

March 16, 1995

Mr. Oliver D. Kingsley, Jr.
President, TVA Nuclear and
Chief Nuclear Officer
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: ISSUANCE OF TECHNICAL SPECIFICATION AMENDMENTS FOR THE BROWNS FERRY
NUCLEAR PLANT UNITS 1 AND 3 (TAC NOS. M89246 AND M89247) (TS 319)

Dear Mr. Kingsley:

The Commission has issued the enclosed Amendment Nos. 220 and 194 to Facility Operating Licenses Nos. DPR-33 and DPR-68 for the Browns Ferry Nuclear Plant (BFN), Units 1 and 3, respectively. These amendments are in response to your application dated March 31, 1994, regarding the High Pressure Coolant Injection (HPCI)/Reactor Core Isolation Cooling (RCIC) steam line space high temperature isolations. The amendment revises the Limiting Conditions for Operation and Surveillance Requirements relating to temperature detection elements that initiate isolation of the HPCI and RCIC turbine main steam supply lines in the event of a line break.

A copy of the NRC's Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

1-1
Joseph F. Williams, Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-259 and 50-296

- Enclosures:
1. Amendment No. 220 to License No. DPR-33
 2. Amendment No. 194 to License No. DPR-68
 3. Safety Evaluation

cc w/enclosures: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 220
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 March 31, 1994, 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-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. 220, 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 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: March 16, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 220

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

3.2/4.2-18
3.2/4.2-19
3.2/4.2-22
3.2/4.2-22a
3.2/4.2-23
3.2/4.2-24
3.2/4.2-46
3.2/4.2-47
3.2/4.2-67
3.2/4.2-68

INSERT

3.2/4.2-18
3.2/4.2-19
3.2/4.2-22*
3.2/4.2-22a
3.2/4.2-23
3.2/4.2-24*
3.2/4.2-46
3.2/4.2-47
3.2/4.2-67
3.2/4.2-68*

TABLE 3.2.B (Continued)

Unit	BFN	Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1		1	HPCI Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
		1	RCIC Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
		1(2)	Instrument Channel - Condensate Header Low Level (LS-73-56A & B)	\geq Elev. 551'	A	1. Below trip setting will open HPCI suction valves to the suppression chamber.
		1(2)	Instrument Channel - Suppression Chamber High Level	\leq 7" above instrument zero	A	1. Above trip setting will open HPCI suction valves to the suppression chamber.
		2(2)	Instrument Channel - Reactor High Water Level	\leq 583" above vessel zero	A	1. Above trip setting trips RCIC turbine.
		1	Instrument Channel - RCIC Turbine Steam Line High Flow	\leq 450" H ₂ O (7)	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
		3(2)	Instrument Channel - RCIC Steam Supply Pressure - Low (PS 71-1A-D)	\geq 50 psig	A	1. Below trip setting isolates RCIC system and trips RCIC turbine.
		3(2)	Instrument Channel - RCIC Turbine Exhaust Diaphragm Pressure - High (PS 71-11A-D)	\leq 20 psig	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.

Unit

3.2/4.2-18

AMENDMENT NO. 220

TABLE 3.2.B (Continued)

Unit	BFN	Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
		2(2)	Instrument Channel - Reactor High Water Level	≤583" above vessel zero.	A	1. Above trip setting trips HPCI turbine.
		1	Instrument Channel - HPCI Turbine Steam Line High Flow	≤90 psi (7)	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
		3(2)	Instrument Channel - HPCI Steam Supply Pressure - Low (PS 73-1A-D)	≥100 psig	A	1. Below trip setting isolates HPCI system and trips HPCI turbine.
		3(2)	Instrument Channel - HPCI Turbine Exhaust Diaphragm (PS 73-20A-D)	≤20 psig	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
		1	Core Spray System Logic	N/A	B	1. Includes testing auto initiation inhibit to Core Spray Systems in other units.
		1	RCIC System (Initiating) Logic	N/A	B	1. Includes Group 7 valves. 2. Group 7: A Group 7 isolation is automatically actuated by only the following condition: 1. The respective turbine steam supply valve not fully closed.
		1	RCIC System (Isolation) Logic	N/A	B	1. Includes Group 5 valves. 2. Group 5: A Group 5 isolation is actuated by any of the following conditions: a. RCIC Steamline Space High Temperature b. RCIC Steamline High Flow c. RCIC Steamline Low Pressure d. RCIC Turbine Exhaust Diaphragm High Pressure
		1 (16)	ADS Logic	N/A	A	

Unit 1

3.2/4.2-19

AMENDMENT NO. 220

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1(10)	Instrument Channel - Thermostat (Core Spray Area Cooler Fan)	$\leq 100^{\circ}\text{F}$	A	1. Above trip setting starts Core Spray area cooler fans.
1(10)	RHR Area Cooler Fan Logic	N/A	A	
1(10)	Core Spray Area Cooler Fan Logic	N/A	A	
1(11)	Instrument Channel - Core Spray Motors A or C Start	N/A	A	1. Starts RHRSW pumps A1, B3, C1, and D3
1(11)	Instrument Channel - Core Spray Motors B or D Start	N/A	A	1. Starts RHRSW pumps A1, B3, C1, and D3
1(12)	Instrument Channel - Core Spray Loop 1 Accident Signal (15)	N/A	A	1. Starts RHRSW pumps A1, B3, C1, and D3
1(12)	Instrument Channel - Core Spray Loop 2 Accident Signal (15)	N/A	A	1. Starts RHRSW pumps A1, B3, C1, and D3
1(13)	RHRSW Initiate Logic	N/A	(14)	
1	RPT Logic	N/A	(17)	1. Trips recirculation pumps on turbine control valve fast closure or stop valve closure > 30% power.
1(16)	ADS Timer	$t \leq 115 \text{ sec.}$	A	1. Above trip setting in conjunction with low reactor water level permissive, low reactor water level; high drywell pressure or ADS high drywell pressure bypass timer timed out, and RHR or CSS pumps running, initiates ADS.
1(16)	ADS High Drywell Pressure Bypass Timer	$t \leq 322 \text{ sec.}$	A	1. Above trip setting, in conjunction with low reactor water level permissive, low reactor water level, ADS timer timed out and RHR or CSS pumps running, initiates ADS.

BFN
Unit 1

3.2/4.2-22

AMENDMENT NO. 205

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	RCIC Steam Line Space Torus Area High Temperature	≤155°F	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	RCIC Steam Line Space RCIC Pump Room Area High Temperature	≤180°F	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	HPCI Steam Line Space Torus Area High Temperature	≤180°F	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.
2	HPCI Steam Line Space HPCI Pump Room Area High Temperature	≤200°F	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.

BFN
Unit 1

3.2/4.2-22a

AMENDMENT NO. 220

NOTES FOR TABLE 3.2.B

1. Whenever any CSCS System is required by Section 3.5 to be OPERABLE, there shall be two OPERABLE trip systems except as noted. If a requirement of the first column is reduced by one, the indicated action shall be taken. If the same function is inoperable in more than one trip system or the first column reduced by more than one, action B shall be taken.

Action:

- A. Repair in 24 hours. If the function is not OPERABLE in 24 hours, take action B.
 - B. Declare the system or component inoperable.
 - C. Immediately take action B until power is verified on the trip system.
 - D. No action required; indicators are considered redundant.
 - E. Within 24 hours restore the inoperable channel(s) to OPERABLE status or place the inoperable channel(s) in the tripped condition.
2. In only one trip system.
 3. Not considered in a trip system.
 4. Deleted
 5. With diesel power, each RHRS pump is scheduled to start immediately and each CSS pump is sequenced to start about 7 sec. later.
 6. With normal power, one CSS and one RHRS pump is scheduled to start instantaneously, one CSS and one RHRS pump is sequenced to start after about 7 sec. with similar pumps starting after about 14 sec. and 21 sec., at which time the full complement of CSS and RHRS pumps would be operating.
 7. The RCIC and HPCI steam line high flow trip level settings are given in terms of differential pressure. The RCICS setting of 450" of water corresponds to at least 150 percent above maximum steady state steam flow to assure that spurious isolation does not occur while ensuring the initiation of isolation following a postulated steam line break. Similarly, the HPCIS setting of 90 psi corresponds to at least 150 percent above maximum steady state flow while also ensuring the initiation of isolation following a postulated break.
 8. Note 1 does not apply to this item.
 9. The head tank is designed to assure that the discharge piping from the CS and RHR pumps are full. The pressure shall be maintained at or above the values listed in 3.5.H, which ensures water in the discharge piping and up to the head tank.

NOTES FOR TABLE 3.2.B (Cont'd)

10. Only one trip system for each cooler fan.
11. In only two of the four 4160-V shutdown boards. See note 13.
12. In only one of the four 4160-V shutdown boards. See note 13.
13. An emergency 4160-V shutdown board is considered a trip system.
14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.
15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level (≥ 378 " above vessel zero) originating in the core spray system trip system.
16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.
17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.
18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

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

<u>Function</u>	<u>Functional Test</u>	<u>Calibration</u>	<u>Instrument Check</u>
Instrument Channel - RHR Pump Discharge Pressure	(1)	once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	once/3 months	none
Core Spray Sparger to RPV d/p	(1)	once/3 months	once/day
Trip System Bus Power Monitor	once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Low Level (LS-73-56A, B)	(1)	once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	once/3 months	none
Instrument Channel - Reactor High Water Level	(1)	once/3 months	once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1)	once/3 months	none
Instrument Channel - RCIC Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
RCIC Steam Line Space Torus Area High Temperature	(1)	once/3 months	none
RCIC Steam Line Space RCIC Pump Room Area High Temperature	(1)	once/3 months	none

BFN
 Unit 1

3.2/4.2-46

AMENDMENT NO. 220

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

Function	Functional Test	Calibration	Instrument Check
HPCI Steam Line Space Torus Area High Temperature	(1)	once/3 months	none
HPCI Steam Line Space HPCI Pump Room Area High Temperature	(1)	once/3 months	none
Instrument Channel - HPCI Turbine Steam Line High Flow	(1)	once/3 months	none
Instrument Channel - HPCI Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
Core Spray System Logic	once/18 months	(6)	N/A
RCIC System (Initiating) Logic	once/18 months	N/A	N/A
RCIC System (Isolation) Logic	once/18 months	(6)	N/A
HPCI System (Initiating) Logic	once/18 months	(6)	N/A
HPCI System (Isolation) Logic	once/18 months	(6)	N/A
ADS Logic	once/18 months	(6)	N/A
LPCI (Initiating) Logic	once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	once/18 months	(6)	N/A
Core Spray System Auto Initiation Inhibit (Core Spray Auto Initiation)	once/18 months (7)	N/A	N/A
LPCI Auto Initiation Inhibit (LPCI Auto Initiation)	once/18 months (7)	N/A	N/A

BFN
 Unit 1

3.2/4.2-47

AMENDMENT NO. 220

3.2 BASES (Cont'd)

The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

Pressure instrumentation is provided to close the main steam isolation valves in RUN Mode when the main steam line pressure drops below 825 psig.

The HPCI high flow and temperature instrumentation are provided to detect a break in the HPCI steam piping. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1-out-of-2 logic, and all sensors are required to be OPERABLE.

High temperature in the vicinity of the HPCI equipment is sensed by four sets of four bimetallic temperature switches. The 16 temperature switches are arranged in two trip systems with eight temperature switches in each trip system. Each trip system consists of two channels. Each channel contains one temperature switch located in the pump room and three temperature switches located in the torus area. The RCIC high flow and high area temperature sensing instrument channels are arranged in the same manner as the HPCI system.

The HPCI high steam flow trip setting of 90 psid and the RCIC high steam flow trip setting of 450" H₂O have been selected such that the trip setting is high enough to prevent spurious tripping during pump startup but low enough to prevent core uncover and maintain fission product releases within 10 CFR 100 limits.

The HPCI and RCIC steam line space temperature switch trip settings are high enough to prevent spurious isolation due to normal temperature excursions in the vicinity of the steam supply piping. Additionally, these trip settings ensure that the primary containment isolation steam supply valves isolate a break within an acceptable time period to prevent core uncover and maintain fission product releases within 10 CFR 100 limits.

High temperature at the Reactor Cleanup System floor drain could indicate a break in the cleanup system. When high temperature occurs, the cleanup system is isolated.

The instrumentation which initiates CSCS action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed.

3.2 BASES (Cont'd)

The control rod block functions are provided to prevent excessive control rod withdrawal so that MCPR does not decrease to 1.07. The trip logic for this function is 1-out-of-n: e.g., any trip on one of six APRMs, eight IRMs, or four SRMs will result in a rod block.

The minimum instrument channel requirements assure sufficient instrumentation to assure the single failure criteria is met. The minimum instrument channel requirements for the RBM may be reduced by one for maintenance, testing, or calibration. This does not significantly increase the risk of an inadvertent control rod withdrawal, as the other channel is available, and the RBM is a backup system to the written sequence for withdrawal of control rods.

The APRM rod block function is flow biased and prevents a significant reduction in MCPR, especially during operation at reduced flow. The APRM provides gross core protection; i.e., limits the gross core power increase from withdrawal of control rods in the normal withdrawal sequence. The trips are set so that MCPR is maintained greater than 1.07.

The RBM rod block function provides local protection of the core; i.e., the prevention of critical power in a local region of the core, for a single rod withdrawal error from a limiting control rod pattern.

If the IRM channels are in the worst condition of allowed bypass, the sealing arrangement is such that for unbypassed IRM channels, a rod block signal is generated before the detected neutrons flux has increased by more than a factor of 10.

A downscale indication is an indication the instrument has failed or the instrument is not sensitive enough. In either case the instrument will not respond to changes in control rod motion and thus, control rod motion is prevented.

The refueling interlocks also operate one logic channel, and are required for safety only when the mode switch is in the refueling position.

For effective emergency core cooling for small pipe breaks, the HPCI system must function since reactor pressure does not decrease rapid enough to allow either core spray or LPCI to operate in time. The automatic pressure relief function is provided as a backup to the HPCI in the event the HPCI does not operate. The arrangement of the tripping contacts is such as to provide this function when necessary and minimize spurious operation. The trip settings given in the specification are adequate to assure the above criteria are met. The specification preserves the effectiveness of the system during periods of maintenance, testing, or calibration, and also minimizes the risk of inadvertent operation; i.e., only one instrument channel out of service.

Two radiation monitors are provided for each unit which initiate Primary Containment Isolation (Group 6 isolation valves) Reactor Building Isolation and operation of the Standby Gas Treatment System. These instrument channels monitor the radiation in the reactor zone ventilation exhaust ducts and in the refueling zone.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 194
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 March 31, 1994, 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. 194, 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 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: March 16, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 194

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* and spillover pages are provided to maintain document completeness.

REMOVE

3.2/4.2-18
3.2/4.2-19
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3.2/4.2-66
3.2/4.2-67
3.2/4.2-68
3.2/4.2-69

INSERT

3.2/4.2-18
3.2/4.2-19
3.2/4.2-21a
3.2/4.2-21b*
3.2/4.2-22
3.2/4.2-23*
3.2/4.2-45
3.2/4.2-46
3.2/4.2-66
3.2/4.2-67**
3.2/4.2-68**
3.2/4.2-69**

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1	HPCI Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1	RCIC Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1(2)	Instrument Channel - Condensate Header Low Level (LS-73-56A & B)	\geq Elev. 551'	A	1. Below trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Suppression Chamber High Level	\leq 7" above instrument zero	A	1. Above trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Reactor High Water Level	\leq 583" above vessel zero	A	1. Above trip setting trips RCIC turbine.
1	Instrument Channel - RCIC Turbine Steam Line High Flow	\leq 450" H ₂ O (7)	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Steam Supply Pressure - Low (PS 71-1A-D)	\geq 50 psig	A	1. Below trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Turbine Exhaust Diaphragm Pressure - High (PS 71-11A-D)	\leq 20 psig	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.

BFN
Unit 3

3.2/4.2-18

APPENDIX NO. 194

TABLE 3.2.B (Continued)

Unit 3	Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
	2(2)	Instrument Channel - Reactor High Water Level	≤583" above vessel zero.	A	1. Above trip setting trips HPCI turbine.
	1	Instrument Channel - HPCI Turbine Steam Line High Flow	≤90 psi (7)	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
	3(2)	Instrument Channel - HPCI Steam Supply Pressure - Low (PS 73-1A-D)	≥100 psig	A	1. Below trip setting isolates HPCI system and trips HPCI turbine.
	3(2)	Instrument Channel - HPCI Turbine Exhaust Diaphragm (PS 73-20A-D)	≤20 psig	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
	1	Core Spray System Logic	N/A	B	1. Includes testing auto initiation inhibit to Core Spray Systems in other units.
	1	RCIC System (Initiating) Logic	N/A	B	1. Includes Group 7 valves. 2. Group 7: A Group 7 isolation is automatically actuated by only the following condition: 1. The respective turbine steam supply valve not fully closed.
	1	RCIC System (Isolation) Logic	N/A	B	1. Includes Group 5 valves. 2. Group 5: A Group 5 isolation is actuated by any of the following conditions: a. RCIC Steamline Space High Temperature b. RCIC Steamline High Flow c. RCIC Steamline Low Pressure d. RCIC Turbine Exhaust Diaphragm High Pressure
	1 (16)	ADS Logic	N/A	A	

3.2/4.2-19

AMENDMENT NO. 194

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1(16)	ADS Timer	$t \leq 115 \text{ sec.}$	A	1. Above trip setting in conjunction with low reactor water level permissive, low reactor water level; high drywell pressure or ADS high drywell pressure bypass timer timed out, and RHR or CSS pumps running, initiates ADS.
1(16)	ADS High Drywell Pressure Bypass Timer	$t \leq 322 \text{ sec.}$	A	1. Above trip setting, in conjunction with low reactor water level permissive, low reactor water level, ADS timer timed out and RHR or CSS pumps running, initiates ADS.
2	RCIC Steam Line Space Torus Area High Temperature	$\leq 155^\circ\text{F}$	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	RCIC Steam Line Space RCIC Pump Room Area High Temperature	$\leq 180^\circ\text{F}$	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	HPCI Steam Line Space Torus Area High Temperature	$\leq 180^\circ\text{F}$	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.
2	HPCI Steam Line Space HPCI Pump Room Area High Temperature	$\leq 200^\circ\text{F}$	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.

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NOTES FOR TABLE 3.2.B

1. Whenever any CSCS System is required by Section 3.5 to be OPERABLE, there shall be two OPERABLE trip systems except as noted. If a requirement of the first column is reduced by one, the indicated action shall be taken. If the same function is inoperable in more than one trip system or the first column reduced by more than one, action B shall be taken.

Action:

- A. Repair in 24 hours. If the function is not OPERABLE in 24 hours, take action B.
 - B. Declare the system or component inoperable.
 - C. Immediately take action B until power is verified on the trip system.
 - D. No action required; indicators are considered redundant.
 - E. Within 24 hours restore the inoperable channel(s) to OPERABLE status or place the inoperable channel(s) in the tripped condition.
2. In only one trip system.
 3. Not considered in a trip system.
 4. Deleted.
 5. With diesel power, each RHRS pump is scheduled to start immediately and each CSS pump is sequenced to start about 7 seconds later.
 6. With normal power, one CSS and one RHRS pump is scheduled to start instantaneously, one CSS and one RHRS pump is sequenced to start after about 7 seconds with similar pumps starting after about 14 seconds and 21 seconds, at which time the full complement of CSS and RHRS pumps would be operating.
 7. The RCIC and HPCI steam line high flow trip level settings are given in terms of differential pressure. The RCICS setting of 450" of water corresponds to at least 150 percent above maximum steady state steam flow to assure that spurious isolation does not occur while ensuring the initiation of isolation following a postulated steam line break. Similarly, the HPCIS setting of 90 psi corresponds to at least 150 percent above maximum steady state flow while also ensuring the initiation of isolation following a postulated break.
 8. Note 1 does not apply to this item.
 9. The head tank is designed to assure that the discharge piping from the CS and RHR pumps are full. The pressure shall be maintained at or above the values listed in 3.5.H, which ensures water in the discharge piping and up to the head tank.

NOTES FOR TABLE 3.2.B (Continued)

10. Only one trip system for each cooler fan.
11. In only two of the four 4160-V shutdown boards. See note 13.
12. In only one of the four 4160-V shutdown boards. See note 13.
13. An emergency 4160-V shutdown board is considered a trip system.
14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.
15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level (\geq 378" above vessel zero) originating in the core spray system trip system.
16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.
17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.
18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

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

<u>Function</u>	<u>Functional Test</u>	<u>Calibration</u>	<u>Instrument Check</u>
Instrument Channel - RHR Pump Discharge Pressure	(1)	once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	once/3 months	none
Core Spray Sparger to RPV d/p	(1)	once/3 months	once/day
Trip System Bus Power Monitor	once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Level (LS-73-56A, B)	(1)	once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	once/3 months	none
Instrument Channel - Reactor High Water Level	(1)	once/3 months	once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1)	once/3 months	none
Instrument Channel - RCIC Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
RCIC Steam Line Space Torus Area High Temperature	(1)	once/3 months	none
RCIC Steam Line Space RCIC Pump Room Area High Temperature	(1)	once/3 months	none
HPCI Steam Line Space Torus Area High Temperature	(1)	once/3 months	none
HPCI Steam Line Space HPCI Pump Room Area High Temperature	(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

<u>Function</u>	<u>Functional Test</u>	<u>Calibration</u>	<u>Instrument Check</u>
Instrument Channel - HPCI Turbine Steam Line High Flow	(1)	once/3 months	none
Instrument Channel - HPCI Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
Core Spray System Logic	once/18 months	(6)	N/A
RCIC System (Initiating) Logic	once/18 months	N/A	N/A
RCIC System (Isolation) Logic	once/18 months	(6)	N/A
HPCI System (Initiating) Logic	once/18 months	(6)	N/A
HPCI System (Isolation) Logic	once/18 months	(6)	N/A
ADS Logic	once/18 months	(6)	N/A
LPCI (Initiating) Logic	once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	once/18 months	(6)	N/A

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3.2/4.2-46

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3.2 BASES (Cont'd)

The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

Pressure instrumentation is provided to close the main steam isolation valves in RUN Mode when the main steam line pressure drops below 825 psig.

The HPCI high flow and temperature instrumentation are provided to detect a break in the HPCI steam piping. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1-out-of-2 logic, and all sensors are required to be OPERABLE.

High temperature in the vicinity of the HPCI equipment is sensed by four sets of four bimetallic temperature switches. The 16 temperature switches are arranged in two trip systems with eight temperature switches in each trip system. Each trip system consists of two channels. Each channel contains one temperature switch located in the pump room and three temperature switches located in the torus area. The RCIC high flow and high area temperature sensing instrument channels are arranged in the same manner as the HPCI system.

The HPCI high steam flow trip setting of 90 psid and the RCIC high steam flow trip setting of 450" H₂O have been selected such that the trip setting is high enough to prevent spurious tripping during pump startup but low enough to prevent core uncover and maintain fission product releases within 10 CFR 100 limits.

The HPCI and RCIC steam line space temperature switch trip settings are high enough to prevent spurious isolation due to normal temperature excursions in the vicinity of the steam supply piping. Additionally, these trip settings ensure that the primary containment isolation steam supply valves isolate a break within an acceptable time period to prevent core uncover and maintain fission product releases within 10 CFR 100 limits.

High temperature at the Reactor Water Cleanup (RWCU) System in the main steam valve vault, RWCU pump room 3A, RWCU pump room 3B, RWCU heat exchanger room or in the space near the pipe trench containing RWCU piping could indicate a break in the cleanup system. When high temperature occurs, the cleanup system is isolated.

3.2 BASES (Cont'd)

The instrumentation which initiates CSCS action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed.

The control rod block functions are provided to prevent excessive control rod withdrawal so that MCPR does not decrease to 1.07. The trip logic for this function is 1-out-of-n: e.g., any trip on one of six APRMs, eight IRMs, or four SRMs will result in a rod block.

The minimum instrument channel requirements assure sufficient instrumentation to assure the single failure criteria is met. The minimum instrument channel requirements for the RBM may be reduced by one for maintenance, testing, or calibration. This does not significantly increase the risk of an inadvertent control rod withdrawal, as the other channel is available, and the RBM is a backup system to the written sequence for withdrawal of control rods.

The APRM rod block function is flow biased and prevents a significant reduction in MCPR, especially during operation at reduced flow. The APRM provides gross core protection; i.e., limits the gross core power increase from withdrawal of control rods in the normal withdrawal sequence. The trips are set so that MCPR is maintained greater than 1.07.

The RBM rod block function provides local protection of the core; i.e., the prevention of critical power in a local region of the core, for a single rod withdrawal error from a limiting control rod pattern.

If the IRM channels are in the worst condition of allowed bypass, the sealing arrangement is such that for unbypassed IRM channels, a rod block signal is generated before the detected neutrons flux has increased by more than a factor of 10.

A downscale indication is an indication the instrument has failed or the instrument is not sensitive enough. In either case the instrument will not respond to changes in control rod motion and thus, control rod motion is prevented.

The refueling interlocks also operate one logic channel, and are required for safety only when the mode switch is in the refueling position.

For effective emergency core cooling for small pipe breaks, the HPCI system must function since reactor pressure does not decrease rapid enough to allow either core spray or LPCI to operate in time. The automatic pressure relief function is provided as a backup to the HPCI in the event the HPCI does not operate. The arrangement of the tripping contacts is such as to provide this function when necessary and minimize spurious operation. The trip settings given in the specification are adequate to assure the above criteria are met. The specification preserves the effectiveness of the system during periods of maintenance, testing, or calibration, and also minimizes the risk of inadvertent operation; i.e., only one instrument channel out of service.

3.2 BASES (Cont'd)

Two radiation monitors are provided for each unit which initiate Primary Containment Isolation (Group 6 isolation valves) Reactor Building Isolation and operation of the Standby Gas Treatment System. These instrument channels monitor the radiation in the reactor zone ventilation exhaust ducts and in the refueling zone.

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.

The allowed inoperable time of 4 hours for functional testing or 24 hours for calibration and maintenance (with the downscale trip of the inoperable channel in the tripped condition) of the Reactor Building Ventilation system is based upon a Probabilistic Risk Assessment (PRA). The assessment considered the failures, relay failures and the probability of an accident occurring for which the RBVRMs are required to operate.

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. 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

3.2 BASES (Cont'd)

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 seismic 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 and to determine whether the plant can continue to be operated safely. The instrumentation provided is consistent with specific portions of the recommendations of Regulatory Guide 1.12 "Instrumentation for Earthquakes."

The instrumentation in Tables 3.2.K/4.2.K monitors 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 63 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



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 220 TO FACILITY OPERATING LICENSE NO. DPR-33
AMENDMENT NO. 194 TO FACILITY OPERATING LICENSE NO. DPR-68
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNITS 1 AND 3
DOCKET NOS. 50-259 AND 50-296

1.0 INTRODUCTION

By letter dated March 31, 1994, the Tennessee Valley Authority (the licensee) requested changes to Technical Specifications (TS) for the Browns Ferry Nuclear Plant (BFN) Units 1 and 3. The proposed changes would revise the Limiting Conditions for Operation and Surveillance Requirements relating to temperature detection instruments that initiate isolation of the High Pressure Coolant Injection System (HPCI) and Reactor Isolation Cooling System (RCIC) turbine main steam supply lines in the event of a line break.

2.0 DISCUSSION AND EVALUATION

2.1 Technical Specification Changes

The proposed changes are conservative in that temperature setpoints for steamline isolation would be lowered, thus resulting in earlier isolation and greater sensitivity to smaller breaks. The new setpoints were determined analytically and incorporate sufficient margins to prevent spurious actuation of isolation valves. The bimetal sensors and instrument logics are not being changed, nor are the surveillance test intervals. However, the proposed amendment does (in addition to changing setpoints) revise the action to be taken in the event of an inoperable channel. The revised action requirements would allow continued operation with an inoperable channel placed in a tripped condition within 24 hours.

TS changes similar to those requested for BFN Units 1 and 3 TS were approved for BFN Unit 2 on January 10, 1991. The staff has reviewed this BFN Unit 2 evaluation, and has confirmed that BFN Units 1 and 3 are of similar design to BFN Unit 2. The staff finds that, similar to BFN Unit 2, the proposed setpoints for BFN Units 1 and 3 provide appropriate isolation protection in the event of a HPCI or RCIC steam line rupture. Therefore, the TS changes for BFN Units 1 and 3 are acceptable for those units on the same basis given for BFN Unit 2 in its January 10, 1991 evaluation.

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ENCLOSURE 3

2.2 Concerns Regarding Inoperable Instrumentation

In the Safety Evaluation accompanying the January 10, 1991 BFN Unit 2 amendment, the staff raised a generic concern regarding the action of placing an inoperable HPCI/RCIC isolation instrument channel (trip system) in the tripped condition for an unlimited time period. When operating in such a condition, the isolation function is still single-failure proof from the standpoint that a single sensor failure will not prevent a required isolation. However, the logic is no longer such that a single failure will not cause an inadvertent isolation.

The concern was that this logic configuration could reduce the reliability of the HPCI and RCIC systems when they are operating under accident conditions. The staff has further considered this question and concluded that the likelihood of a spurious ESF isolation actuation, and the associated required actions that must be taken, provide a strong motivation for timely repair of instruments in a tripped channel and thus avoid prolonged operation or startup with a channel in a tripped condition. Therefore, the staff's concerns raised in the January 10, 1991 Safety Evaluation are resolved.

3.0 SUMMARY

The proposed changes to the BFN Units 1 and 3 TS are consistent with changes previously reviewed and approved for BFN Unit 2. The changes are similarly acceptable for BFN Units 1 and 3. Therefore, the licensee's proposed amendments of the BFN Units 1 and 3 TS are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes the surveillance requirements. The NRC 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 the amendments involve no significant hazards consideration, and there has been no public comment on such finding (59 FR 42347). 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 or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based upon 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 (3) issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: W. Long

Dated: March 16, 1995

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BROWNS FERRY NUCLEAR PLANT

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