

3/29/78

Docket Nos. 50-259 ✓
50-260
and 50-296

Tennessee Valley Authority
ATTN: Mr. N. B. Hughes
Manager of Power
830 Power Building
Chattanooga, Tennessee 37401

Gentlemen:

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The Commission has issued the enclosed Amendments Nos. 37, 34 and 11 to Facility Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units Nos. 1, 2 and 3. These amendments consist of changes to the Technical Specifications in response to your request of March 22, 1978.

The amendments change the Technical Specifications to permit you to provide a third offsite power source by connecting the onsite 4160 volt distribution system to the 500,000 volt offsite system through the main transformers and station service transformers.

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

Sincerely,

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:

1. Amendment No. 37 to DPR-33
2. Amendment No. 34 to DPR-52
3. Amendment No. 11 to DPR-68
4. Safety Evaluation
5. Notice

cc w/enclosures:
see next page

*SEE PREVIOUS YELLOW FOR CONCURRENCES

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|---------|------------|-----------|-----------|-----------|--|
| OFFICE | ORB#3 | ORB#3 | OELD | ORB#3 | |
| SURNAME | *SSheppard | *RClark | *JScinto | <i>6</i> | |
| DATE | 3/ /78 | 3/ 27 /78 | 3/ 28 /78 | 3/ 29 /78 | |

Docket Nos. 50-259
50-260
and 50-296

Tennessee Valley Authority
ATTN: Mr. Godwin Williams, Jr.
Manager of Power
818 Power Building
Chattanooga, Tennessee 37201

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The Commission has issued the enclosed Amendments Nos. , and to Facility Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units Nos. 1, 2 and 3. These amendments consist of changes to the Technical Specifications in response to your request of March 22, 1978.

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4. Safety Evaluation
5. Notice

cc w/enclosures: See page 2

Subjects noted to Clark R. Clark 3/22/78

Distribution
Docket JRBuchanan
ORB #3
Local PDR
NRC PDR
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GLear
SSheppard
RClark
Attorney, OELD
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| SURNAME | SSheppard | RClark:mjt | | GLear | | |
| DATE | 3/ /78 | 3/27/78 | 3/ /78 | 3/ /78 | | |

Docket Nos. 50-259
50-260
and 50-296

Tennessee Valley Authority
ATTN: Mr. H. B. Hughes
Manager of Power
830 Power Building
Chattanooga, Tennessee 37401

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see next page

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Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:

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cc w/enclosures: See page 2

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| OFFICE > | ORB #3 | ORB #3 | OELD | ORB #3 | | |
| SURNAME > | SSheppard | RClark:mjf | | GLear | | |
| DATE > | 3/ /78 | 3/ /78 | 3/ /78 | 3/ /78 | | |

cc: H. S. Sanger, Jr., Esquire
General Counsel
Tennessee Valley Authority
400 Commerce Avenue
E 11B 33 C
Knoxville, Tennessee 37902

Mr. D. McCloud
Tennessee Valley Authority
303 Power Building
Chattanooga, Tennessee 37401

Mr. William E. Garner
Route 4, Box 354
Scottsboro, Alabama 35768

Mr. Charles R. Christopher
Chairman, Limestone County Commission
Post Office Box 188
Athens, Alabama 35611

Ira L. Myers, M.D.
State Health Officer
State Department of Public Health
State Office Building
Montgomery, Alabama 36104

Mr. C. S. Walker
Tennessee Valley Authority
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Knoxville, Tennessee 37902

Athens Public Library
South and Forrest
Athens, Alabama 35611

Chief, Energy Systems
Analyses Branch (AW-459)
Office of Radiation Programs
U.S. Environmental Protection Agency
Room 645, East Tower
401 M Street, SW
Washington, D.C. 20460

U. S. Environmental Protection
Agency
Region IV Office
ATTN: EIS Coordinator
345 Courtland Street
Atlanta, Georgia 30308



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 FACILITY OPERATING LICENSE

Amendment No. 37
License No. DPR-33

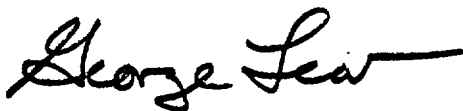
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated March 22, 1978, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules 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. 37, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 29, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 37

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise Appendix A as follows:

Remove the following pages and replace with identically numbered pages:

292/293

294/295

296/297

298/299

Marginal lines indicate revised area. Overleaf pages are provided for convenience.

3.9 AUXILIARY ELECTRICAL SYSTEMApplicability

Applies to the auxiliary electrical power system.

Objective

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

SpecificationA. 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, both 161-kV transmission lines are operable and supplying power to the plant, at least one 500 kV transmission line is operable and supplying power to the plant backfeeding through the Unit 2 main and station transformers, and the requirements of 3.9.A.4 through 3.9.A.7 are met.

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

1. At least one off-site 161-kV transmission line and its common transformer are available and capable of automatically 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 161-kV transmission line and its

4.9 AUXILIARY ELECTRICAL SYSTEMApplicability

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

Objective

Verify the operability of the auxiliary electrical system.

SpecificationA. 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 to demonstrate the emergency diesel generators will start and accept emergency load within

LIMITING CONDITIONS FOR OPERATION**SURVEILLANCE REQUIREMENTS****3.9.A Auxiliary Electrical Equipment**

- common transformer or cooling tower transformer (not parallel with the energized common transformer) 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.
 - b. The units 1 and 2 4-kV shutdown boards are energized.
 - c. The 480-V shutdown boards associated with the unit are energized.
 - d. Undervoltage relays operable on start buses 1A and 1B and 4-kV shutdown boards, A, B, C, and D.
5. The 250-Volt unit and shutdown board batteries and a battery charger for each battery and associated 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.
8. At least one offsite 500-kV transmission line backfeeding through the unit 2 main and station service transformers is available and capable of supplying auxiliary power to the shutdown boards.

4.9.A Auxiliary Electrical Equipment

- the specified time sequence.
- 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 with instructions based on the manufacturer's recommendations.
 - e. Once a month a sample of diesel fuel shall be checked for quality. The quality shall be within the acceptable limits specified in Table 1 of ASTM D975-68 and logged.
2. D.C. Power System - Unit Batteries (250-Volt) Diesel Generator Batteries (125-Volt) and Shutdown Board Batteries (250-Volt)
- 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.
 - 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.

1.9.A Auxiliary Electrical Equipment4.9.A Auxiliary Electrical Equipment

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. Once every 6 months, the condition under which the undervoltage relays are required shall be simulated with an undervoltage on start buses 1A and 1B to demonstrate that the diesel generators will start.
- b. Once every 6 months, the conditions under which the undervoltage relays are required shall be simulated with an undervoltage on each shutdown board to demonstrate that the associated diesel generator will start.
- c. The undervoltage relays which start the diesel generators from start buses 1A and 1B and the 4-kV shutdown boards, shall be calibrated annually for trip and reset and the measurements logged.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

3.9.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 one 161-kV line or one common station transformer and its parallel cooling tower transformer or one start bus becomes inoperable, reactor operation is permissible under this condition for seven days.
2. When one of the units 1 and 2 diesel generator is inoperable, continued reactor operation is permissible during the succeeding 7 days, provided that both off-side 161-kV transmission lines and both common station transformers or one common transformer and one cooling tower transformer (not parallel with the energized common transformer) 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 both reactors shall be shutdown and in the cold condition within 24 hours.

4.9.B Operation with Inoperable Equipment

1. When one 161-kV line or one common station transformer and its parallel cooling tower transformers or one start bus is found to be inoperable, or when one 500kV line or Unit 2 main or station service transformer is found to be inoperable, all units 1 and 2 diesel generators and associated boards must be demonstrated to be operable immediately and daily thereafter.
2. 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.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

4.8 Operation with Inoperable Equipment

3. 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, provided that both off-site 161-kV transmission lines and both common station transformers are available or one offsite 500kV source is back-feeding through the Unit 2 main generator and station service transformers, and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and Containment Cooling) Systems, and all 480V emergency power boards are operable. If this requirement cannot be met, an orderly shutdown shall be initiated and both reactors shall be shutdown and in the cold condition within 24 hours.

4. 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.

5. From and after the date that one of the four 250-volt shutdown

4.9.8 Operation with Inoperable Equipment

3. 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 supplies by the remaining 4-kV shutdown boards shall be demonstrated to be operable, immediately and daily thereafter.

3.9.B Operation with Inoperable Equipment

board batteries and/or its associated battery board is found to be inoperable for any reason, continued reactor operation is permissible during the succeeding five days in accordance with 3.9.B.4.

6. 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.B Operation with Inoperable Equipment

3.9.C Operation in Cold Shutdown

Whenever both reactors are in cold shutdown condition with irradiated fuel in either 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. One 161-kV transmission line and its associated common station transformer or cooling tower transformer capable of supplying power to the units 1 and 2 shutdown boards.
 - b. A third operable diesel generator.
 - c. One 500kV transmission source backfeeding through the Unit 2 main and station service transformers.
3. At least one 480-V shutdown board for each unit must be operable.

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 four sources of alternating current electrical energy available, namely, the 161-kV transmission system, the nuclear generating units, the 500-kV transmission system, and the diesel generators.

The 161-kV offsite power supply consists of two lines which are fed from different sections of the TVA 161-kV grid. In the normal mode of operation the 161-kV system is operating and four diesel generators are operational. If one diesel generator is out of service, there normally remain the 161-kV sources, the nuclear generating units, and the other three diesel generators. For a diesel generator to be considered operable its associated 125 V battery must be operable.

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 500-kV offsite power supply consists of 6 lines which are connected to different parts of the TVA 500-kV grid. Unit 2, in a shutdown mode, can be backfed through its unit main transformers and unit station transformers.

Auxiliary power for Browns Ferry Nuclear Plant is supplied from three sources; the unit station transformers from the main generators, the 161-kV transmission system through the common station transformers or the cooling tower transformers, or the unit 2 station transformers from the 500-kV system. If a common station transformer is lost, the units can continue to operate since the unit station transformers are in service, the other common station transformer and the cooling tower transformers are available, and four diesel generators are operational.

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.



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 FACILITY OPERATING LICENSE

Amendment No. 34
License No. DPR-52

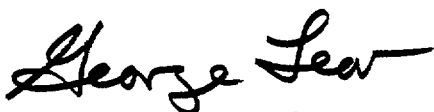
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated March 22, 1978, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules 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. 34, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script that reads "George Lear".

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 29, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 34

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise Appendix A as follows:

Remove the following pages and replace with identically numbered pages:

1/2

Marginal line indicate revised area. Overleaf page is provided for convenience.

Introduction

This document presents the tech specs for the Browns Ferry Nuclear Plant unit 2 only.

Browns Ferry unit 2 is in the refueling mode and is expected to remain in this condition until a safety analysis has been performed ensuring adequate offsite capability for three-unit operation in accordance with T/S 3.9.

One offsite 500-kV transmission source shall be backfed through the unit 2 main and unit station service transformers.

1.0 DEFINITIONS

The succeeding frequently used terms are explicitly defined so that a uniform interpretation of the specifications may be achieved.

- A. Safety Limit - The safety limits are limits below which the reasonable maintenance of the cladding and primary systems are assured. Exceeding such a limit requires unit shutdown and review by the Atomic Energy Commission before resumption of unit operation. Operation beyond such a limit may not in itself result in serious consequences but it indicates an operational deficiency subject to regulatory review.
- B. Limiting Safety System Setting (LSSS) - The limiting safety system settings are settings on instrumentation which initiate the automatic protective action at a level such that the safety limits will not be exceeded. The region between the safety limit and these settings represent margin with normal operation lying below these settings. The margin has been established so that with proper operation of the instrumentation the safety limits will never be exceeded.
- C. Limiting Conditions for Operation (LCO) - The limiting conditions for operation specify the minimum acceptable levels of system performance necessary to assure safe startup and operation of the facility. When these conditions are met, the plant can be operated safely and abnormal situations can be safely controlled.
- D. DELETED



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. 11
License No. DPR-68

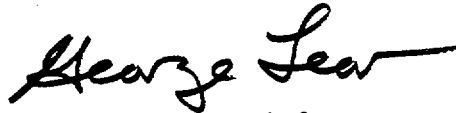
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 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - 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. 11, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script that reads "George Lear". The signature is written in black ink and is positioned above the typed name and title.

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 29, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 11

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Revise Appendix A as follows:

Remove the following pages and replace with identically numbered pages:

316
317
321
322
323
324
326
327

Marginal lines indicate changed areas.

3.9 AUXILIARY ELECTRICAL SYSTEMApplicability

Applies to the auxiliary electrical power system.

Objective

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

SpecificationA. Auxiliary Electrical Equipment

The reactor shall not be started up (made critical from the cold condition) unless four unit 3 diesel generators (3A, 3B, 3C, and 3D) are operable, both 161-kV transmission lines are operable and supplying power to the plant, at least one 500 kV transmission line is operable and supplying power to the plant by back-feeding through the Unit 2 main and station service transformers and the requirements of 3.9.A.4 through 3.9.A.7 are met. The reactor shall not be started up (made critical from the hot Standby Condition) unless all of the following conditions are satisfied:

4.9 AUXILIARY ELECTRICAL SYSTEMApplicability

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

Objective

Verify the operability of the auxiliary electrical system.

SpecificationA. 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.

3.9 AUXILIARY ELECTRICAL SYSTEM

1. At least one off-site 161-kV transmission line and its common station-service transformer or cooling tower transformer are available and capable of automatically supplying auxiliary power to the shutdown boards.

4.9 AUXILIARY ELECTRICAL SYSTEM

- 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 Unit 3 operating cycle a test will be conducted to demonstrate the unit 3 emergency diesel generators will start and accept emergency load within the specified time sequence.
 - c. Once a month the quantity of diesel fuel available shall be logged.

3.9 AUXILIARY ELECTRICAL SYSTEM

5. The 250-Volt unit batteries and a battery charger for each battery and associated battery boards are operable.
6. Logic Systems
 - a. Accident signal logic system is operable.
7. There shall be a minimum of 103,300 gallons of diesel fuel in the unit 3 standby diesel generator fuel tanks.
8. At least one offsite 500kV transmission line back-feeding through the Unit 2 main and station service transformers is available and capable of supplying auxiliary power to the shutdown boards.

4.9 AUXILIARY ELECTRICAL SYSTEM

- c. The undervoltage relays which start the diesel generators from start buses 1A and 1B and the 4-kV shutdown boards, shall be calibrated annually for trip and reset and the measurements logged.

3.9 AUXILIARY ELECTRICAL SYSTEMB. 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 one common station transformer and one cooling tower transformer, or one 161-kV line becomes inoperable, reactor operation is permissible under this condition for seven days.

4.9 AUXILIARY ELECTRICAL SYSTEMB. Operation with Inoperable Equipment

1. When one common station transformer or one cooling tower transformer, one 161-kV line or a 500-kV unit back-feeding is found to be inoperable, all unit 3 diesel generators and associated boards must be demonstrated to be operable immediately and daily thereafter.

3.9 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 both offsite 161-kV transmission lines, both common transformers or one common transformer and one cooling tower transformer, or one offsite 500 kv transmission line backfeeding through the the Unit 2 main and station service transformers are available and capable of supplying power to the unit 3 shutdown boards, 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.

4.9 AUXILIARY ELECTRICAL SYSTEM

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.

3.9 AUXILIARY ELECTRICAL SYSTEM

3. When one unit 3 4-kV shutdown board is inoperable, continued reactor operation is permissible for a period not to exceed 5 days, provided that both offsite 161-kV transmission lines and both common transformers or one offsite 500 kv source backfeeding through the Unit 2 main and station service transformers are available 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.

4.9 AUXILIARY ELECTRICAL SYSTEM

3. 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.

3.9 AUXILIARY ELECTRICAL SYSTEM**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 consisting of one of the following:
 - a. One 161-kV transmission line and its associated common transformer or cooling tower transformer capable of supplying power to the unit 3 shutdown boards.
 - b. A third operable diesel generator.
 - c. One 500 kv transmission source back-feeding through the Unit 2 main and station service transformers capable of supplying power to the Unit 3 shutdown boards.
3. At least one unit 3 480-V shutdown board must be operable.

4.9 AUXILIARY ELECTRICAL SYSTEM

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 161-kV offsite power supply consists of two lines which are fed from different sections of the TVA 161-kV grid. In the normal mode of operation, the 161-kV system is operating and four diesel generators are operational. If one diesel generator is out of service, there normally remain the 161-kV sources, and the other three diesel generators. For a diesel generator to be considered operable its associated 125 V battery must be operable.

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 500-kV offsite power supply consists of six lines which are connected to different parts of the TVA 500-kV grid. In the unit 2 refueling mode this source is backfed through the unit 2 main transformers and unit station transformers.

Offsite auxiliary power for Browns Ferry Nuclear Plant is supplied from three sources: the unit station transformers from the main generators, the 161-kV transmission system through the common station transformers or the cooling tower transformer, or the unit 2 station transformers from the 500-kV system. If a common station transformer is lost, the unit can continue to operate since the station transformer is in service, the other common station transformer and the cooling tower transformers are available, and four diesel generators are operational.

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 four 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 250-volt d-c system is so arranged, and the batteries sized such, that the loss of any one unit 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



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 37 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 34 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 11 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT NOS. 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

1.0 Introduction

By letter dated March 22, 1978, the Tennessee Valley Authority (the licensee or TVA) requested changes to the Technical Specifications (Appendix A) appended to Facility Operating Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units Nos. 1, 2 and 3. The proposed amendment and revised Technical Specifications would provide a third offsite power source. As described in Section 8.4 of the Final Safety Analysis Report (FSAR) the startup and alternate power source for unit auxiliaries is either of two (161 kV to 4.16 kV) common station transformers which are fed from the TVA 161 kV system. Currently, the two normal offsite power sources are the 1) Trinity 161 kV transmission line through either the common station service or cooling tower transformers and 2) the Athens 161 kV transmission line through either the common station service or cooling tower transformers.

Browns Ferry Unit No. 2 shut down for refueling on March 19, 1978 and is expected to be down for 3 months. While Unit No. 2 is in the refueling configuration, the proposed change will provide a third offsite power supply from the 500 kV transmission system by "backfeeding" through the Unit No. 2 main generator transformers and the unit 2 station service transformer.

2.0 Background

On October 17, 1977, while Browns Ferry Units 1 and 3 were in a shutdown condition, Unit 2 tripped from essentially full load. TVA management was concerned that low voltage on Browns Ferry buses connected to the offsite system contributed to this loss of a unit. TVA established an interdisciplinary task force to investigate the incident, to determine the cause of the trip and to make recommendations to prevent a reoccurrence. This investigation included an evaluation to ensure that the information provided in TVA's July 22, 1977, response to NRC concerns on bus undervoltage was still valid in the light of actual measured inplant conditions. Preliminary conclusions of the TVA investigating group (January 11, 1978)

indicated that safety-related implications did not exist for the October 17th event, but that additional analysis and inplant measurements were necessary to evaluate the incident. Also, additional investigations of design improvements were initiated.

On the basis of inplant measurements of actual real and reactive load, TVA performed detailed calculations. These calculations evaluated the inplant voltage that would result from various assumed onsite events coupled with degraded offsite transmission conditions. These calculations, which were completed March 18, 1978, indicated that for a simultaneous 3-unit trip with the Athens or Trinity 161 kV line or one common station service transformer out of service, that acceptable voltage could not be maintained from the remaining offsite sources. However, at the time these calculations were completed, only Units Nos. 1 and 2 were in operation and Unit No. 3 was shutdown to repair electrical connectors. Additional calculations were performed based on operation of one or two units, with the third unit shutdown. While these calculations were being performed, Unit 2 was shutdown to investigate the cause of unidentified leakage in the drywell. Since Unit 2 was scheduled to shutdown on March 26, 1978 for refueling, TVA decided to place Unit 2 in a cold shutdown condition and commence its refueling outage a week earlier than scheduled. Unit 2 is expected to be shutdown for three months for refueling and repair of feedwater spargers. Unit 3 was subsequently returned to power operations on March 21, 1978.

3.0 Discussion

Assuming certain postulated conditions, including degradation of the two 161 kV offsite power systems, and simultaneous 1-unit LOCA and 1-unit trip or a 2-unit trip, the calculations discussed above demonstrated to the licensee that operation of two units (Units 1 and 3), while the third unit (Unit 2) was shutdown, could result in the potential for degraded voltage conditions* on the 4160 volt emergency buses that satisfy the minimum voltage conditions described in "ANSI C84.1-1970". Additional calculations were performed based on a plant electrical lineup which included blocking of certain automatic transfer features of non-safety-related loads in the Plant. These calculations and associated safety evaluation confirmed that satisfactory voltage could be maintained on safety-related buses under degraded offsite conditions for a postulated simultaneous trip of the two operating units or a simultaneous trip of one unit and a LOCA in another unit with the third unit in the shutdown mode. This arrangement, however, would not provide sufficient operational flexibility during the Unit 2 refueling outage. Based on the provision of a third offsite power source, additional calculations confirmed that satisfactory voltage could be maintained on inplant buses, even if there were loss of one of the 161 kV offsite lines, under conditions which postulated 1) a simultaneous two unit trip, or 2) a simultaneous one unit LOCA and a one unit trip with Unit 2 in the refueling shutdown configuration.

While the general subject of offsite power for the Browns Ferry Station is under review, TVA has proposed to provide a third offsite power source during the Unit 2 refueling outage.

The third offsite power source will be authorized by the proposed changes to the Technical Specifications. The changes will allow the 500 kV offsite power system to be backfed to the onsite 4160 volt emergency buses through the Unit 2 main generator transformers and the Unit 2 station service transformer. This arrangement would be for the approximately 89 days that Unit 2 is shutdown for refueling. Meanwhile, TVA is performing additional studies on means of providing a permanent third offsite power supply.

This change has no adverse safety effects and does not detract from the availability and reliability of onsite emergency power supplies.

In addition to the change in Technical Specifications, the licensee's submittal supersedes the Browns Ferry FSAR Amendment 40 description which indicated that the two capable offsite sources were either the Athens and Trinity 161 kV lines and either the two common station service transformers or the cooling tower transformers added to increase offsite capabilities.

4.0 Evaluation

We concluded that the proposed changes to provide a third offsite power source during the Unit 2 refueling outage will ensure safe operating conditions without the undesirable interruption of non-safety-related equipment. Although Units Nos. 1 and 3 can be safely operated without the proposed change during the Unit 2 refueling outage, the addition of a third offsite power source will provide operational flexibility which is desirable. Based on our review, we conclude that the licensee's proposed changes to the Technical Specifications are acceptable.

5.0 Environmental Considerations

We have determined that these 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 these 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 these amendments.

6.0 Conclusion

We have concluded that: (1) because the amendments do not involve a significant increase in the probability or consequences or 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: March 29, 1978