Distribution:
~~Docket~~ File
NRC PDR
Local PDR
ORB#2 Reading
D. Eisenhut
S. Norris
D. Clark
OELD
OI&E (4)
G. Deegan (8)
B. Scharf (10)
J. Wetmore
ACRS (10)
OPA (Clare Miles)
R. Diggs
NSIC
TERA
A. Rosenthal, ASLAB
Gray (2)

Docket Nos. 50-259
and 50-260

Mr. Hugh G. Parris
Manager of Power
Tennessee Valley Authority
500A Chestnut Street, Tower II
Chattanooga, Tennessee 37401

September 3, 1981

Dear Mr. Parris:

The Commission has issued the enclosed Amendment Nos. 75 and 72 to Facility Licenses Nos. DPR-33 and DPR-52 for the Browns Ferry Nuclear Plant, Units Nos. 1 and 2. These amendments are in response to your letter of April 9, 1981 (TVA BFNP TS 156), as supplemented by letters dated June 8, 1981, July 2, 1981; July 31, 1981; and August 17, 1981.

These amendments change the Technical Specifications to reflect the modifications to the electrical distribution systems presently being accomplished on Browns Ferry Unit Nos. 1 and 2. The modifications, changes to the Technical Specifications and analyses you submitted also satisfactorily resolve - with the exception of verification testing - the two generic issues of 1) adequacy of station electric distribution system voltages and 2) degraded grid protection for Class 1E power systems. These issues were raised by our generic letters to you of June 3, 1977; August 8, 1979; and December 13, 1979; and to which you responded by your letters of July 22, 1977; May 2, 1978; May 12, 1978; September 4, 1979; March 14, 1980; and May 1, 1980.

These amendments are effective within 30 days of issuance.

Copies of the Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

/S/

Thomas A. Ippolito, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosures:
1. Amendment No. 75 to DPR-33
2. Amendment No. 72 to DPR-52
3. Safety Evaluation
4. Notice

cc w/encls:
See next page

OFFICE		ORB#2	ORB#2	ORB#2	DL:AD:OR	OELD	
SURNAME		DClark:pob	SNorris	TIppolito	TNovak		
		8/31/81	8/31/81	8/31/81	9/1/81	9/3/81	

Mr. Hugh G. Parris

cc:

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50- 259

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 1

AMENDMENT TO FACILTIY OPERATING LICENSE

Amendment No. 75
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 April 9, 1981 as supplemented by letters dated June 8, 1981, July 2, 1981, July 31, 1981 and August 17, 1981, 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 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. 75 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 3, 1981

ATTACHMENT TO LICENSE AMENDMENT NO. 75

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise Appendix A as follows:

1. Remove the following pages and replace with identically numbered pages:

292/293

294/295

296/297

298/299

300/301

2. The underlined pages are the pages being changed; marginal lines on these pages indicate the revised area. The overleaf page is provided for convenience.

3. Add the following new pages:

293a

294a

297a

297b

298a

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
Applicability	Applicability
Applies to all the auxiliary electrical power system.	Applies to the periodic testing requirements of the auxiliary electrical systems.
Objective	Objective
To assure an adequate supply of electrical power for operation of those systems required for safety.	Verify the operability of the auxiliary electrical system.
Specification	Specification
A. Auxiliary Electrical Equipment	A. Auxiliary Electrical Equipment
A reactor shall not be started up (made critical) from the cold condition unless four units 1 and 2 diesel generators are operable, the requirements of 3.9.A.4 through 3.9.A.7 are met and two of the following off-site power sources are available as stated with no credit taken for the two 500-kV Trinity lines.	1. Diesel Generators
- Both 161-kV lines and common station service transformers provided the second source is from the 500kV system.	a. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue for at least a one hour period at 75% of rated load or greater.
- The unit 1 unit station service transformer TUSS1B is available. If the unit 2 station service transformers is the second source, a minimum of two 500-kV lines must be available.	During the monthly generator test, the diesel generator starting air compressor shall be checked for operation and its ability to recharge air receivers. The operation of the diesel fuel oil transfer pumps shall be demonstrated, and the diesel starting time to reach rated voltage and speed shall be logged.
- The unit 2 unit station service transformer TUSS2B is available. If the unit 1 station service transformers is the second source, a minimum of two 500kV lines must be available.	b. Once per operating cycle, a test will be conducted simulating a loss of offsite power and similar conditions that would exist with the presence of an actual safety-injection signal to demonstrate the
- Both 161-kV lines, both cooling	

3.9 AUXILIARY ELECTRICAL SYSTEM

tower transformers, and the bus tie board energized and capable of supply power to the units 1 and 2 shutdown boards, provided that the second source is from the 500-kV system.

- Both 161-kV lines, one common station service transformer, and one cooling tower transformer (through the bus tie board) provided the cooling tower transformer is not parallel to the common station service transformer and provided that the second source is from the 500-kV system.

A reactor shall not be started up (made critical) from the Hot Standby Condition unless all of the following conditions are satisfied:

1. One of the off-site power sources listed above is available and capable of supplying auxiliary power to the shutdown boards.

2. Three units 1 and 2 diesel generators shall be operable.

3. An additional source of power consisting of one of the following:

   a. A second off-site power source available and capable of supplying power to the shutdown boards.

   b. A fourth operable units 1 and 2 diesel generator.

4. Buses and Boards Available

   a. Start buses 1A and 1B are energized.

4.9 AUXILIARY ELECTRICAL SYSTEM

following:

1. Deenergization of the emergency buses and load shedding from the emergency buses.

2. The diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

3. On diesel generator breaker trip, the loads are shed from the emergency buses and the diesel restarts on the auto-start signal, the emergency buses are energized with permanently connected loads, the auto-connected emergency loads are energized through the load sequencer, and the diesel operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

c. Once a month the quantity of diesel fuel available shall be logged.

d. Each diesel generator shall be given an annual inspection in accordance

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
b. The units 1 and 2 4-kV shutdown boards are energized.	with instructions based on the manufacturer's recommendations.
c. The 480-V shutdown boards associated with the unit are energized.	e. Once a month a sample of diesel fuel shall be checked for quality. The quality shall be within acceptable limits specified in Table 1 of the latest revision to ASTM D975 and logged.
d. The units 1 and 2 diesel auxiliary boards are energized.	2. D. C. Power System - Unit Batteries (250-Volt) Diesel Generator Batteries (125-Volt) and Shutdown Board Batteries (250-Volt)
e. Loss of voltage and degraded voltage relays operable on 4-kV shutdown boards A, B, C, and D.	a. Every week the specific gravity and the voltage of the pilot cell, and temperature of an adjacent cell and overall battery voltage shall be measured and logged.
f. Shutdown busses 1 and 2 energized.	b. Every three months the measurement shall be made of voltage of each cell to nearest 0.1 volt, specific gravity of each cell, and temperature of every fifth cell. These measurements shall be logged.
g. The 480V Rx. MOV Boards D&E are energized with M-G Sets IDN, IDA, IEN, and IEA in service.	c. A battery rated discharge (capacity) test shall be performed and the voltage, time, and output current measurements shall be logged at intervals not to exceed 24 hours.
5. The 250-volt unit and shutdown board batteries and a battery charger for each battery boards are operable.	
6. Logic Systems	
a. Common accident signal logic system is operable.	
b. 480-V load shedding logic system is operable.	
7. There shall be a minimum of 103,300 gallons of diesel fuel in the standby diesel generator fuel tanks.	

Amendment No. 75

LIMITING CONDITIONS FOR OPERAT	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
	3. Logic Systems
	a. Both divisions of the common accident signal logic system shall be tested every 6 months to demonstrate that it will function on actuation of the core spray system of each reactor to provide an automatic start signal to all 4 units 1 and 2 diesel generators.
	b. Once every 6 months, the condition under which the 480-Volt load shedding logic system is required shall be simulated using pendant test switches and/or pushbutton test switches to demonstrate that the load shedding logic system would initiate load shedding signals on the diesel auxiliary boards, reactor MOV boards, and the 480-Volt shutdown boards.
	4. Undervoltage Relays
	a. (deleted)
	b. Once every 6 months, the conditions under which the loss of voltage and degraded voltage relays are required shall be simulated with an undervoltage on each shutdown board to

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
B. Operation with Inoperable Equipment	B. Operation with Inoperable Equipment
Whenever a reactor is in Startup mode or Run mode and not in a cold condition, the availability of electric power shall be as specified in 3.9.A except as specified herein.	
1. From and after the date that only one off-site power source is available, reactor operation is permissible for seven days.	1. When only one offsite power source is inoperable, all units 1 and 2 diesel generators and associated boards must be demonstrated to be operable immediately and daily thereafter.
	2. N.A.
2. From and after the date that the 4-kV bus tie board becomes inoperable, reactor operation is permissible indefinitely provided one of the required off-site power source is not supplied from the 161-kV system through the bus tie board.	
3. When one of the units 1 and 2 diesel generator is inoperable, continued reactor operation is permissible during the succeeding 7 days, provided that two offsite power sources are available, and all of the CS, RHR (LPCI and Containment Cooling) Systems, and the remaining three units 1 and 2 diesel generators are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the cold condition within 24 hours.	3. When one of the units 1 and 2 diesel generator is found to be inoperable, all of the CS, RHR (LPCI and Containment Cooling) Systems and the remaining diesel generators and associated boards shall be demonstrated to be operable immediately and daily thereafter.
4. When one units 1 and 2 4-kV shutdown board is inoperable, continued reactor operation is permissible for a period not to exceed 5 days,	4. When one 4-kV shutdown board is found to be inoperable, all remaining 4-kV shutdown boards and associated diesel generators, CS, and RHR (LPCI and Containment Cooling) Systems supplied by the remaining 4-kV shutdown boards shall be demonstrated to be operable, immediately and daily thereafter.
	5. When one shutdown bus is found to be inoperable all 1 and 2 diesel generators shall be proven operable immediately and daily thereafter.
	6. When one units 1 and 2 Diesel Aux. board is found to be inoperable, the remaining diesel Aux. board and each unit 1 and 2 diesel generator

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
	demonstrate that the associated diesel generator will start.
	c. The loss of voltage and degraded voltage relays which start the diesel generators from the 4-kV shutdown boards shall be calibrated annually for trip and reset and the measurements logged. These relays shall be calibrated as specified in Table 4.9.A.4.c.
	d. 4-kV shutdown board voltages shall be recorded once every 12 hours.
	5. 480-V RMOV boards D and E
	a. Once per operating cycle the automatic transfer feature for 480-V RMOV boards D and E shall be functionally tested to verify auto-transfer capability.

LIMITING CONDITIONS FOR OPE TION	SURVEILLANCE REQ EMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
provided that two off-site power sources are available, and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and Containment Cooling) Systems, and all 480-V emergency power boards are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the cold condition by the end of the fifth day.	shall be proven operable immediately and daily thereafter.
5. When one of the shutdown busses is inoperable, reactor operation is permissible for a period of 7 days.	
6. When one of the 480-V diesel Aux. boards becomes inoperable, reactor operation is permissible for a period of 5 days.	
7. From and after the date that one of the three 250-Volt unit batteries and/or its associated battery board is found to be inoperable for any reason, continued reactor operation is permissible during the succeeding seven days. Except for routine surveillance testing, the NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an operable state.	
8. From and after the date that one of the 250-volt shutdown board batteries and/or its associated battery board is found to be inoperable for	

3.9 AUXILIARY ELECTRICAL SYSTEM

4.9 AUXILIARY ELECTRICAL SYSTEM

any reason, continued reactor operation is permissible during the succeeding five days in accordance with 3.9.B.7.

9. When one division of the Logic System is inoperable, continued reactor operation is permissible under this condition for seven days, provided the CSCS requirements listed in specification 3.9.B.3 are satisfied. The NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an operable state.

10. (deleted)

11. The following limiting conditions for operation exists for the undervoltage relays which start the diesel generators on the 4-kV shutdown boards.

    a. The loss of voltage relay channel which starts the diesel generator for a complete loss of voltage on a 4-kV shutdown board may be inoperable for 10 days provided the degraded voltage relay channel on that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b.)

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
b. The degraded voltage relay channel which starts the diesel generator for degraded voltage on a 4-kV shutdown board may be inoperable for 10 days provided the loss of voltage relay channel on that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b).	
c. One of the three phase-to-phase degraded voltage relays provided to detect a degraded voltage on a 4-kV shutdown board may be inoperable for 15 days provided both of the following conditions are satisfied.	
1. The other two phase-to-phase degraded voltage relays on that 4-kV shutdown board are operable (within the surveillance schedule of 4.9.A.4.b).	
2. The loss of voltage relay channel on that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b).	
d. The degraded voltage relay channel and the loss of voltage relay channel on a 4-kV shutdown board may be inoperable for 5 days provided the other shutdown boards and undervoltage relays are operable. (Within the	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
surveillance schedule of 4.9.A.4.b).	
12. When one 480-volt shutdown board is found to be inoperable, the reactor will be placed in hot standby within 12 hours and cold shutdown within 24 hours.	
13. If one 480-V RMOV board M-G set is inoperable, the reactor may remain in operation for a period not to exceed seven days, provided the remaining 480-V RMOV board m-g sets and their associated loads remain operable.	
14. If any two 480-V RMOV board M-G sets become inoperable, the reactor shall be placed in the cold shutdown condition within 24 hours.	
15. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.14 cannot be met, an orderly shutdown shall be initiated and the reactor shall be shutdown and in the cold condition within 24 hours.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM

C. Operation in Cold Shutdown

Whenever the reactor is in cold shutdown condition with irradiated fuel in the reactor, the availability of electric power shall be as specified in Section 3.9.A except as specified herein.

1. At least two units 1 and 2 diesel generators and their associated 4-kV shutdown boards shall be operable.

2. An additional source of power consisting of at least one of the following:

   a. The unit 1 or 2 unit station service transformers energized.

   b. One 161-kV transmission line and its associated common station service transformer energized.

   c. Either 161-kV line, one cooling tower transformer and the bus tie board energized and capable of supplying power to the units 1 and 2 shutdown boards energized.

   d. A third operable diesel generator.

3. At least one 480-V shutdown board for each unit must be operable.

4. One 480-V RMOV board motor-generator (M-G) set is required for each RMOV board (D or E) required to support operation of the RHR system in accordance with 3.5.B.9.

3.9 BASES

The objective of this specification is to assure an adequate source of electrical power to operate facilities to cool the plant during shutdown and to operate the engineered safeguards following an accident. There are three sources of alternating current electrical energy available, namely, the 161-kV transmission system, the 500-kV system by way of either or both nuclear generating units 1 and 2 unit station service transformer B, and the diesel generators.

The generator breaker for units 1 and 2 can provide non-interruptible sources of off-site power from the 500-kV transmission system to the units 1 and 2 shutdown boards. A source of auxiliary power can be supplied from the 161-kV transmission system through the common station service transformers or the cooling tower transformer by way of the bus tie board. The 4-kV bus tie board may remain out of service indefinitely provided one of the required off-site power sources is not supplied from the 161-kV system through the bus tie board.

The minimum fuel oil requirement of 103,300 gallons is sufficient for seven days of full load operation of three diesels and is conservatively based on availability of a replenishment supply.

The degraded voltage sensing relays provide a start signal to the diesel generators in the event that a deteriorated voltage condition exists on a 4-kV shutdown board. This starting signal is independent of the starting signal generated by the complete loss of voltage relays and will continue to function and start the diesel generators on complete loss of voltage should the loss of voltage relays become inoperable. The 15-day inoperable time limit specified when one of the three phase-to-phase degraded voltage relays is inoperable is justified based on the two out of three permissive logic scheme provided with these relays.

A 4-kV shutdown board is allowed to be out of operation for a brief period to allow for maintenance and testing, providing all remaining 4-kV shutdown boards and associated diesel generators CS, RHR, (LPCI and Containment Cooling) Systems supplied by the remaining 4-kV shutdown boards, and all emergency 480-V power boards are operable.

There are eight 250-volt d-c battery systems each of which consists of a battery, battery charger, and distribution equipment. Three of these systems provide power for unit

Table 4.9.A.4.c

VOLTAGE RELAY SETPOINTS/DIESEL GENERATOR START

Relay Location	Trip Level Setting			Remarks
1. 4-kV Shutdown Boards	Trip Setpoint: Allowable Values: Trip Range: Reset Setpoint: Allowable Values: Reset Range:	0 volts with a 1.5-second time delay ± .1 second 1.4 to 1.6 seconds 2870-V ± 2% of 2870-V 2813-V to 2927-V		Start diesel generators on loss of offsite power.
2. 4-kV Shutdown Boards		Undervoltage		Second level undervoltage sensing relays - start diesel generator on degraded voltage.
	Trip Setpoint:	3920		
	Allowable Values:	3900-3940		
	Reset Setpoint:	Reset at ≤ 1.5% above trip value		
3. 4-kV Shutdown Boards (Timers shown for 4-kV shutdown board A. 4-kV shutdown boards B, C, and D, similiar, except for change of suffix)	Timer	Setpoint (seconds)	Critical Time (seconds)	Auxiliary timers for second level undervoltage sensing relays. The setpoint ranges specified assure that the operating times will be below the critical times specified. These ranges are based on timer repeatability of ± 5% as specified by the manufacturer.
	2-211-1A	0.27 ± 5%	0.3	
	2-211-2A	4.00 ± 5%	N/A	
	2-211-3A	7.43 ± 5%	8.2	
	2-211-4A	1.36 ± 5%	1.5	

control functions, operative power for unit motor loads, and alternative drive power for a 115-volt a-c unit preferred motor-generator set. One 250-volt d-c system provides power for common plant and transmission system control functions, drive power for a 115-volt a-c plant preferred motor-generator set, and emergency drive power for certain unit large motor loads. The four remaining systems deliver control power to the 4160-volt shutdown boards.

Each 250-Volt d-c shutdown board control power supply can receive power from its own battery, battery charger, or from a spare charger. The chargers are powered from normal plant auxiliary power or from the standby diesel-driven generator system. Zero resistance short circuits between the control power supply and the shutdown board are cleared by fuses located in the respective control power supply. Each power supply is located in the reactor building near the shutdown board it supplies. Each battery is located in its own independently ventilated battery room.

The 250-volt d-c system is so arranged, and the batteries sized such, that the loss of any one unit battery will not prevent the safe shutdown and cooldown of all three units in the event of the loss of offsite power and a design basis accident in any one unit. Loss of control power to any engineered safeguards control circuit is annunciated in the main control room of the unit affected. The loss of one 250-Volt shutdown board battery affects normal control power only for the 4160-Volt shutdown board which is supplies. The station battery supplies loads that are not essential for safe shutdown and cooldown of the nuclear system. This battery was not considered in the accident load calculations.

There are two 480-V ac Reactor Motor-Operated Valve (RMOV) Boards that contain motor-generator (M-G) sets in their feeder lines. These 480-V ac RMOV boards have an automatic transfer from their normal to alternate power source (480-V ac shutdown boards). The M-G sets act as electrical isolators to prevent a fault from propagating between electrical divisions due to an automatic transfer. The 480-V ac RMOV boards involved provide motive power to valves associated with the LPCI mode of the RHR system. Having an M-G set out of service reduces the assurance that full RHR (LPCI) capacity will be available when required. Since sufficient equipment is available to maintain the minimum complement required for RHR (LPCI) operation, a 7-day servicing period is justified. Having two M-G sets out of service can considerably reduce equipment availability. Therefore, the affected unit shall be placed in cold shutdown within 24 hours.

4.9 BASES

The monthly tests of the diesel generators are primarily to check for failures and deterioration in the system since last use. The diesels will be loaded to at least 75 percent of rated power while engine and generator temperatures are stabilized (about one hour). The minimum 75 percent load will prevent soot formation in the cylinders and injection nozzles. Operation up to an equilibrium temperature ensures that there is no overheat problem. The tests also provide an engine and generator operating history to be compared with subsequent engine-generator test data to identify and to correct any mechanical or electrical deficiency before it can result in a system failure.

The test during refueling outages is more comprehensive, including procedures that are most effectively conducted at that time. These include automatic actuation and functional capability tests to verify that the generators can start and be ready to assume load in 10 seconds. The annual inspection will detect any signs of wear long before failure.

Battery maintenance with regard to the floating charge, equilizing charge, and electrolyte level will be based on the manufacturer's instruction and sound maintenance practices. In addition, written records will be maintained of the battery performance. The plant batteries will deteriorate with time but precipitous failure is unlikely. The type of surveillance called for in this specification is that which has been demonstrated through experience to provide an indication of a cell becoming irregular or unserviceable long before it becomes a failure.

The equalizing charge, as recommended by the manufacturer, is vital to maintaining the Ampere-hour capacity of the battery, and will be applied as recommended.

The testing of the logic systems will verify the ability of the logic systems to bring the auxiliary electrical system to running standby readiness with the presence of an accident signal from any reactor or an undervoltage signal on the 4-kV shutdown boards.

The periodic simulation of accident signals in conjunction with diesel generator voltage available signals will confirm the ability of the 480-volt load shedding logic system to sequentially shed and restart 480-volt loads if an accident signal were present and diesel generator voltage were the only source of electrical power.

REFERENCES

1. Normal Auxiliary Power System (BFNP FSAR subsection 8.4)

2. Standby A.C. Power Supply and Distribution (BFNP FSAR subsection 8.5)

3. 250-volt D.C. Power Supply and Distribution (BFNP FSAR subsection 8.6)

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 2

AMENDMENT TO FACILTIY OPERATING LICENSE

Amendment No. 72
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 April 9, 1981 as supplemented by letters dated June 8, 1981, July 2, 1981, July 31, 1981 and August 17, 1981, 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 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. 72, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 3, 1981

ATTACHMENT TO LICENSE AMENDMENT NO. 72

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise Appendix A as follows:

1. Remove the following pages and replace with identically numbered pages:

291/292

293/294

295/296

297/298

299/300*

301/302

2. The underlined pages are the pages being changed; marginal lines on these pages indicate the revised area. The overleaf page is provided for convenience.

3. Add the following new pages:

293a

294a

297a

297b

298a

*The only change on page 300 is a relocation, verbatim, of information formerly on page 299.

3.8.C/4.8.C Mechanical Vacuum Pump

The purpose of isolating the mechanical vacuum pump line is to limit the release of activity from the main condenser. During an accident, fission products would be transported from the reactor through the main steam lines to the condenser. The fission product radioactivity would be sensed by the main steam line radioactivity monitors which initiate isolation.

4.8.A and 4.8.B BASES

The surveillance requirements given under Specification 4.8.A and 4.8.B provide assurance that liquid and gaseous wastes are properly controlled and monitored during any release of radioactive materials in the liquid and gaseous effluents. These surveillance requirements provide the data for the licensee and the Commission to evaluate the station's performance relative to radioactive wastes released to the environment. Reports on the quantities of radioactive materials released in effluents shall be furnished to the Commission on the basis of Section 6 of these technical specifications. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such actions as the Commission deems appropriate.

3.8.D and 4.8.D BASES

The objective of this specification is to assure that leakage from byproduct, source, and special nuclear radioactive material sources does not exceed allowable limits.

LIMITING CONDITIONS FOR OPERATION

3.9 AUXILIARY ELECTRICAL SYSTEM

Applicability

Applies to all the auxiliary electrical power system.

Objective

To assure an adequate supply of electrical power for operation of those systems required for safety.

Specification

A. Auxiliary Electrical Equipment

A reactor shall not be started up (made critical) from the cold condition unless four units 1 and 2 diesel generators are operable, the requirements of 3.9.A.4 through 3.9.A.7 are met and two of the following off-site power sources are available as stated with no credit taken for the two 500-kV Trinity lines.

- Both 161-kV lines and common station service transformers provided the second source is from the 500kV system.
- The unit 1 unit station service transformer TUSS1B is available. If the unit 2 station service transformers is the second source, a minimum of two 500-kV lines must be available.
- The unit 2 unit station service transformer TUSS2B is available. If the unit 1 station service transformers is the second source, a minimum of two 500kV lines must be available.
- Both 161-kV lines, both cooling

SURVEILLANCE REQUIREMENTS

4.9 AUXILIARY ELECTRICAL SYSTEM

Applicability

Applies to the periodic testing requirements of the auxiliary electrical systems.

Objective

Verify the operability of the auxiliary electrical system.

Specification

A. Auxiliary Electrical Equipment

1. Diesel Generators

a. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue for at least a one hour period at 75% of rated load or greater.

During the monthly generator test, the diesel generator starting air compressor shall be checked for operation and its ability to recharge air receivers. The operation of the diesel fuel oil transfer pumps shall be demonstrated, and the diesel starting time to reach rated voltage and speed shall be logged.

b. Once per operating cycle, a test will be conducted simulating a loss of offsite power and similar conditions that would exist with the presence of an actual safety-injection signal to demonstrate the

3.9 AUXILIARY ELECTRICAL SYSTEM

tower transformers, and the bus tie board energized and capable of supply power to the units 1 and 2 shutdown boards, provided that the second source is from the 500-kV system.

- Both 161-kV lines, one common station service transformer, and one cooling tower transformer (through the bus tie board) provided the cooling tower transformer is not parallel to the common station service transformer and provided that the second source is from the 500-kV system.

A reactor shall not be started up (made critical) from the Hot Standby Condition unless all of the following conditions are satisfied:

1. One of the off-site power sources listed above is available and capable of supplying auxiliary power to the shutdown boards.

2. Three units 1 and 2 diesel generators shall be operable.

3. An additional source of power consisting of one of the following:

   a. A second off-site power source available and capable of supplying power to the shutdown boards.

   b. A fourth operable units 1 and 2 diesel generator.

4. Buses and Boards Available

   a. Start buses 1A and 1B are energized.

4.9 AUXILIARY ELECTRICAL SYSTEM

following:

1. Deenergization of the emergency buses and load shedding from the emergency buses.

2. The diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

3. On diesel generator breaker trip, the loads are shed from the emergency buses and the diesel restarts on the auto-start signal, the emergency buses are energized with permanently connected loads, the auto-connected emergency loads are energized through the load sequencer, and the diesel operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

c. Once a month the quantity of diesel fuel available shall be logged.

d. Each diesel generator shall be given an annual inspection in accordance

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
	3. Logic Systems
	a. Both divisions of the common accident signal logic system shall be tested every 6 months to demonstrate that it will function on actuation of the core spray system of each reactor to provide an automatic start signal to all 4 units 1 and 2 diesel generators.
	b. Once every 6 months, the condition under which the 480-Volt load shedding logic system is required shall be simulated using pendant test switches and/or pushbutton test switches to demonstrate that the load shedding logic system would initiate load shedding signals on the diesel auxiliary boards, reactor MOV boards, and the 480-Volt shutdown boards.
	4. Undervoltage Relays
	a. (deleted)
	b. Once every 6 months, the conditions under which the loss of voltage and degraded voltage relays are required shall be simulated with an undervoltage on each shutdown board to

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
b. The units 1 and 2 4-kV shutdown boards are energized.	with instructions based on the manufacturer's recommendations.
c. The 480-V shutdown boards associated with the unit are energized.	e. Once a month a sample of diesel fuel shall be checked for quality. The quality shall be within acceptable limits specified in Table 1 of the latest revision to ASTM D975 and logged.
d. The units 1 and 2 diesel auxiliary boards are energized.	2. D. C. Power System - Unit Batteries (250-Volt) Diesel Generator Batteries (125-Volt) and Shutdown Board Batteries (250-Volt)
e. Loss of voltage and degraded voltage relays operable on 4-kV shutdown boards A, B, C, and D.	a. Every week the specific gravity and the voltage of the pilot cell, and temperature of an adjacent cell and overall battery voltage shall be measured and logged.
f. Shutdown busses 1 and 2 energized.	b. Every three months the measurements shall be made of voltage of each cell to nearest 0.1 volt, specific gravity of each cell, and temperature of every fifth cell. These measurements shall be logged.
5. The 250-volt unit and shutdown board batteries and a battery charger for each battery boards are operable.	c. A battery rated discharge (capacity) test shall be performed and the voltage, time, and output current measurements shall be logged at intervals not to exceed 24 hours.
6. Logic Systems	
a. Common accident signal logic system is operable.	
b. 480-V load shedding logic system is operable.	
7. There shall be a minimum of 103,300 gallons of diesel fuel in the standby diesel generator fuel tanks.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
	demonstrate that the associated diesel generator will start.
	c. The loss of voltage and degraded voltage relays which start the diesel generators from the 4-kV shutdown boards shall be calibrated annually for trip and reset and the measurements logged. These relays shall be calibrated as specified in Table 4.9.A.4.c.
	d. 4-kV shutdown board voltages shall be recorded once every 12 hours.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
B. Operation with Inoperable Equipment	B. Operation with Inoperable Equipment
Whenever a reactor is in Startup mode or Run mode and not in a cold condition, the availability of electric power shall be as specified in 3.9.A except as specified herein.	
1. From and after the date that only one off-site power source is available, reactor operation is permissible for seven days.	1. When only one offsite power source is inoperable, all units 1 and 2 diesel generators and associated boards must be demonstrated to be operable immediately and daily thereafter.
	2. N.A.
2. From and after the date that the 4-kV bus tie board becomes inoperable, reactor operation is permissible indefinitely provided one of the required off-site power source is not supplied from the 161-kV system through the bus tie board.	3. When one of the units 1 and 2 diesel generator is found to be inoperable, all of the CS, RHR (LPCI and Containment Cooling) Systems and the remaining diesel generators and associated boards shall be demonstrated to be operable immediately and daily thereafter.
3. When one of the units 1 and 2 diesel generator is inoperable, continued reactor operation is permissible during the succeeding 7 days, provided that two offsite power sources are available, and all of the CS, RHR (LPCI and Containment Cooling) Systems, and the remaining three units 1 and 2 diesel generators are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the cold condition within 24 hours.	4. When one 4-kV shutdown board is found to be inoperable, all remaining 4-kV shutdown boards and associated diesel generators, CS, and RHR (LPCI and Containment Cooling) Systems supplied by the remaining 4-kV shutdown boards shall be demonstrated to be operable, immediately and daily thereafter.
	5. When one shutdown bus is found to be inoperable all 1 and 2 diesel generators shall be proven operable immediately and daily thereafter.
4. When one units 1 and 2 4-kV shutdown board is inoperable, continued reactor operation is permissible for a period not to exceed 5 days,	6. When one units 1 and 2 Diesel Aux. board is found to be inoperable, the remaining diesel Aux. board and each unit 1 and 2 diesel generator

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
provided that two off-site power sources are available, and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and Containment Cooling) Systems, and all 480-V emergency power boards are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the cold condition by the end of the fifth day.	shall be proven operable immediately and daily thereafter.
5. When one of the shutdown busses is inoperable, reactor operation is permissible for a period of 7 days.	
6. When one of the 480-V diesel Aux. boards becomes inoperable, reactor operation is permissible for a period of 5 days.	
7. From and after the date that one of the three 250-Volt unit batteries and/or its associated battery board is found to be inoperable for any reason, continued reactor operation is permissible during the succeeding seven days. Except for routine surveillance testing, the NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an operable state.	
8. From and after the date that one of the 250-volt shutdown board batteries and/or its associated battery board is found to be inoperable for	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
any reason, continued reactor operation is permissible during the succeeding five days in accordance with 3.9.B.7.	
9. When one division of the Logic System is inoperable, continued reactor operation is permissible under this condition for seven days, provided the CSCS requirements listed in specification 3.9.B.3 are satisfied. The NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an operable state.	
10. (deleted)	
11. The following limiting conditions for operation exists for the undervoltage relays which start the diesel generators on the 4-kV shutdown boards.	
a. The loss of voltage relay channel which starts the diesel generator for a complete loss of voltage on a 4-kV shutdown board may be inoperable for 10 days provided the degraded voltage relay channel on	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM

C. Operation in Cold Shutdown

Whenever the reactor is in cold shutdown condition with irradiated fuel in the reactor, the availability of electric power shall be as specified in Section 3.9.A except as specified herein.

1. At least two units 1 and 2 diesel generators and their associated 4-kV shutdown boards shall be operable.

2. An additional source of power consisting of at least one of the following:

   a. The unit 1 or 2 unit station service transformers energized.

   b. One 161-kV transmission line and its associated common station service transformer energized.

   c. Either 161-kV line, one cooling tower transformer and the bus tie board energized and capable of supplying power to the units 1 and 2 shutdown boards energized.

   d. A third operable diesel generator.

3. At least one 480-V shutdown board for each unit must be operable.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b).	
b. The degraded voltage relay channel which starts the diesel generator for degraded voltage on a 4-kV shutdown board may be inoperable for 10 days provided the loss of voltage relay channel on that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b).	
c. One of the three phase-to-phase degraded voltage relays provided to detect a degraded voltage on a 4-kV shutdown board may be inoperable for 15 days provided both of the following conditions are satisfied.	
1. The other two phase-to-phase degraded voltage relays on that 4-kV shutdown board are operable (within the surveillance schedule of 4.9.A.4.b).	
2. The loss of voltage relay channel on that shutdown board is operable (within the surveillance schedule of 4.9.A.4.b).	
d. The degraded voltage relay channel and the loss of voltage relay channel on a 4-kV shutdown board may be inoperable for 5 days provided the other	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
shutdown boards and undervoltage relays are operable. (Within the surveillance schedule of 4.9.A.4.b).	
12. When one 480-volt shutdown board is found to be inoperable, the reactor will be placed in hot standby within 12 hours and cold shutdown within 24 hours.	
13. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.12 cannot be met, an orderly shutdown shall be initiated and the reactor shall be shutdown and in the cold condition within 24 hours.	

Table 4.9.A.4.c VOLTAGE RELAY SETPOINTS/DIESEL GENERATOR START

Relay Location	Trip Level Setting			Remarks
1. 4-kV Shutdown Boards	Trip Setpoint: Allowable Values: Trip Range: Reset Setpoint: Allowable Values: Reset Range:	0 volts with a 1.5-second time delay ± .1 second 1.4 to 1.6 seconds 2870-V ± 2% of 2870-V 2813-V to 2927-V		Start diesel generators on loss of offsite power.
2. 4-kV Shutdown Boards	Undervoltage Trip Setpoint: Allowable Values: Reset Setpoint:	3920 3900-3940 Reset at ≤ 1.5% above trip value		Second level undervoltage sensing relays - start diesel generator on degraded voltage.
3. 4-kV Shutdown Boards (Timers shown for 4-kV shutdown board A. 4-kV shutdown boards B, C, and D, similiar, except for change of suffix)	Timer	Setpoint (seconds)	Critical Time (seconds)	Auxiliary timers for second level undervoltage sensing relays. The setpoint ranges specified assure that the operating times will be below the critical times specified. These ranges are based on timer repeatability of ± 5% as specified by the manufacturer.
	2-211-1A	0.27 ± 5%	0.3	
	2-211-2A	4.00 ± 5%	N/A	
	2-211-3A	7.43 ± 5%	8.2	
	2-211-4A	1.36 ± 5%	1.5	

3.9 BASES

The objective of this specification is to assure an adequate source of electrical power to operate facilities to cool the plant during shutdown and to operate the engineered safeguards following an accident. There are three sources of alternating current electrical energy available, namely, the 161-kV transmission system, the 500-kV system by way of either or both nuclear generating units 1 and 2 unit station service transformer B, and the diesel generators.

The generator breaker for units 1 and 2 can provide non-interruptible sources of off-site power from the 500-kV transmission system to the units 1 and 2 shutdown boards. A source of auxiliary power can be supplied from the 161-kV transmission system through the common station service transformers or the cooling tower transformer by way of the bus tie board. The 4-kV bus tie board may remain out of service indefinitely provided one of the required off-site power sources is not supplied from the 161-kV system through the bus tie board.

The minimum fuel oil requirement of 103,300 gallons is sufficient for seven days of full load operation of three diesels and is conservatively based on availability of a replenishment supply.

The degraded voltage sensing relays provide a start signal to the diesel generators in the event that a deteriorated voltage condition exists on a 4-kV shutdown board. This starting signal is independent of the starting signal generated by the complete loss of voltage relays and will continue to function and start the diesel generators on complete loss of voltage should the loss of voltage relays become inoperable. The 15-day inoperable time limit specified when one of the three phase-to-phase degraded voltage relays is inoperable is justified based on the two out of three permissive logic scheme provided with these relays.

A 4-kV shutdown board is allowed to be out of operation for a brief period to allow for maintenance and testing, providing all remaining 4-kV shutdown boards and associated diesel generators CS, RHR, (LPCI and Containment Cooling) Systems supplied by the remaining 4-kV shutdown boards, and all emergency 480-V power boards are operable.

There are eight 250-volt d-c battery systems each of which consists of a battery, battery charger, and distribution equipment. Three of these systems provide power for unit

control functions, operative power for unit motor loads, and alternative drive power for a 115-volt a-c unit preferred motor-generator set. One 250-volt d-c system provides power for common plant and transmission system control functions, drive power for a 115-volt a-c plant preferred motor-generator set, and emergency drive power for certain unit large motor loads. The four remaining systems deliver control power to the 4160-volt shutdown boards.

Each 250-Volt d-c shutdown board control power supply can receive power from its own battery, battery charger, or from a spare charger. The chargers are powered from normal plant auxiliary power or from the standby diesel-driven generator system. Zero resistance short circuits between the control power supply and the shutdown board are cleared by fuses located in the respective control power supply. Each power supply is located in the reactor building near the shutdown board it supplies. Each battery is located in its own independently ventilated battery room.

The 250-volt d-c system is so arranged, and the batteries sized such, that the loss of any one unit battery will not prevent the safe shutdown and cooldown of all three units in the event of the loss of offsite power and a design basis accident in any one unit. Loss of control power to any engineered safeguards control circuit is annunciated in the main control room of the unit affected. The loss of one 250-Volt shutdown board battery affects normal control power only for the 4160-Volt shutdown board which is supplies. The station battery supplies loads that are not essential for safe shutdown and cooldown of the nuclear system. This battery was not considered in the accident load calculations.

4.9 BASES

The monthly tests of the diesel generators are primarily to check for failures and deterioration in the system since last use. The diesels will be loaded to at least 75 percent of rated power while engine and generator temperatures are stabilized (about one hour). The minimum 75 percent load will prevent soot formation in the cylinders and injection nozzles. Operation up to an equilibrium temperature ensures that there is no overheat problem. The test also provides an engine and generator operating history to be compared with subsequent engine-generator test data to identify and to correct any mechanical or electrical deficiency before it can result in a system failure.

The test during refueling outages is more comprehensive, including procedures that are most effectively conducted at that time. These include automatic actuation and functional capability tests to verify that the generators can start and be ready to assume load in 10 seconds. The annual inspection will detect any signs of wear long before failure. The diesel generators are shared by units 1 and 2. Therefore, the capability for the units 1 and 2 diesel generators to accept the emergency loads will be performed during the unit 1 operating cycle using the unit 1 loads.

Battery maintenance with regard to the floating charge, equalizing charge, and electrolyte level will be based on the manufacturer's instruction and sound maintenance practices. In addition, written records will be maintained of the battery performance. The plant batteries will deteriorate with time but precipitous failure is unlikely. The type of surveillance called for in this specification is that which has been demonstrated through experience to provide an indication of a cell becoming irregular or unserviceable long before it becomes a failure.

The equalizing charge, as recommended by the manufacturer, is vital to maintaining the Ampere-hour capacity of the battery, and will be applied as recommended.

The testing of the logic systems will verify the ability of the logic systems to bring the auxiliary electrical system to running standby readiness with the presence of an accident signal from any reactor or an undervoltage signal on the 4-kV shutdown boards.

The periodic simulation of accident signals in conjunction with diesel generator voltage available signals will confirm the ability of the 480-volt load shedding logic system to sequentially shed and restart 480-volt loads if an accident signal were present and diesel generator voltage were the only source of electrical power.

REFERENCES

1. Normal Auxiliary Power System (BFNP FSAR subsection 8.4)

2. Standby A. C. Power Supply and Distribution (BFNP FSAR subsection 8.5)

3. 250-volt D. C. Power Supply and Distribution (BFNP FSAR subsection 8.6

LIMITING CONDITIONS FOR OPERATION

3.10 CORE ALTERATIONS

Applicability

Applies to the fuel handling and core reactivity limitations.

Objective

To ensure that core reactivity is within the capability of the control rods and to prevent criticality during refueling.

Specification

A. Refueling Interlocks

1. The reactor mode switch shall be locked in the "Refuel" position during core alterations and the refueling interlocks shall be operable except as specified in 3.10.A.5 and 3.10.A.6 below.

2. Fuel shall not be loaded into the reactor core unless all control rods are fully inserted.

SURVEILLANCE REQUIREMENTS

4.10 CORE ALTERATIONS

Applicability

Applies to the periodic testing of those interlocks and instrumentation used during refueling and core alterations.

Objective

To verify the operability of instrumentation and interlocks used in refueling and core alterations.

Specification

A. Refueling Interlocks

1. Prior to any fuel handling with the head off the reactor vessel, the refueling interlocks shall be functionally tested. They shall be tested at weekly intervals thereafter until no longer required. They shall also be tested following any repair work associated with the interlocks.

2. Prior to performing control rod or control rod drive maintenance on control cells without removing fuel assemblies, it shall be demonstrated that the core can be made subcritical by a margin of 0.38 percent δk at any time during the maintenance with the strongest operable control rod fully withdrawn and all other operable rods fully inserted. Alternatively if the remaining

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 75 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 72 TO FACILITY OPERATING LICENSE NO. DPR-52

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS NOS. 1 AND 2

DOCKET NOS. 50-259 AND 50-260

1.0 Introduction

By letter dated April 9, 1981[1] (TVA BFNP TS 156) and supplemented by letter dated June 8, 1981[2], July 2, 1981[3], July 31, 1981[4] and August 17, 1981[5], the Tennessee Valley Authority (the licensee or TVA) requested changes to the Technical Specifications (Appendix A) appended to Facility Operating License Nos. DPR-33 and DPR-52 for the Browns Ferry Nuclear Plant, Unit Nos. 1 and 2.

The proposed amendments and revised Technical Specifications would accommodate operation of Browns Ferry Unit Nos. 1 and 2 (BF-1 and BF-2) with a modified electric distribution system. The electrical modifications, reanalysis of the electrical systems and changes to the Technical Specifications also resolve the generic issues of degraded grid protection for class IE power systems and adequacy of station electric distribution system voltages for BF-1 and BF-2. These issues were raised by NRC's generic letters of June 3, 1977, August 8, 1979 and December 13, 1979 and responded to by TVA in their letters of July 22, 1977, May 2, 1978, May 12, 1978, September 4, 1979, March 14, 1980 and May 1, 1980 as well as in the submittal of April 9, 1981 referred to initially.

2.0 Background

As a result of a degraded grid voltage occurrence at Millstone Unit No. 2 on July 5, 1976, we sent a letter to TVA and other licensees on August 12, 1976[6] requesting that each utility conduct an investigation of plant and equipment operation during a degraded grid voltage condition. After reviewing the information submitted by TVA[7] and other licensees we issued a generic letter on June 3, 1977[8] to TVA and other licensees requesting that TVA (and the other licensees for their facilities) assess the susceptibility of the safety-related electrical equipment at the Browns Ferry Nuclear Plant to a sustained voltage degradation of the offsite source and the interaction of the offsite and onsite emergency power systems. The letter contained three positions with which the current design of the plant was to be compared. After comparing the

current design to the staff positions, TVA was required to either propose modifications to satisfy the positions and criteria or furnish an analysis to substantiate that the existing facility design has equivalent capabilities.

TVA responded initially on July 22, 1977[9] and concluded, at that time, that the addition of a second level of voltage protection with a time delay was not necessary. On October 17, 1977, while BF-1 and BF-3 were in a shutdown condition, Unit 2 tripped from essentially full load. There were indications that low voltages on Browns Ferry buses connected to the offsite system might have contributed to the cause of the trip. TVA initiated a detailed evaluation of the Browns Ferry inplant voltage levels that might result from aberrations in the offsite power supplies, including computer model studies. These studies indicated that under certain postulated conditions, an undervoltage condition might exist. Following a meeting with the licensee, by letters dated May 2, 1978[10] and May 17, 1978[11], TVA submitted a proposed design of short term modifications and proposed changes to the Technical Specifications to correct the possible undervoltage condition. The design was approved by our letter of May 31, 1978[12]; the amendments changing the Technical Specifications were issued by our letter of June 23, 1978[13]. As a result of their reevaluation of degraded grid voltage conditions, TVA also submitted a revision to their letter of July 22, 1977 on May 12, 1978[14] in which they concluded that the installation of a second level of voltage protection for the onsite power system was necessary. Engineering design was also started on the permanent modifications to the Browns Ferry electrical systems, which are the subject of this safety evaluation.

On September 16, 1978, an event at Arkansas Nuclear One (ANO) station, which is described in NRC OIE Information Notice No. 79-04, brought into question the conformance of the station electric distribution system to GDC-17. As a result of our review of this event, on August 8, 1979 we issued a generic letter to all power reactor licensees regarding "Adequacy of Station Electric Distribution Voltages"[15]. This letter required each licensee to confirm, by analysis, the adequacy of the voltage at the class 1E loads. This letter included 13 specific guidelines to be followed in determining if the load terminal voltage is adequate to start and continuously operate the class 1E loads. In their response of September 4, 1979[16] TVA advised us that an actual transient at Browns Ferry "confirmed that with the short-term modifications in place, acceptable in-plant conditions (voltage) were maintained" and that this issue would be included in the engineering evaluation and design of the permanent modifications.

A description of the grid system and interconnections and the plant electrical power system that will exist following the modifications is included in the revised chapter 8 to the Final Safety Analysis Report (FSAR) which was incorporated in TVA's April 9, 1981 submittal. The most significant changes that have been completed as part of the permanent modifications include:

1. addition of a seventh 500 kV transmission line from the Cordova Substation (Memphis, Tenn.) to Browns Ferry.

2. second level undervoltage protection was added to the 4160 volt shutdown boards for all three units at previous shutdowns to ensure that upon a voltage degradation, the shutdown boards are supplied from an onsite power system (i.e., diesel generators).

3. capacitors were added to each cooling tower lift pump and to each unit's condenser circulating water pump.

4. generator low-side breakers are being added to all three units.

5. load tap-changing is being added to the unit station service transformers.

6. a 42 Mvar and a 39 Mvar capacitor bank were installed prevously on the 161-kV system to improve power factors under high inplant load demand situations.

7. upgrade the 161 kV capacitor bank controls.

3.0 Discussion:

System Description - Plant Electrical Power System

Under normal operating conditions, units 1 and 2 are supplied electric power from their associated main generator via the unit station service transformers. During normal startup and shutdown the unit's main generator is isolated by a generator breaker, and electric power is supplied to the unit auxiliary power system from the 500-kV grid via the main transformers. If electric power from the 500-kV grid is unvailable to a particular unit, power is then supplied from two 161-kV transmission lines via two common station service transformers. In addition, two cooling tower transformers provide a backup source of power for units 1 and 2 shutdown loads via the bus tie board.

The standby source of auxiliary power is from four diesel generator units. These units start automatically on loss of voltage or a degraded voltage on the associated shutdown board from self-contained starting air systems. In the long term following an accident, units 1 and 2 diesel generators will be paralleled with their unit 3 counterparts (Reference: FSAR Section 8.5.4.1)

Figure 8.3-1b, attached to this safety evaluation, shows the electrical distribution systems for Browns Ferry Units 1 and 2 is from the material submitted by TVA.(2) The four shutdown boards (A, B, C and D) are powered by shutdown buses 1 or 2, which derive their power from unit boards 1A or 2B and 1B or 2A respectively. Shutdown buses 1 and 2 can also be powered by the 4 kV bus tie board associated with Unit 3. The unit boards are normally powered by the 500-kV switchyard through the Unit Station Service Transformers (USST) 1B and 2B. A generator breaker isolates the unit generator from the intermidiate voltage (22 kV) isolated phase bus on a unit trip. Unit boards 1A, 1B, 2A and 2B can also be powered by the 161 kV grid via the Common Station Service Transformers (CSST) A or B. The 4 kV bus tie is also connected to the 161 kV grid via cooling tower transformers (CTT) 1 and 2. Therefore, 4 kV shutdown boards A, B, C and D have a access to two switchyards of different voltages through multiple redundant paths.

The shutdown board ties between the Units 1 and 2 shutdown boards and the Unit 3 shutdown boards are used only to parallel diesel generator capacity. The use of these ties is controlled by Emergency Operating Instruction No. 5.(3) They have no impact on the TVA analysis.

The 480 volt shutdown boards and diesel auxiliary boards each have access to two 4 kV shutdown boards for power sources. 120 V instrument and control buses derive their power from the 480 V shutdown boards. Each 4 kV shutdown board will have loss-of-voltage relaying and degraded-voltage relaying.

3.2 Existing Undervoltage Protection

Each of the four 4160V class 1E shutdown boards and 4160 V start buses 1A and 1B have undervoltage relays to detect loss of power. They have a setpoint of 2870V(15).

Should the relay logic of a shutdown board detect loss of voltage, the diesel generator associated with that bus will be started (or all will be started if the loss of voltage occurs on start buses 1A or 1B). After a 3-1/2 second time delay the feed breakers to the bus will be tripped. The diesel-generator breaker automatically closes as the generator voltage and frequency become acceptable.

3.3 Modifications for Undervoltage Protection

The licensee has proposed to change the undervoltage protection scheme for Units 1 and 2. The changes include:

1. Degraded-voltage relaying system for Unit Nos. 1 and 2, 4160 V shutdown boards,
2. Overvoltage alarms for Units 1 and 2, 4160 V shutdwon boards,
3. Annunciation if the 161 kV grid deteriorates below 166 kV, and
4. Removal of the start bus loss-of-voltage relaying (2).

These changes are in addition to the existing loss-of-voltage relays on the 4160 V shutdown boards. The degraded grid voltage relaying will consist of two-out-of-three relay logic for each shutdown bus. When the 4160 V shutdown board voltage is below 3920 ($\pm$ 20) V for 1.63 seconds the degraded voltage relaying system will start the diesel generator for that bus. After an additional 6.07 seconds, the offsite source breaker is tripped and the loads are shed in preparation for the connection of the diesel generator to the shutdown board.

4.0 Evaluation

4.1 Evaluation Criteria

4.1 Adequacy of Station Electric Distribution System Voltages

The positions applied in determining the acceptability of the offsite voltage conditions in supplying power to the class 1E equipment are derived from the following:

1. General design Criterion 17 (GDC 17), "Electrical Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

2. General Design Criterion 5 (GDC 5), "Sharing of Structures, Systems, and Components," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

3. General Design Criterion 13 (GDC 13), "Instrumentation and Control," of Apendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

4. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."

5. ANSI C84.1-1977, "Voltage Ratings for Electric Power Systems and Equipment (60 Hz)."

6. Staff positions as detailed in a letter sent to the licensee, dated August 8, 1979(16).

In our generic letter of August 8, 1979, TVA was requested to review the electric power system at Browns Ferry Nuclear Plant. The review was to consist of:

a) Determining analytically the capacity and capability of the offsite power system and the onsite distribution system to automatically start as well as operate all required loads within their required voltage ratings in the event of 1) an anticipated transient, or 2) an accident (such as LOCA) without manual shedding of any electric loads.

b) Determining if there are any events or conditions which could result in the simultaneous or, consequential loss of both required circuits from the offsite network to the onsite electric distribution system and thus violating the requirements of GDC 17.

The August 8, 1979 letter included staff guidelines for performing required voltage analysis and the licensee was further required to perform a test in order to verify the validity of the analytical results.

This safety evaluation addresses the capacity and capability of the onsite distribution system of Unit Nos. 1 and 2 of the Browns Ferry Nuclear Plant, in conjunction with the offsite power system, to maintain the voltage for the required class 1E equipment within acceptable limits for the worst-case starting and load conditions. Browns Ferry Unit No. 3 is scheduled to shutdown for its fourth refueling beginning on or about September 25, 1981, during which time similar electrical modifications will be made on this unit as discussed herein for Units 1 and 2. TVA has not as yet submitted the changes to the Technical Specifications that will be necessary for

Unit 3; besides, the Technical Specifications cannot be changed until the modifications are actually made or the plant configuration would not be in conformance. The Unit 3 electrical modifications will be covered in a separate action.

4.1.2 Degraded Grid Voltage

The design base criteria applied in determining the acceptability of the system modifications to protect the safety-related equipment from a sustained degradation of the offsite grid are:

1. General Design Criterion 17 (GDC 17), "Electrical Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.

2. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

3. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."

4. ANSI Standard C84.1-1977, "Voltage Ratings for Electrical Power Systems and Equipment (60 Hz)."

5. Staff positions as detailed in a letter sent to the licensee, dated June 3, 1977.(9)

4.2 Adequacy of Station Electric Distribution System Voltages

4.2.1 Analysis and Test Features

TVA analyzed each offsite power source to the onsite distribution system under maximum and minimum load conditions with the offsite power sources at maximum and minimum voltage, 500 KV and 465 KV on the 500 KV system and 166 KV and 170 KV on the 161 KV system. TVA has determined that the required minimum voltage on the 161 kV to support the Class 1E equipment is 166 KV. Automatically connected capacitor banks have been added to assist in providing this voltage and annunciators will alarm in the control room if the voltage on this system (a third source of offsite power) deteriorates to 166 KV. The analysis included the effects on the Class 1E equipment with all LOCA loads on one unit, shutdown loads on the other unit and simultaneous start of a residual heat removal pump and core spray pump which produced the worst case loading on the shutdown boards under minimum grid voltage conditions. Table 1 shows the projected worst case class 1E equipment terminal voltages with the 500 kV grid as source. Table 2 shows the projected worst case class 1E equipment terminal voltages with the 161 kV grid as source. It has been established that the 4160 volt and 480 volt emergency loads will operate within allowable limits when supplied from the 500 KV grid. When the third source of offsite power (161 KV grid) is supplying power this voltage must be maintained above 166 KV. This is accomplished by the use of capacitor banks on the common station service transformer. Alarms are installed which annunciate in the control room should this source fall to 166 KV. The use of these capacitor banks could cause an overvoltage

condition under the minimum loading condition. TVA has provided an overvoltage alarm that annunciates in the control room if the voltage on the 4160 volt shutdown board exceeds 110%. This overvoltage condition is not considered significant since the alarm will allow operator action to reduce this overvoltage and any significant loading of equipment on the buses would additionally reduce the voltage to within safe operating limits. TVA has committed to test and to verify the results of this analysis. These tests are to be completed by March 1983. TVA has not outlined the scope of these tests. As a minimum NRC requires the following criteria be met:

a. Loading the station distribution buses, including all Class 1E buses down to the 120/208 V level, to at least 30%;

b. Recording the existing grid and Class 1E bus voltages and bus loading down to the 120/208 volt level at steady state conditions and during starting of both a large Class 1E and non-Class 1E motor (not concurrently).

NOTE: To minimize the number of instrumented locations (recorders) during the motor starting transient tests, the bus voltages and loading need only be recorded on that string of buses which previously showed the lowest analyzed voltages.

c. Using the analytical techniques and assumptions of the previous voltage analyses, and the measured existing grid voltage and bus loading conditions recorded during conduct of test, calculate a new set of voltages for all Class 1E buses down to the 120/208 volt level.

d. Compare the analytically derived voltage values against the test results.

e. With good correlation between the analytical and the test results, the test verification requirements will be met. In general, the test results should not be more than 3% lower than the analytical results; however, the difference between the two when subtracted from the voltage levels determined in the original analysis should never be less than the Class 1E equipment rated voltages.

4.2.2 Design Changes

As a result of the initial voltage analysis TVA has proposed the following design changes:

1. On-load tap changer for unit station service transformer 1B and 2B.

2. Unit generator breakers for Units 1 and 2.

3. The automatic alternate feed for the Class 1E 120V instrument and control buses is removed. A manual alternate source connection will still be available.

4. Replacement of the 480/208/120 V instrument and control transformers with self regulating and larger capacity transformers.

5. Annunciation if the 4 KV shutdown boards experience an overvoltage condition.

The installation of the generator circuit breakers for units 1 and 2 changes the normal and alternate supply to the Class 1D distribution system. Operation of the generator circuit breakers will allow backfeeding from the 500 KV switchyard as the immediate access source of offsite power to the onsite distribution system. The breakers are arranged to open automatically on a unit trip and maximum fault current. At the present time no standards exist for testing of generator circuit breakers of this type (isolated phase bus construction) and size (over 5000 amperes current rating and 80 Ks interrupting rating at generator voltages). The existing ANSI/IEEE Standards are applicable to high voltage switchyard breakers and medium and low voltage breakers of the type used in plant. The test procedures described in ANSI C37.09-1971 were used by TVA to develop testing requirements for the generator circuit breakers. This testing was performed by KEMA (The Netherlands) and witnessed by TVA. Breakers of this same type and manufacturer (with a higher rating) have been previously evaluated by NRC and its consultant (Union Carbide) and approved for installation in McGuire Nuclear Plant. TVA has performed short circuit studies which show the maximum fault current anticipated for breaker operation is 145 KA. Based on these studies TVA specified a rating of 165 KA for the generator breakers. The results of the tests (Table 3) demonstrates that the generator circuit breakers will satisfactorily perform their intended function of isolating the generator from the 500 KV grid and allow the grid to backfeed through the main and unit station service transformer as an immediate source of offsite power on a unit trip. The generator circuit breakers successfully passed all testing specified by TVA. As an additional precaution against out-of-phase switching TVA has installed a out-of-sync relay which supervises generator breaker closure by the operator. In the event that a generator breaker should fail to operate, additional sources of offsite power are available from the 500 KV and 161 KV grids. In the unlikely event of a failure of more than two of the single phase stepup transformers, which could require use of a lower impedance temporary transformer, TVA has decided to upgrade the generator circuit breakers to a 200 KA rating. These modifications will be performed during the refueling outage of unit 2. The additional testing to verify this higher rating will be performed on a similar unit at the KEMA test facility and completed prior to installation of the modifications to the installed breakers. Preoperational tests will be performed on these breakers prior to placing them in operation. Periodic testing and maintenance of the breakers is planned for each plant refueling outage. TVA states that as experience is gained with these breakers, the testing and maintenance will be readjusted accordingly. Based on the above we find the generator breakers acceptable for use in Units 1 and 2.

4.2.3 Summary

We have reviewed the design of the electrical modifications currently being implemented at Browns Ferry Unit Nos. 1 and 2 and the analyses submitted by TVA. We have determined that upon satisfactory completion of the verification tests (which TVA has committed to perform and which are discussed in Section 4.2.2, above) that the generic issue regarding the

adequacy of station electric distribution system voltages is acceptably resolved for Browns Ferry Units 1 and 3. Specifically, we have found that:

(1) TVA has provided voltage analysis to demonstrate that the Class 1E equipment voltages remain within acceptable operating limits for the postulated worst conditions. Voltages within the operating limits of the class 1E equipment are supplied for all projected combinations of plant load and normal offsite power grid conditions, including an accident in one unit and the safe shutdown of the other units.

(2) TVA has determined that no potential for either a simultaneous or consequential loss of all offsite power sources exists.

(3) TVA's reaffirmation of compliance with GDC 17 requirements is acceptable.

(4) Loss of offsite power to the Class 1E buses, due to spurious operation of the voltage relays, will not occur with the 500 KV grid within its expected operating limits. Spurious separation with the 161 KV grid as the power source will not occur as long as this grid is maintained above 166 KV.

(5) The tests proposed by TVA, provided the methods outlined in Section 4.4.2 of this safety evaluation are incorporated, will verify the analysis accuracy.

4.3 Degraded Grid Protection

4.3.1 Electrical modifications and changes to Technical Specifications

The following electrical systems design modifications and Technical Specification changes were proposed by TVA.

a. Installation of a second level of undervoltage relays on each of the 4160 volt shutdown boards for Units 1 and 2. The second level degraded grid voltage relaying will consist of a two-out-of-three logic for each shutdown board. When the 4160 volt shutdown board voltage is below 3920 (± 20) volts for 1.63 seconds, the relays will start the diesel generator for the effected board. After an additional 6.07 seconds, the offsite source breaker is tripped allowing the diesel generator to supply the effected shutdown board.

b. Installation of overvoltage alarm annunciated in the control room for the Unit 1 and 2 4160 volt shutdown boards.

c. Annunciation in the control room when the 161 kv grid (a third source of offsite power), normally operated between 160 and 170 kv, deteriorates below 166 kv. This is the minimum voltage required by this source to supply accident loads on one unit and safe shutdown loads on the second unit. This alarm will allow TVA to take action and maintain the voltage above 166 kv.

d. The start bus loss-of-voltage relaying which provides no safety functions after these modifications have been removed.

e. Additions and changes to the plant Technical Specifications including the surveillance requirements, allowable limits for the setpoint and time delay, and limiting conditions for operation have been provided by the licensee. An analysis to substantiate limiting conditions for operation and minimum and maximum setpoint limits were included as part of the modification proposal. The changes and additions to Technical Specifications have been reviewed by the NRC and found acceptable with the exception of the periodic (10 month) testing requirements for Unit 2 onsite power system. These tests are used to demonstrate the full-functional system operability and independence of the onsite power system. The licensee's present proposal on how this testing will be performed is under discussion with TVA and will be resolved prior to the actual testing that will be required during Unit 2 refueling outage. Browns Ferry Unit 2 is currently scheduled to shutdown for its fourth refueling beginning on or about March 26, 1982 with a projected restart date of mid August 1982. Since the test program and schedule for testing the Unit 1 diesel generators meets all staff positions, there is reasonable expectation that a satisfactory schedule for testing the Unit 2 diesel generators can be resolved during the next year.

One of the NRC staff positions in our generic letter of June 3, 1977[9] is that tests to demonstrate the full-functional operability and independence of the onsite power sources are to be performed at least once per 18 months during shutdown. The tests are to simulate interruption and subsequent reconnection of onsite power sources. These tests verify the proper operation of the load-shed system, the load-shed bypass when the emergency diesel generators are supplying power to their respective buses, and that there is no adverse interaction between the onsite and offsite power sources. The proposed technical specifications comply with the requirement to test by simulated loss of offsite power in conjunction with a safety-injection signal. However, the Unit 2 technical specifications differ from the Unit 1 technical specifications in that they share diesel generation. The technical specifications allow the Unit 1 diesel generator loading test to serve for Unit 2. There is at present no requirement for periodic verification that the Unit 2 safety related loads can be sequenced onto and maintained on the diesel generators.

4.3.2 Summary

We have reviewed the design and analysis of the electrical modifications currently being installed at Browns Ferry Units 1 and 2 and have determined that, subject to resolution of a verification test schedule for Unit 2, that the generic issue regarding degraded grid protection for class 1E power systems is satisfactorily resolved for Units 1 and 2. Specifically, we have determined that:

(1) The proposed degraded grid modification will protect the Class 1E equipment and systems from sustained degraded voltage of the offsite power source.

(2) The proposed Technical Specification changes while acceptable for Unit 1 are not fully acceptable for Unit 2. The one unacceptable test is presently being discussed with the licensee and will be resolved prior to Unit 2 refueling shutdown.

(3) The existing load shedding circuit will block load shedding once the diesel generators are supplying the safety loads. The load shedding feature will be reinstated if the diesel generator breaker should trip.

5.0 Environmental Considerations

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR 51.5(d)(4) that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of the amendments.

6.0 Conclusion

We have concluded, based on the consideration discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: September 3, 1981

REFERENCES

1. Letter, L. M. Mills, TVA, to Harold R. Denton, NRC, dated April 9, 1981.

2. Letter, L. M. Mills, TVA, to Harold R. Denton, NRC, dated June 8, 1981.

3. Letter, L. M. Mills, TVA, to Harold R. Denton, NRC, dated July 2, 1981.

4. Letter, L. M. Mills, TVA, to Harold R. Denton, NRC, dated July 31, 1981.

5. Letter, L. M. Mills, TVA, to Harold R. Denton, NRC, dated August 17, 1981.

6. Letter, A. Schwencer, NRC, to Godwin Williams, TVA dated August 12, 1976.

7. Letter, J. E. Gilleland, TVA to Al Schwencer, NRC, dated September 15, 1976.

8. Letter, A. Schwencer, NRC, to Godwin Williams, TVA, dated June 3, 1977.

9. Letter, J. E. Gilleland, TVA, to A Schwencer, NRC, dated July 22, 1977.

10. Letter, J. E. Gilleland, TVA, to Edson G. Case, NRC, dated May 2, 1978.

11. Letter, R. H. Davidson, TVA, to Edson G. Case, NRC, dated May 17, 1978.

12. Letter, George Lear, NRC, to N. B. Hughes, TVA, dated May 31, 1978.

13. Amendment Nos. 39, 37 and 13 to Facility Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Unit Nos. 1, 2 and 3, dated June 23, 1978.

14. Letter, J. E. Gilleland, TVA, to George Lear, NRC, dated May 12, 1978

15. Generic Letter to "All Power Reactor Licensees (except Humboldt Bay) RE: Adequacy of Station Electric Distribution Voltages" dated August 8, 1979.

16. Letter, L. M. Mills, TVA, to W. P. Gammill, NRC dated September 4, 1979

TABLE 1. CLASS 1E EQUIPMENT VOLTAGE RATINGS AND ANALYZED WORST CASE TERMINAL VOLTAGES--BROWNS FERRY UNIT NOS. 1 AND 2 (% of nominal voltage) 500 kV GRID SOURCE

		Maximum		Minimum		
					Analyzed	
Equipment	Condition	Rated	Analyzed	Rated	Steady State	Transient
4 KV Motors	Start	--	--	85	--	94.3
	Operate	110	105.5	90	103.5	--
460 V Motors	Start	--	--	85	--	89.4
	Operate	110	111.1[a]	90	96.5	--
480 V Starters	Pickup	--	--	85	--	88.6
	Dropout	--	--	60	--	88.6
	Operate	110	106.5	90	94.3	--
Other Equipment[b]						

a. 111.1% is based on no station loads. With any load connected, some transformer and feeder cable voltage drop would be present. TVA indicates that the minimum feeder voltage drop is 1%.[4] Therefore, with the connection of a 460 V motor, it would not have a voltage in excess of 110% of its rated value.

b. 120 V instrumentation and control circuits will, after the proposed modification is complete, have self-regulating transformers to maintain the bus voltage at 120 V ±1% with an input voltage of 480 V +10%-20%. As seen above for the 480 V starters, the 480 V bus voltage is within these ratings.

TABLE 2. CLASS 1E EQUIPMENT VOLTAGE RATINGS AND ANALYZED WORST CASE TERMINAL VOLTAGES--BROWNS FERRY UNIT NOS. 1 AND 2 (% of nominal voltage) 161 kV GRID SOURCE

		Maximum		Minimum		
					Analyzed	
Equipment	Condition	Rated	Analyzed	Rated	Steady State	Transient
4 kV Motors	Start	--	--	85	--	88.7
	Operate	110	112.6[a]	90	97.7	--
460 V Motors	Start	--	--	85	--	89.4[b]
	Operate	110	115.9	90	96.5[b]	--
480 V Starters	Pickup	--	--	85	--	88.6[b]
	Dropout	--	--	60	--	88.6[b]
	Operate	110	111.1[c]	90	94.3[b]	--
Other Equipment[d]						

a. This is based on no station loads, i.e.--no equipment is connected. The observed voltage would be lower as loads are connected.

b. This is based on the lower limit of the degraded voltage relays.

c. 111.1% is based on no station loads. With minimal station shutdown loads, the starter rating would not be exceeded.

d. 120 V instrumentation and control circuits will, after the proposed modification is complete, have self-regulating transformers to maintain the bus voltage at 120 V ±1% with an input voltage of 480 V +10%-20%. As seen for the 480 V starters, the 480 V bus voltage can exceed this rating. However, as the 480 V bus voltage reaches 115.9% the 120 V voltage would approach 6% higher than the bus rating. This would not exceed the equipment ratings when station loads are taken into account.

TABLE 3

BROWNS FERRY SPECIFIED RATINGS AND TESTS FOR GENERATOR BREAKERS

Parameter	Rating	Tests
1. Voltage kV-rms	24	Dielectric withstand 60 kV-rms, 1 minute, passed (routine test).
2. Load current (continuous) kA	36	Heat run BBC Rpt No. HAQ-2611E (on Bellefonte generator contract 72C2-85500), 40.8 kA 50 Hz = 38.51 kA 60 Hz, breaker within acceptable temperature rise.
3. Insulation level	150 kV BIL	Withstood 1.2 x 50 microseconds 195 kV crest, positive and negative waves, BBC test 1-352780-041-900 (Bellefonte).
4. Interrupting capacity, kA-rms	165	
A. Symmetrical		176 kA @ 15.5 kV. (See Raccoon Mountain DEMA test No. 2366-74. Passed.
B. Asymmetrical	-	230 kA @ 15.5 kV. (See KEMA 2366-74). Passed.
5. Close and latch, kA-peak	446	558 kA @ 20.5 kV. (See KEMA test report 624-80). Passed.
6. Short time, kA	3 sec @ 165 kA	4 seconds @ 461 kA. (See KEMA 2366-74). Passed.
7. Maximum rate of rise of recovery voltage	Not specified	3 kV/microseconds. (See KEMA 2366-74). Adequate.
8. Out-of-phase	29.5 kV, 90 kA	29.5 kV @ 98 kA asymmetrical. (See KEMA 2366-74). Passed.

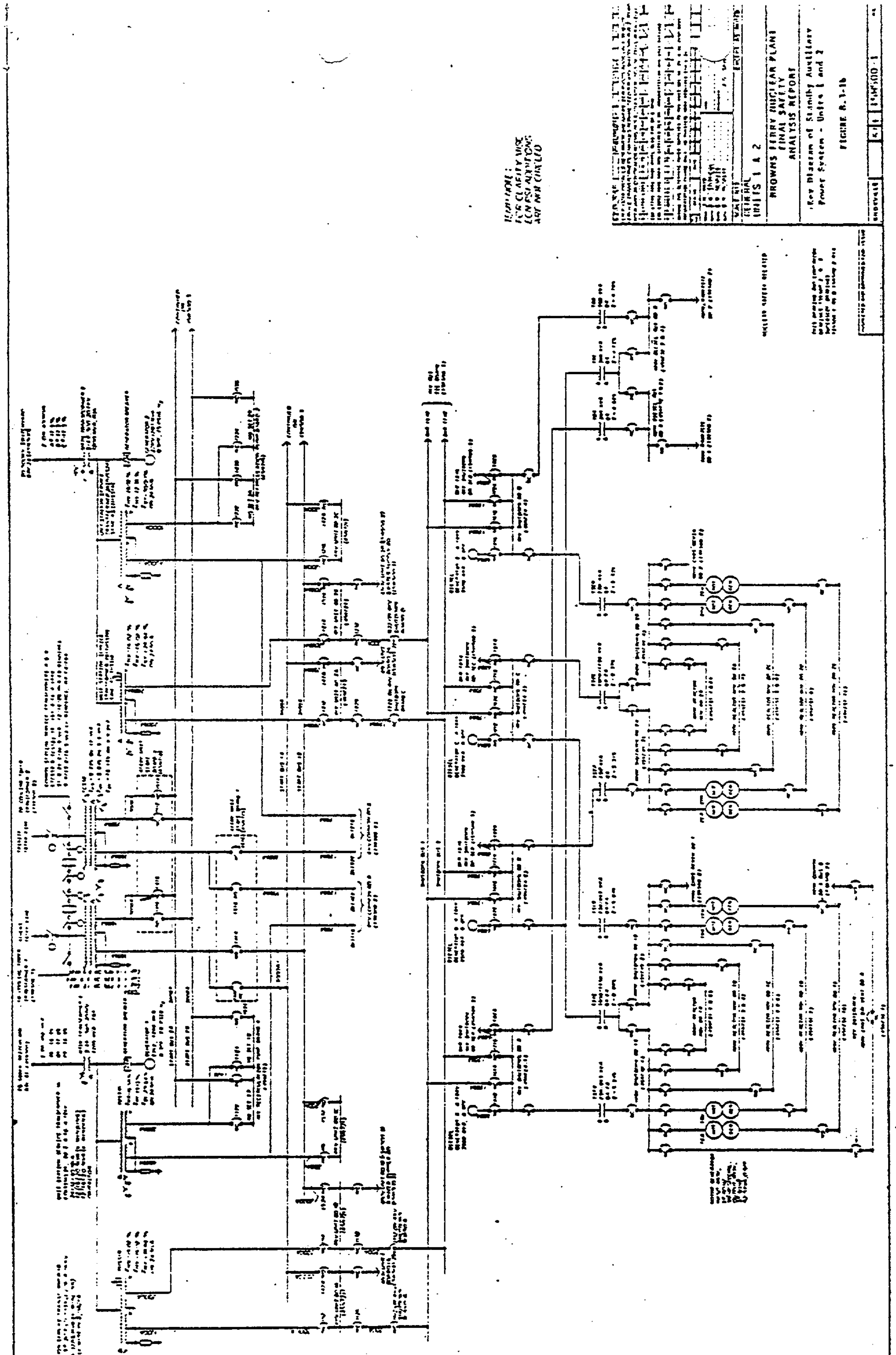

Figure 8.3-1b. Key diagram of stand-by auxiliary power system
Units 1 and 2.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NOS. 50-259 AND 50-260

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 75 to Facility Operating License No. DPR-33 and Amendment No. 72 to Facility Operating License No. DPR-52 issued to Tennessee Valley Authority (the licensee), which revised Technical Specifications for operation of the Browns Ferry Nuclear Plant, Units Nos. 1 and 2, located in Limestone County, Alabama. The amendments are effective within 30 days of issuance.

These amendments change the Technical Specifications to reflect modifications being made to the plant electrical distributions systems and to resolve the generic issues of adequacy of station electrical distribution system voltages and degraded grid protection for class 1E power systems.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of these amendments was not required since the amendments do not involve a significant hazards consideration.

The Commission has determined that the issuance of these amendments will not result in any significant environmental impact and that pursuant to 10 CFR Section 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

For further details with respect to this action, see (1) the application for amendments dated April 9, 1981, as supplemented by letters dated June 8, 1981, July 2, 1981, July 31, 1981 and August 17, 1981, (2) Amendment No. 75 to License No. DPR-33 and Amendment No. 72 to License No. DPR-52 and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, NW., Washington, D. C. and at the Athens Public Library, South and Forrest, Athens, Alabama 35611. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland, this 3rd day of September 1981.

FOR THE NUCLEAR REGULATORY COMMISSION

Philip J. Polk, Acting Branch Chief
Operating Reactors Branch #2
Division of Licensing