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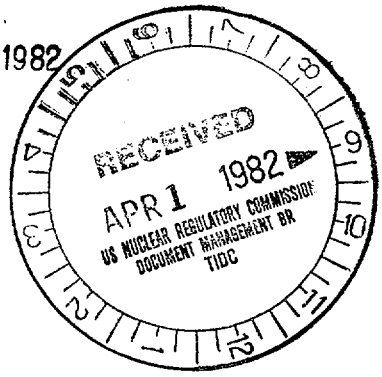
Docket No. 50-296

MAR 29 1982



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

Dear Mr. Parris:

The Commission has issued the enclosed Amendment No. 52 to Facility License No. DPR-68 for the Browns Ferry Nuclear Plant, Unit 3. This amendment changes the Technical Specifications in response to your request of December 11, 1981 (TVA BFNP TS 171) to reflect the modifications to the electrical distribution systems presently being accomplished on Browns Ferry Unit 3. The modifications, changes to the Technical Specifications and analyses you submitted also acceptably resolve - on the condition of acceptable verification testing discussed in Section 4.3 of the enclosed Safety Evaluation - the two generic issues related to the (1) adequacy of station electric distribution system voltages, and (2) degraded grid protection for Class 1E power systems (Multi-plant Actions B-48 and B-23, respectively). These issues were raised in 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, May 12, and May 17, 1978; September 4, 1979; March 14, May 1 and August 6, 1980; April 9 and June 8, 1981, as well as the complete modification design and analysis submitted by your letter of December 11, 1981.

This amendment is effective upon startup of Unit 3 in the fifth fuel cycle.

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

Sincerely,

8204270572

Richard J. Clark, Project Manager
Operating Reactors Branch #2
Division of Licensing

Enclosures:
1. Amendment No. 52 to DPR-68
2. Safety Evaluation
3. Notice

OFFICE	cc w/enclosures: See next page	DL:ORB#2	DL:ORB#2	DL:ORB#2	DL:AD:OR	OELD
SURNAME		SNorris	RClark:pob:MC	DVassallo	TMNovak	TRowsell
DATE		3/19/82	3/19/82	3/20/83	3/24/83	3/26/83

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-960

Mr. Hugh G. Parris

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 52
License No. DPR-68

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated December 11, 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-68 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 52 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective upon startup of Unit No. 3 in the fifth fuel cycle.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 29, 1982

ATTACHMENT TO LICENSE AMENDMENT NO. 52

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Revise Appendix A as follows:

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

316	324
317	325
318	325a
319	326
320	327
321	328
322	330
323	

2. Marginal lines on each page indicate the area being revised.

3. Add the following new pages:

325b
326a

LIMITING CONDITIONS FOR OPERATION

3.9 AUXILIARY ELECTRICAL SYSTEM

Applicability

Applies to 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

1. The reactor shall not be started up (made critical from the cold condition) unless the following are satisfied:

   a. Diesel generators 3A, 3B, 3C, and 3D operable.

   b. Requirements 3.9.A.3 through 3.9.A.6 are met.

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 unit 3 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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
c. At least two of the following offsite power sources are available: 1. The 500-kV system is available to the unit 3 shutdown boards through the unit 3 station service transformer TUSS 3B with no credit taken for the two 500-kV Trinity lines. 2. The Trinity 161-kV line is available to the unit 3 shutdown boards through a common station service or cooling tower transformer. 3. Until June 1, 1983, the Athens 161-kV line can be considered an offsite source if it is available to the unit 3 shutdown boards through a common station service or cooling tower transformer not operating in parallel with source (2) above.	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 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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
A. 2. The reactor shall not be started up (made critical) from the hot standby condition unless all of the following conditions are satisfied:	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.
a. At least one offsite power source is available as specified in 3.9.A.1.c.	c. Once a month the quantity of diesel fuel available shall be logged.
b. Three unit 3 diesel generators shall be operable.	d. Each diesel generator shall be given an annual inspection in accordance with instructions based on the manufacturer's recommendations.
c. An additional source of power consisting of one of the following:	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.
1. A second offsite power source available as specified in 3.9.A.1.c.	2. D.C. Power System - Unit Batteries (250-Volt) and Diesel Generator Batteries (125-Volt) and Shutdown Board Battery (250-Volt)
2. A fourth unit 3 diesel generator operable.	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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
	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.
	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 months.
	3. Logic Systems
	a. Both divisions of the accident signal logic system shall be tested every 6 months to demonstrate that it will function on actuation of the core spray system of the reactor to provide an automatic start signal to all 4 diesel generators.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
A. 3. Buses and Boards Available a. The respective start bus is energized for each common station service transformer designated as an off-site power source. b. The 4-kV bus tie board is energized if a cooling tower transformer is designated as an off-site power source. c. Shutdown boards (3EA, 3EB, 3EC, 3ED) are energized. d. The 480-V shutdown boards 3A and 3B are energized. e. Loss of voltage and degraded voltage relays operable on 4-kV shutdown boards, 3EA, 3EB, 3EC, and 3ED. f. The 480V diesel Aux. Boards 3EA and 3EB are energized. g. The 480V Rx. MOV Boards D & E are energized with M-G Sets 3DN, 3DA 3EN, and 3EA in service.	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 demonstrate that the associated diesel generator will start.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
4. The 250-Volt Shutdown Board 3EB battery, all three unit batteries, a battery charger for each battery, and associated battery boards are operable.	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.
5. Accident signal logic system is operable.	d. 4-kV shutdown board voltages shall be recorded once every 12 hours.
6. There shall be a minimum of 103, 300 gallons of diesel fuel in the unit 3 standby diesel generator fuel tanks.	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.
B. Operation with Inoperable Equipment	B. Operation with Inoperable Equipment
Whenever the 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 offsite power source is available, reactor operation is permissible under this condition for seven days.	1. When only one offsite power source is operable, all unit 3 diesel generators and associated boards must be demonstrated to be operable immediately and daily thereafter.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
2. When one unit 3 diesel generator (3A, 3B, 3C, or 3D) is inoperable, continued reactor operation is permissible during the succeeding 7 days, provided that two offsite power sources are available as specified in 3.9.A.1.c, and all of the CS, RHR (LPCI and Containment Cooling) Systems, and the remaining three unit 3 diesel generators are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shutdown and in the cold condition within 24 hours.	2. When one unit 3 diesel generator is found to be inoperable, all of the CS, RHR (LPCI and Containment Cooling) Systems and the remaining unit 3 diesel generators and associated boards shall be demonstrated to be operable immediately and daily thereafter.
3. From and after the date that the 4-kV bus tie board becomes inoperable, reactor operation is permissible indefinitely provided one of the required offsite power sources is not supplied from the 161-kV system through the bus tie board.	3. When a required offsite power sources is unavailable because the 4-kV bus tie board or a start bus is inoperable, all unit 3 diesel generators and associated boards shall be demonstrated operable immediately and daily thereafter. The remaining offsite source and associated busses shall be checked to be energized daily.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
4. When one unit 3 4-kV shutdown board is inoperable, continued reactor operation is permissible for a period of 5 days, provided that two offsite power sources are available, as specified in 3.9.A.1.c and the remaining unit 3 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and Containment Cooling) Systems, and all unit 3 480-V emergency power boards are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shutdown and in the cold condition within 24 hours.	4. When one unit 3 4-kV shutdown board is found to be inoperable, all remaining unit 3 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. From and after the date that one of the 480 volt diesel Aux. boards becomes inoperable, reactor operation is permissible for a period of 5 days.	5. When one 480 Volt diesel auxiliary board is found inoperable, the remaining diesel auxiliary board and each unit 3 diesel shall be verified operable immediately and daily thereafter.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

3.9 AUXILIARY ELECTRICAL SYSTEM

6. From and after the date that the 250-Volt Shutdown board 3EB battery or 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.

7. 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.2 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.

4.9 AUXILIARY ELECTRICAL SYSTEM

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
8. (deleted)	
9. The following limiting conditions for operation exists for the under-voltage 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).	
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.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
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 surveillance schedule of 4.9.A.4.b).	
10. 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.	
11. If one 480-V RMOV board MG set is inoperable, the reactor may remain in operation for a period not to exceed seven days, provided the remaining 480-V RMOV board MG sets and their associated loads remain operable.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
12. If any two 480-V RMOV board MG sets become inoperable, the reactor shall be placed in the cold shutdown condition 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.	
C. Operation in Cold Shutdown Condition	
Whenever the reactor is in the 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 unit 3 diesel generators and their associated 4-kV shutdown boards shall be operable.	
2. An additional source of power energized and capable of supplying power to the unit 3 shutdown boards consisting of at least one of the following:	
a. One of the offsite power sources specified in 3.9.A.1.c.	
b. A third operable diesel generator.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.9 AUXILIARY ELECTRICAL SYSTEM	4.9 AUXILIARY ELECTRICAL SYSTEM
3. At least one unit 3 480-V shutdown board must be operable.	
4. One 480-V RMOV board motor generator (MG) 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.	

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 3EA. 4-kV shutdown boards 3EB, 3EC, and 3ED, similar, 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	0.3 ± 10%	N/A
	2-211-2A	4.0 ± 10%	N/A
	2-211-3A	6.9 ± 10%	6.2
	2-211-4A	1.3 ± 10%	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 unit 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 transmission system, and the diesel generators.

The generator breaker and a unit station service transformer for unit 3 provide a non-interruptible source of offsite power from the 500-kV transmission system to the unit 3 shutdown boards. Auxiliary power can also be supplied from the 161-kV transmission system through the common station service transformers or through the cooling tower transformers by way of the bus tie board. The 4-kV bus tie board may remain out of service indefinitely provided one of the required offsite 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 7 days of full load operation of 3 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 480V power boards are operable.

The 480V diesel Aux. board may be out of service for short periods for tests and maintenance.

There are five 250-Volt d-c battery systems associated with unit 3, 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 perferred 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 fifth battery system delivers control power to a 4-kV shutdown board.

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 safeguard control circuit is annunciated in the main control room of the unit affected.

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.

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

4. Memorandum from T. G. Campbell to G. T. Jones concerning capacity of 161-kV transmission lines dated October 28, 1981 (L23 811014 929)

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 52 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

DOCKET NO. 50-296

Authors: Dick Clark, Dick Prevatte, Al Udy

1.0 Introduction

By letter dated December 11, 1981 (TVA BVNP TS-171), the Tennessee Valley Authority (the licensee or TVA) requested changes to the Technical Specifications (Appendix A) appended to Facility Operating License No. DPR-68 for the Browns Ferry Nuclear Plant, Unit 3. The proposed amendment and revised Technical Specifications would accommodate operation of Browns Ferry Unit 3 (BF-3) 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-3 (Multi-plant Actions B-48 and B-23, respectively). 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, May 12, and May 17, 1978; September 4, 1979; March 14, May 1, and August 6, 1980; April 9, and June 8, 1981 as well as in the submittal of December 11, 1981 referred to initially above.

2.0 Background

As a result of our generic letter of June 3, 1977 and a trip of Browns Ferry Unit 2 (BF-2) on October 17, 1977, TVA initiated a detailed evaluation of the Browns Ferry electrical distribution systems. The studies indicated that under certain postulated accident conditions and postulated system degradation, an undervoltage condition might exist. To correct this possible condition, TVA proposed a number of short-term modifications which we approved in May and June 1978. Engineering design was also started on longer term permanent modifications which are the subject of this safety evaluation. The permanent modifications to Units 1 and 2, which share many electrical systems, was completed during the six-month outage of Unit 1 in the spring, summer and fall of 1981 and during the June 1981 outage of Unit 2. These modifications were approved by our letter of September 3, 1981, transmitting Amendment Nos. 75 and 72 to Facility License Nos. DPR-33 and DPR-52 for Units 1 and 2. Our safety evaluation supporting these amendments contained all pertinent background information, a description of the grid system and interconnections and extensive information on the design of the plant electrical power system.

The design for the permanent modifications to BF-3 was submitted by TVA's letter of December 11, 1981. Our evaluation of these proposed modifications is covered in this safety evaluation. The proposed modifications were also evaluated with respect to whether the modifications adequately resolved two generic multi-plant concerns-namely, degraded grid protection for Class 1E power systems and adequacy of station electric distribution system voltages (multi-plant actions B-23 and B-48, respectively).

A detailed review and technical evaluation of the proposed modifications and changes to the Technical Specifications submitted by TVA's letter of December 11, 1981 was performed by EG&G, under contract to the NRC, and with general supervision by NRC staff. This work is reported by EG&G in "Degraded Grid Protection for Class 1E Power Systems, Browns Ferry Nuclear Plant Unit No. 3," EGG-EA-5719 dated February 1982 (Enclosure 1) and in "Adequacy of Station Electric Distribution System Voltages, Browns Ferry Nuclear Plant, Unit 3," EGG-EA-5720 dated February 1982 (Enclosure 2) . We have reviewed these reports and on the basis of our evaluation discussed below, we concur in our contractor's conclusions that: 1) the proposed electrical design modifications and proposed changes to the Technical Specifications are acceptable and 2) the offsite power system and the onsite distribution system are capable of providing acceptable voltages for worst-case station electric load and grid voltages.

3.0 Evaluation - Degraded Grid Voltage

3.1 Evaluation Criteria

The criteria used by EG&G in its technical evaluation of the proposed changes include General Design Criterion (GDC)-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1977 ("Voltage Ratings for Electrical Power Systems and Equipment - 60 Hz"); and staff positions defined in our letter to TVA dated June 3, 1977.

3.2 Description of Modifications

The following electrical systems design modifications were performed at BF-3 during the current outage.

a) Installation of a second level of undervoltage relays on each 4160 volt shutdown board for Unit 3. 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 4.3 (±5%) seconds the relays will start the diesel generator for the affected board. After an additional 2.9 (±5%) seconds, the offsite source breaker is tripped allowing the diesel generator to supply the affected shutdown board.

b) Installation of overvoltage alarms annunciated in the control room for the 4160 volt shutdown boards.

c) Annunciation in the control room if the 161 Kv grid deteriorates below 166 Kv. This power source is normally operated between 160 and 170 Kv. The minimum voltage of 166 Kv is required by this source to supply accident loads on one unit and safe shutdown loads on all other units. This alarm will allow TVA to take action and maintain the voltage above 166 Kv.

d) Since the above modifications have been implemented, the start bus loss-of-voltage relaying is no longer required, and hence these relays have been removed.

3.3 Findings

We have reviewed the EG&G Technical Evaluation Report and concur in its findings that:

(1) The proposed degraded grid modifications will protect the Class 1E equipment and system from sustained degraded voltage of the offsite power system over the full range of system voltage fluctuations analyzed.

(2) The existing load shedding circuit is blocked while the diesel generator is supplying the safety loads and is reinstated when the diesel generator breaker is tripped. This will automatically prevent load shedding when the diesel generators are supplying safety loads. This meets the staff position and is acceptable.

(3) Additions and changes to the plant Technical Specifications including the surveillance requirements, allowable limits for setpoint and time delay, and limiting conditions for operation (LCOs) have been provided by the licensee. An analysis to substantiate the limiting conditions for operation and minimum and maximum setpoint limits were included as part of the modification proposal. We have reviewed the changes and additions to Technical Specifications and find the LCOs and surveillance requirements acceptable.

We therefore find the Browns Ferry Unit 3 proposed design modifications and Technical Specifications for degraded grid protection for Class 1E power systems acceptable.

4.0 Evaluation - Adequacy of Distribution System Voltages

4.1 Basis for Review

TVA was requested by NRC letter dated August 8, 1979 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 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 leading to violation of the requirements of GDC 17.

The August 8, 1979 letter included staff guidelines for performing the required voltage analysis and the licensee was further required to perform a test in order to verify the validity of the analytical results. TVA responded by letters dated September 4, 1979 and December 11, 1981.

4.2 Evaluation Criteria

The criteria used by EG&E in this technical evaluation of the analysis includes GDC 5 ("Sharing of Structures, Systems, and Components"), GDC 13 ("Instrumentation and Control"), GDC 17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 308-1974 ("Class 1E Power Systems for Nuclear Power Generating Stations"), ANSI C84.1-1977 ("Voltage Ratings for Electric Power Systems and Equipment - 60 Hz"), and the staff positions and guidelines provided in the NRC letter to TVA dated August 8, 1979.

4.3 Results of System Analysis

TVA analyzed each offsite power source to the onsite distribution system under maximum and minimum load conditions. The analyses were performed with the offsite power sources at maximum and minimum anticipated voltages of 550 Kv and 465 Kv, respectively, on the 500 Kv system and with 170 Kv and 162 Kv, respectively, on the 161 Kv system. TVA has determined that the required minimum voltage on the 161 Kv system is 162 Kv when the shutdown boards are powered from the common station service transformers and 164 Kv when powered from the cooling tower transformers. The switchyard voltage will be maintained within the limits of 162 Kv and 170 Kv by automatic capacitor switching and manual operator action. Annunciators are provided to assist the operator in ensuring that this voltage is maintained. The analysis included the effects on the Class 1E equipment with all LOCA loads on one unit, shutdown loads on the other units and simultaneous start of a residual heat removal pump and core spray pump. These conditions produced the worst-case loading on the shutdown boards under minimum grid conditions.

It has been established that the 4160 volt and 480 volt emergency loads will operate satisfactorily within the voltage limits when supplied from the 500 Kv grid. When the 161 Kv grid is supplying the offsite power source, this voltage must be maintained above 164 Kv if the cooling tower transformers are used and above 162 Kv if the common station service transformers are used. The design modifications adding the automatic capacitor banks and annunciators should allow this voltage to be maintained within proper limits. If these capacitor banks or operator actions allows the voltage to fall below the required level, the degraded grid undervoltage relays will provide the protection necessary to ensure that safety equipment is not exposed to degraded

voltages. The use of the 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 could additionally reduce the voltage to within safe operating limits. TVA has committed to verify by tests 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 we require that the criteria outlined in Section 4.4 of the enclosed TER be incorporated into the TVA's verification test program.

4.4 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 3B.

2. Installation of a generator breaker.

3. Removal of the automatic alternate feed for the Class 1E 120 volt instrument and control buses. A manual alternate feed is still available.

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

The installation of the generator circuit breaker changes the normal and alternate supply to the Class 1E distribution system. Operation of the generator circuit breaker will allow backfeeding from the 500 Kv switchyard as the immediate access source of offsite power to the onsite distribution system. The breaker is designed to open automatically on a unit trip or maximum fault current. The use of the generator breaker has been previously evaluated by us and approved for use in Browns Ferry Units 1 and 2 by Amendment Nos. 75 and 72 to Facility Licenses Nos. DPR-33 and DPR-52, issued on September 3, 1981. In the event that the generator breaker should fail to operate, additional sources of offsite power are available from the 161 Kv grid through the common station service or cooling tower transformers.

4.5 Findings

We have reviewed the EG&G Technical Evaluation Report and concur in the findings that:

(1) TVA has provided a voltage analysis to demonstrate that after the proposed modifications are accomplished, the Class 1E equipment voltages will remain within acceptable operating limits for the postulated worst-case conditions.

(2) The tests proposed by TVA with the incorporation of the methods outlined in Section 4.4 of the TER will adequately verify the voltage analysis accuracy.

(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 protection relays, will not occur with the offsite grid voltage within its expected limits.

(5) The design modifications to the BF-3 electrical systems are acceptable.

5.0 Environmental Considerations

We have determined that this amendment does 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 this amendment involves 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 this amendment.

6.0 Conclusion

We have concluded, based on the considerations discussed above: that (1) because the amendment does not involve a significant increase in the probability or consequence of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: March 29, 1982

Enclosures:
1. EGG-EA-5719
2. EGG-EA-5720

TECHNICAL EVALUATION REPORT

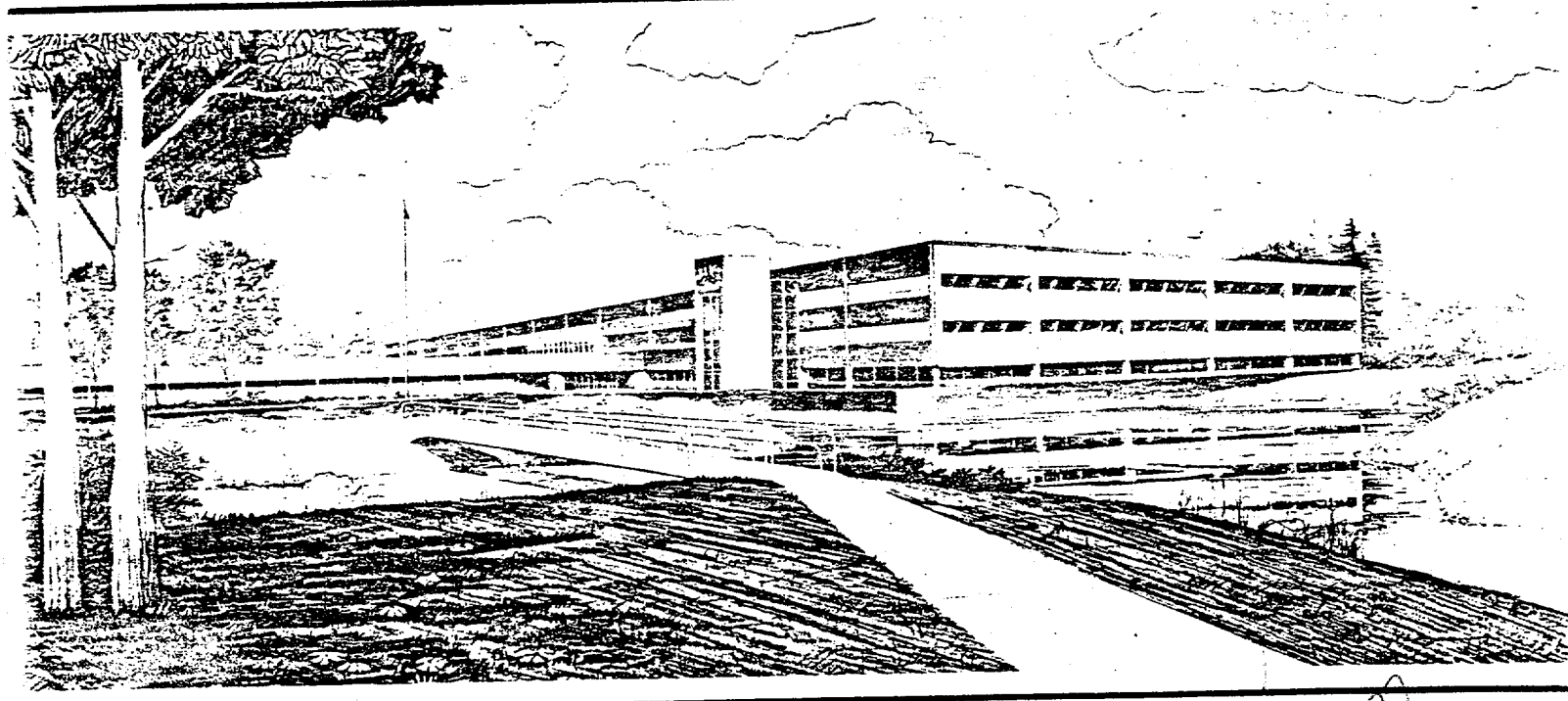
EGG-EA-5719

FEBRUARY 1982

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS, BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

A. C. Udy

U.S. Department of Energy
Idaho Operations Office • Idaho National Engineering Laboratory



This is an informal report intended for use as a preliminary or working document

Prepared for the
U. S. Nuclear Regulatory Commission
Under DOE Contract No. DE-AC07-76ID01570
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EG&G Idaho

EG&G Idaho, Inc.

FORM EG&G-398
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INTERIM REPORT

Accession No. _____

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INTERIM REPORT

0012j

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

February 1982

A. C. Udy
Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

Docket No. 50-296
TAC No. 10043

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DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

1.0 INTRODUCTION

On June 3, 1977, the NRC requested the Tennessee Valley Authority (TVA) to 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 interaction of the offsite and onsite emergency power systems.[1] 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, the 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 initally on July 22, 1977.[2] Additional information was provided on May 2, 1978,[3] and reference 2 was amended on May 12, 1978.[4] Proposed technical specifications to correspond with references 3 and 4 were submitted on May 17, 1978.[5] Revised proposed technical specifications were provided in response to NRC questioning on August 6, 1980.[6] NRC questioning on this submittal resulted in a replacement submittal of April 9, 1981.[7] This last submittal is the most current proposed design for Units 1 and 2 of the Browns Ferry Nuclear Plant. A submittal containing proposed modifications to the Unit 3 technical specifications, description and analyses was provided on December 11, 1981.[8] A letter of September 15, 1976[9] describes the undervoltage protection prior to the NRC letter.[1] Time sequencing of the degraded voltage monitoring system, and other information, was provided on June 8, 1981.[10]

2.0 DESIGN BASE CRITERIA

The design base criteria that were applied in determining the acceptablility of the system modifications to protect the safety-related equipment from a sustained degradation of the offsite grid voltage 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.[11]

2. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."[12]

3. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."[13]

4. Staff positions as detailed in a letter sent to the licensee, dated June 3, 1977.[1]

5. ANSI Standard C84.1-1977, "Voltage Ratings for Electrical Power Systems and Equipment (60 HZ)."[14]

1. "The selection of voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels."

   The TVA has provided voltage and time setpoints per this NRC requirement. The degraded voltage relays trip on undervoltage (3920V±1/2%). The diesel generator will start after a time delay and after an additional time delay, the normal offsite power will be tripped. These setpoints and time delays were chosen to provide adequate voltage to the most limiting 480V equipment.

2. "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power sources."

   The relay logic for each shutdown board is arranged in a two-out-of-three logic scheme, thereby satisfying this criterion.

3. "The time delay selected shall be based on the following conditions:

   a. "The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis."

      The TVA has identified the maximum length of the time delay between the degraded voltage condition and the diesel generator accepting this load, as 9.35 seconds.[10] Separate action as a result of an accident signal will also start the diesel generators. The diesel generators will be started and ready to accept load within the time analyzed in the Final Safety Analysis Report with an accident and a sustained 4160V shutdown board undervoltage or loss of voltage.

   b. "The time delay shall minimize the effect of short-duration disturbances from reducing the unavailability of the offsite power source(s)."

      The licensee's proposed minimum time delay of 6.48 seconds to the trip of offsite power is long enough to override any short inconsequential grid distrubances. Further, review of the licensee's analysis shows that any voltage dips, caused by the start of large motors, will not trip the offsite source.

   c. "The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components."

      The licensee's analysis shows that the time delay will not cause failures of safety-related equipment, because the voltage setpoint is within the allowable tolerance of the rated voltage of the equipment.

4.0 CONCLUSIONS

Based on the information provided by TVA, it has been determined that the proposed modifications comply with NRC staff position 1.

The existing load-shed circuitry fully complies with staff position 2.

TVA has proposed changes to the Technical Specifications to comply with the staff position 3.

It is therefore concluded that the TVA proposed modifications and the technical specification changes for this topic are acceptable for Unit No. 3 of the Browns Ferry Nuclear Plant.

5.0 REFERENCES

1. NRC letter to TVA, G. Williams, Jr., dated June 3, 1977.

2. TVA letter, J. E. Gilleland to Director of Nuclear Reactor Regulation, NRC, July 22, 1977.

3. TVA letter, J. E. Gilleland to E. D. Case, NRC, May 2, 1978.

4. TVA letter, J. E. Gilleland to Director of Nuclear Reactor Regulation, NRC, May 12, 1978.

5. TVA letter, R. H. Davidson to E. D. Case, NRC, May 17, 1978.

6. TVA letter, L. M. Mills to H. R. Denton, NRC, August 6, 1980, TVA BFNP TS 143.

7. TVA letter, L. M. Mills to H. R. Denton, NRC, April 9, 1981, TVA BFNP TS 156.

8. TVA letter, L. M. Mills to H. R. Denton, NRC, December 11, 1981, TVA BFNP TS 171.

9. TVA letter, J. E. Gilleland to Director of Nuclear Reactor Regulation, NRC, September 15, 1976.

10. TVA letter, L. M. Mills to H. R. Denton, NRC, June 8, 1981.

11. General Design Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

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

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

TECHNICAL EVALUATION REPORT

EGG-EA-5720

FEBRUARY 1982

ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES, BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

A. C. Udy

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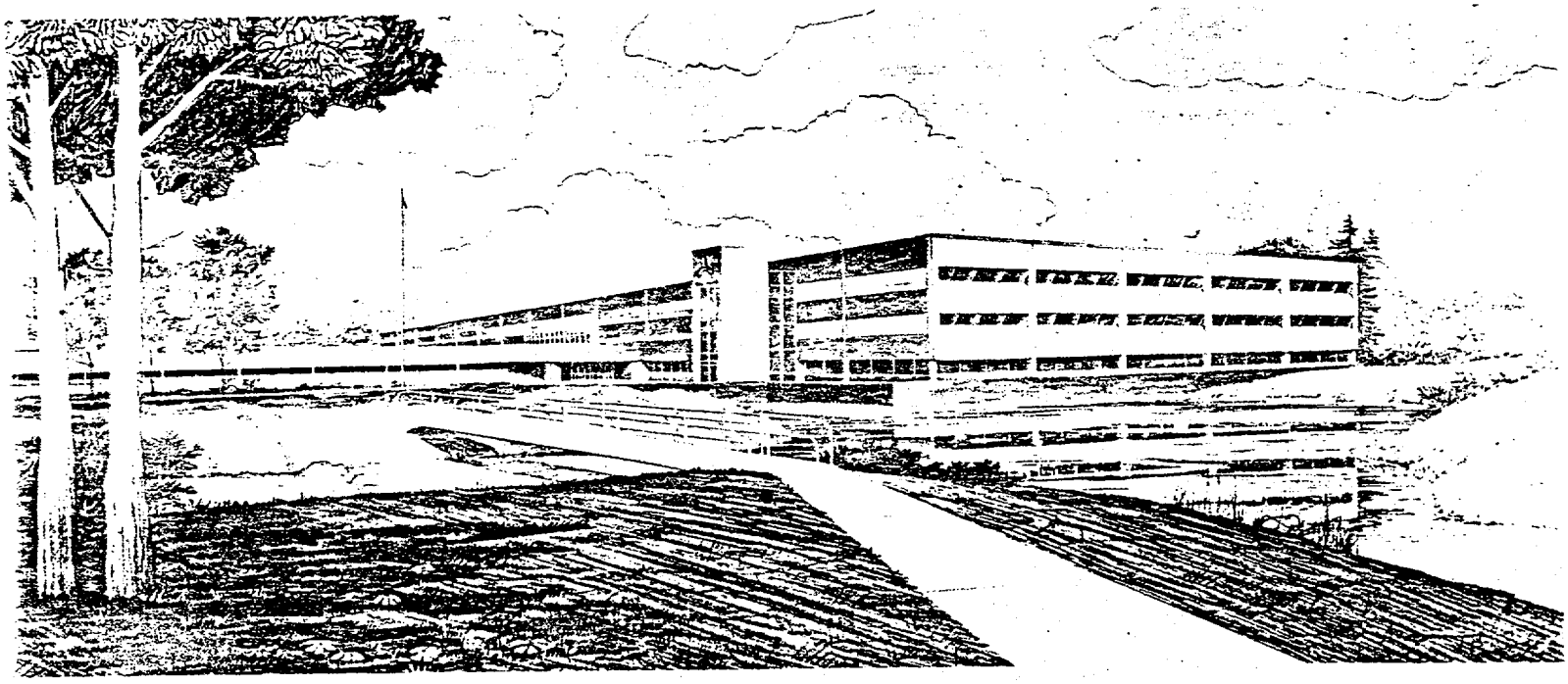
U.S. Department of Energy
Idaho Operations Office • Idaho National Engineering Laboratory



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EG&G Idaho

EG&G Idaho, Inc.

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INTERIM REPORT

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A. C. Udy

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Responsible NRC/DOE Individual and NRC/DOE Office or Division:

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Prepared for the
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INTERIM REPORT

0010j

ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

February 1982

A. C. Udy
Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

Docket No. 50-296
TAC No. 13106

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FIGURE

TABLES

ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

1.0 INTRODUCTION

An event at the Arkansas Nuclear One station on September 16, 1978 is described in NRC IE Information Notice No. 79-04. As a result of this event, station conformance to General Design Criteria (GDC) 17 is being questioned at all nuclear power stations. The NRC, in the generic letter of August 8, 1979, "Adequacy of Station Electric Distribution Systems Voltages," [1] 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.

Tennessee Valley Authority (TVA) responded initially with a letter of September 4, 1979.[2] A submittal addressing Unit No. 3 was made on December 11, 1981.[3]

Based on the information supplied by the TVA, this report addresses the capacity and capability of the onsite distribution system of Unit No. 3 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.

2.0 DESIGN BASIS CRITERIA

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 Appendix 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. Staff positions as detailed in a letter sent to the licensee, dated August 8, 1979.[1]

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

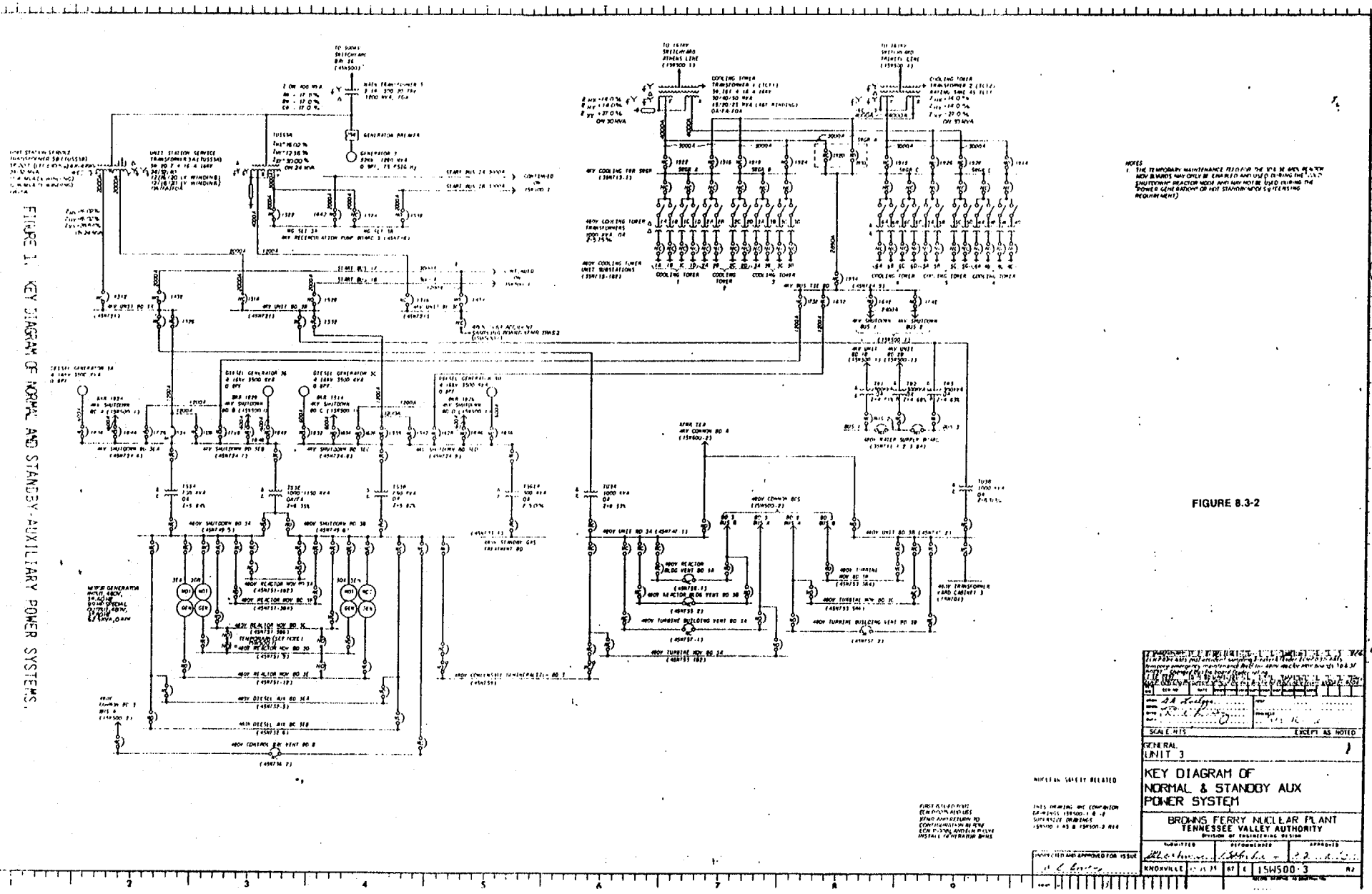

FIGURE 1. KEY DIAGRAM OF NORMAL AND STANDBY AUXILIARY POWER SYSTEMS.

FIGURE 8.3-2

NOTES
1. THE TEMPORARY MAINTENANCE FEEDER FOR THE 161 KV GATE HEATER MOV BOARDS MAY ONLY BE ENABLED AND USED DURING THE UNIT SHUTDOWN/ REACTOR MODE AND MAY NOT BE USED DURING THE "POWER GENERATION" OR HOT STANDBY MODE SYSTEM TESTING REQUIREMENT)

NUCLEAR SAFETY RELATED

THIS DRAWING IS A COMPANION TO DRAWINGS 15W500-1 & -2 SUPERSEDES DRAWINGS 15W500-3 R18 & 15W500-3 R19

FIRST ISSUED FOR CONSTRUCTION REVISIONS SENT AND RETURN TO CONSTRUCTION BEING ECN 6309, ANTENNA PLANE INSTALL GENERATOR BKRS

INSPECTED AND APPROVED FOR ISSUE

SCALE: NTS EXCEPT AS NOTED

GENERAL
UNIT 3

KEY DIAGRAM OF
NORMAL & STANDBY AUX
POWER SYSTEM

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED

KNOXVILLE | 15W500-3 | R2

Except for item 4, the above modifications are scheduled to be completed during the fall 1981 outage. Item 4 is presently scheduled for completion during the spring 1985 outage.[3]

4.2 Analysis Conditions. The TVA has determined by contingency planning that the maximum expected 500 kV offsite grid voltage is 550 kV and that the minimum is 465 kV. By grid stability analysis and contingency planning, TVA has determined that the maximum expected 161 KV offsite grid voltage is 170 kV and that the minimum is 162 kV. The 161 kV switchyard voltage will be maintained within these limits by both automatic capacitor switching and by manual action.

The TVA has analyzed each offsite source to the onsite distribution system under extremes of load and offsite voltage conditions to determine the terminal voltages to the Class 1E equipment. The worst case Class 1E equipment terminal voltages occur when connected to the 161 kV grid under the following conditions:

1. The minimum expected continuous Class 1E load terminal voltages occur when the 161 kV grid is at 162 kV, and shutdown boards 3EA, 3EB, 3EC and 3ED are powered by the common station service transformers. However, when a cooling tower transformer is providing power for the shutdown boards, the grid voltage must be maintained above 164kV for the load terminal voltages to be equivalent.

2. The minimum expected transient Class 1E load terminal voltages occur under the conditions above, with the simultaneous start of a residual heat removal pump and a core spray pump.

3. The maximum expected continuous load terminal voltages occur when the grid is at 170 kV and no station loads are assumed.

4.3 Analysis Result. Table 1 shows the projected worst case Class 1E equipment terminal voltages.

4.4 Analysis Verification. TVA has proposed to test the analysis for the Browns Ferry Nuclear Plant.[7] The test will cover the use of unit station service transformers, common station service transformers and cooling tower transformers. Voltages, current and power will be measured at the grid, 4kV bus and 480V shutdown boards. These measurements will be used to verify the analysis calculations. This verification is scheduled to be completed by March 1983.[6] TVA has not outlined the scope of the test. As a minimum, the test should:

a. record the grid, load and intermediate bus voltages down to the 480V level,

b. include steady state measurements and transient measurements of the start of both a large Class 1E load and a large non-Class 1E load (not simultaneously),

TABLE 2. COMPARISON OF ANALYZED VOLTAGES AND UNDERVOLTAGE RELAY SETPOINTS

	Minimum Analyzed[a]		Relay Setpoint	
Location/Relays	Voltage	Time	Voltage (Tolerance)	Time
4.16kV shutdown board[a]				
Degraded grid	3923 V 3597 V	continuous less than 4 sec.	3920 ± 20 V	4.3 ± 0.43 sec[b] 7.2 ± 0.72 sec[c]
Loss of grid	3923 V 3597 V	continuous less than 4 sec.	0 V	1.5 ± 0.1 sec

a. Licensee has determined by analysis the minimum bus voltages with the offsite grid at the minimum expected voltage and the worst case plant and Class 1E loads.

b. Diesel-generator start.

c. Trip of offsite power sources.

starts. Furthermore, spurious trips of this offsite source are possible. The Browns Ferry design includes an alarm when the grid voltage drops below 166kV, which is above the grid voltage that is shown necessary by the analysis. This would alert the operators to follow plant procedures to increase the grid voltage. Verification test results (see Section 4.4) that show the analysis as conservative would eliminate this concern for the second source of offsite power.

Position 4--The NRC letter[1] requires that test results verify the accuracy of the voltage analyses supplied.

The TVA has committed to test to verify the accuracy of the supplied voltage analysis.

Position 5--No event or condition should result in the simultaneous or consequential loss of both required circuits from the offsite power network to the onsite distribution system (GDC 17).

The TVA has analyzed the Unit No. 3 connections of the Browns Ferry Nuclear Plant to the offsite power grid, and has determined that no potential exists for the simultaneous or the consequential loss of both circuits from the offsite grid.

Position 6--As required by GDC 5, each offsite source shared between units in a multi-unit station must be capable of supplying adequate starting and operating voltage for all required Class 1E loads with an accident in one unit and an orderly shutdown and cooldown in the remaining units.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-296

TENNESSE VALLEY AUTHORITY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY

OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 52 to Facility Operating License No. DPR-68 issued to the Tennessee Valley Authority (the licensee), which revised Technical Specifications for operation of the Browns Ferry Nuclear Plant, Unit 3, located in Limestone County, Alabama. The amendment is effective upon startup of Unit 3 in the fifth fuel cycle.

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

The application for the amendment 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 reuqired by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

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

For further details with respect to this action, see (1) the application for amendment dated December 11, 1981 (2) Amendment No. 52 to License No. DPR-68, 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, N. W., 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 29th day of March 1982

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactor Branch #2
Division of Licensing