer	(4)	once/operating cycle	none

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#### NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K

- 1. Functional tests shall be performed once per month.
- 2. Functional tests shall be performed before each startup with a required frequency not to exceed once per week.
- 3. This instrumentation is excepted from the functional test definition. The functional test will consist of injecting a simulated electrical signal into the measurement channel.
- 4. Tested during logic system functional tests.
- 5. Refer to Table 4.1.B.
- 6. The logic system functional tests shall include a calibration once per operating cycle of time delay relays and timers necessary for proper functioning of the trip systems.
- 7. The functional test will consist of verifying continuity across the inhibit with a volt-ohmmeter.
- 8. Instrument checks shall be performed in accordance with the definition of instrument check (see Section 1.0, Definitions). An instrument check is not applicable to a particular setpoint, such as Upscale, but is a qualitative check that the instrument is behaving and/or indicating in an acceptable manner for the particular plant condition. Instrument check is included in this table for convenience and to indicate that an instrument check will be performed on the instrument. Instrument checks are not required when these instruments are not required to be operable or are tripped.
- 9. Calibration frequency shall be once/year.
- 10. (DELETED)
- 11. Portion of the logic is functionally tested during outage only.
- 12. The detector will be inserted during each operating cycle and the proper amount of travel into the core verified.
- 13. Functional test will consist of applying simulated inputs (see note 3). Local alarm lights representing upscale and downscale trips will be verified, but no rod block will be produced at this time. The inoperative trip will be initiated to produce a rod block (SRM and IRM inoperative also bypassed with the mode switch in RUN). The functions that cannot be verified to produce a rod block directly will be verified during the operating cycle.

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BFN Unit 3 NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Continued)

- 14. (Deleted)
- 15. The flow bias comparator will be tested by putting one flow unit in "Test" (producing 1/2 scram) and adjusting the test input to obtain comparator rod block. The flow bias upscale will be verified by observing a local upscale trip light during operation and verified that it will produce a rod block during the operating cycle.
- 16. Performed during operating cycle. Portions of the logic is checked more frequently during functional tests of the functions that produce a rod block.
- 17. This calibration consists of removing the function from service and performing an electronic calibration of the channel.
- 18. Functional test is limited to the condition where secondary containment integrity is not required as specified in Sections 3.7.C.2 and 3.7.C.3.
- 19. Functional test is limited to the time where the SGTS is required to meet the requirements of Section 4.7.C.l.a.
- 20. Calibration of the comparator requires the inputs from both recirculation loops to be interrupted, thereby removing the flow bias signal to the APRM and RBM and scramming the reactor. This calibration can only be performed during an outage.
- 21. Logic test is limited to the time where actual operation of the equipment is permissible.
- 22. One channel of either the reactor zone or refueling zone Reactor Building Ventilation Radiation Monitoring System may be administratively bypassed for a period not to exceed 24 hours for functional testing and calibration.
- 23. (DELETED)
- 24. This instrument check consists of comparing the thermocouple readings for all valves for consistence and for nominal expected values (not required during refueling outages).
- 25. During each refueling outage, all acoustic monitoring channels shall be calibrated. This calibration includes verification of accelerometer response due to mechanical excitation in the vicinity of the sensor.

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#### NOTES FOR TABLES 4.2.A THROUGH 4.2.L except 4.2.D AND 4.2.K (Continued)

- 26. This instrument check consists of comparing the background signal levels for all valves for consistency and for nominal expected values (not required during refueling outages).
- 27. Functional test frequency decreased to once/3 months to reduce the challenges to relief valves per NUREG-0737, Item II.K.3.16.
- 28. Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify operability of the trip and alarm functions.
- 29. Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so its output relay changes state at or more conservatively than the analog equivalent of the trip level settings.

Function	Functional Test	Channel Calibration	Instrument Check
Reactor Vessel Water Level Low LS-3-58A-D	M(28)	R(29)	N/A
Reactor Vessel Dome Pressure High PS-3-204-D	M(28)	R(29)	N/A

Table 4.2.L Anticipated Transient Without Scram (ATWS) -Recirculation Pump Test (RPT) Instrumentation Surveillance

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Trip setting of 100 mr/hr for the monitors in the refueling zone are based upon initiating normal ventilation isolation and SGTS operation so that none of the activity released during the refueling accident leaves the Reactor Building via the normal ventilation path but rather all the activity is processed by the SGTS.

Flow integrators and sump fill rate and pump out rate timers are used to determine leakage in the drywell. A system whereby the time interval to fill a known volume will be utilized to provide a backup. An air sampling system is also provided to detect leakage inside the primary containment (See Table 3.2.E).

For each parameter monitored, as listed in Table 3.2.F, there are two channels of instrumentation except as noted. By comparing readings between the two channels, a near continuous surveillance of instrument performance is available. Any deviation in readings will initiate an early recalibration, thereby maintaining the quality of the instrument readings.

Instrumentation is provided for isolating the control room and initiating a pressurizing system that processes outside air before supplying it to the control room. An accident signal that isolates primary containment will also automatically isolate the control room and initiate the emergency pressurization system. In addition, there are radiation monitors in the normal ventilation system that will isolate the control room and initiate the emergency pressurization system. Activity required to cause automatic actuation is about one mRem/hr.

Because of the constant surveillance and control exercised by TVA over the Tennessee Valley, flood levels of large magnitudes can be predicted in advance of their actual occurrence. In all cases, full advantage will be taken of advance warning to take appropriate action whenever reservoir levels above normal pool are predicted; however, the plant flood protection is always in place and does not depend in any way on advanced warning. Therefore, during flood conditions, the plant will be permitted to operate until water begins to run across the top of the pumping station at elevation 565. Seismically qualified, redundant level switches each powered from a separate division of power are provided at the pumping station to give main control room indication of this condition. At that time an orderly shutdown of the plant will be initiated, although surges even to a depth of several feet over the pumping station deck will not cause the loss of the main condenser circulating water pumps.

The operability of the meteorological instrumentation ensures that sufficient meteorological data is available for estimating potential radiation dose to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public.

The operability of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for Browns Ferry Nuclear Plant. The instrumentation provided is consistent with specific portions of the recommendations of Regulatory Guide 1.12 "Instrumentation for Earthquakes."

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments will be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring the concentration of potentially explosive gas mixtures in the offgas holdup system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with guidance provided in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20 Appendix B, Table II, Column 2. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

ATWS/RPT, Anticipated Transients without Scram/Recirculation Pump Trip system provides a means of limiting the consequences of the unlikely occurrence of a failure to scram during an ATWS event. The response of the plant to this postulated event (ATWS/RPT) follows the BWR Owners Group Report by General Electric NEDE-31096-P-A and the accompanying NRC Staff Safety Evaluation Report.

ATWS/RPT utilizes the engineered safety feature (ESF) master/slave analog trip units (ATU) which consists of four level and four pressure channels total. The initiating logic consists of two independent trip systems each consisting of two reactor dome high pressure channels and two reactor vessel low level channels. A coincident trip of either two low levels or two high pressures in the same trip system causes initiation of ATWS/RPT. This signal from either trip system opens one of two EOC

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(end-of-cycle) breakers in series (the other system opens the other breaker) between the pump motor and the Motor Generator set driving each recirculation pump. Both systems are completely redundant such that only one trip system is necessary to perform the ATWS/RPT function. Power comes from the 250 VDC shutdown boards.

Setpoints for reactor dome high pressure and reactor vessel low level are such that a normal Reactor Protection System scram and accompanying recirculation pump trip would occur before or coincident with the trip by ATWS/RPT.

#### 4.2 BASES

The instrumentation listed in Tables 4.2.A through 4.2.F will be functionally tested and calibrated at regularly scheduled intervals. The same design reliability goal as the Reactor Protection System of 0.99999 generally applies for all applications of (1-out-of-2) X (2) logic. Therefore, on-off sensors are tested once/3 months, and bistable trips associated with analog sensors and amplifiers are tested once/week.

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Amendment No. 135

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



#### ENCLOSURE

## SAFETY EVALUATION BY THE OFFICE OF SPECIAL PROJECTS

# SUPPORTING AMENDMENT NO. 164 TO FACILITY OPERATING LICENSE NO. DPR-33

## AMENDMENT NO. 161 TO FACILITY OPERATING LICENSE NO. DPR-52

## AMENDMENT NO. 135 TO FACILITY OPERATING LICENSE NO. DPR-68

#### TENNESSEE VALLEY AUTHORITY

### BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

#### DOCKETS NOS. 50-259, 50-260 AND 50-296

#### 1.0 INTRODUCTION

10 CFR 50.62 (c)(5) requires in part that each boiling water reactor must have equipment to trip the reactor recirculation pumps automatically under conditions indicative of an anticipated transient without scram (ATWS). The Tennessee Valley Authority (TVA) is installing at Browns Ferry Nuclear Plant (BEN) an ATWS-recirculation pump trip (RPT) to comply with the regulations. The NRC staff evaluation of TVA's ATWS modifications is the subject of a separate safety evaluation report.

By submittal dated August 4, 1988, TVA requested an amendment to the Technical Specifications (TS) for BFN Units 1, 2 and 3 to add limiting conditions for operation (LCO) and surveillance requirements (SR) for the above-mentioned ATWS-RPT system. The proposed addition of these TS provides additional assurance that the ATWS-RPT system will be operable and will perform its intended safety function.

#### 2.0 EVALUATION

The BFN Units 1, 2, and 3 TS are being revised to incorporate requirements for the ATWS-RPT system. The proposed LCO of Section 3.2.L and Table 3.2.L, provide operability requirements for the ATWS-RPT system. The SRs of Section 4.2.L are being added to provide periodic verification of system operability. The appropriate TS Bases sections and indices are being revised to reflect this change.

The ATWS-RPT System is required to be operable during Reactor Power Operation. Reactor Power Operation is defined in the BFN TS as operation with the mode switch in startup or run with the reactor critical and above one percent power. This is more conservative than the operability requirements of the General Electric Standard Technical Specifications (NUREG-0123) which require operability whenever the mode switch is in run only (4-5 percent power).

8902020423 890126 PDR ADOCK 05000259 The ATWS-RPT trip setpoint and allowable value for the low reactor water level are 483 and 471.5 inches above vessel zero, respectfully. The trip setpoints for high reactor pressure are 1118 and 1146.5 psig. The existing Reactor Protection System (RPS) trip setpoints are 538 inches above vessel zero for low reactor water level and 1055 psig for reactor dome pressure. The ATWS-RPT setpoints were chosen such that a RPS trip would occur before the ATWS-RPT trip. The proposed setpoints are essentially equivalent to or more conservative than the existing RPT setpoints are being used in concurrence with the existing RPT-Motor Generator (MG) trip logic. The ATWS-RPT system will replace the existing RPT-MG logic, therefore, the proposed deletion of the old system setpoints is appropriate and acceptable.

The ATWS-RPT trip logic consists of a two-out-of-two low reactor water level signal or a two-out-of-two high reactor dome pressure signal. A coincident trip of either two low-level signals or two high-pressure signals in the same trip channel initiates an ATWS-RPT trip. The minimum number of channels operable per trip system remains at two and is therefore acceptable.

The NRC staff has not yet issued guidance on a generic basis regarding ATWS related TS; however, the proposed SR frequencies for the ATWS-RPT Functional Test, Channel Calibration and Instrument Check are presently acceptable as proposed as they are generally consistent with SR frequencies for other safety related logic circuitry. Upon receipt of the NRC staff's generic guidance, however, TVA may revise these TS to comply with the generic guidance. The remaining proposed changes, including bases changes, page number and indices changes are administrative in nature, do not affect safety, and are therefore found to be acceptable.

## 3.0 ENVIRONMENTAL CONSIDERATION

The amendments involve a change to a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of these amendments.

#### 4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the <u>Federal</u> <u>Register</u> (53 FR 48836) on 30 November, 1988 and consulted with the State of Alabama. No public comments were received and the State of Alabama did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

Principal Contributor: T. Rotella

Dated: January 26, 1989