FOR ADMINISTRATIVE USE ONLY

Distribution
Docket
ORB #3
Local PDR
NRC PDR
NRR Reading
DEisenhut
BGrimes
RVollmer
TJCarter
WRussell
SSheppard
RClark
Atty, OELD
OI&E (5)
BJones (12)
BScharf (10)
STSG
BHarless
ACRS (16)
OPA (CMiles)
RDiggs
HDenton
TERA
JRBuchanan

AUGUST 15 1979

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

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

Dear Mr. Parris:

The Commission has issued the enclosed Amendments Nos. 52, 47 and 24 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 January 5, 1979 (TVA BFNP TS 119).

The amendments authorize you to substitute a computational thermal model for in-situ temperature monitoring stations to determine compliance with the mixing zone temperature limits and the State of Alabama water temperature standards.

The amendments do not involve significant new safety information of a type not considered by a previous Commission safety review of the facility. They do not involve a significant increase in the probability or consequences of an accident, do not involve a significant decrease in a safety margin, and, therefore, do not involve a significant hazards consideration. We have also concluded that there is reasonable assurance that the health and safety of the public will not be endangered by this action.

Copies of the related Environmental Impact Appraisal and the Notice of Issuance and Negative Declaration also are enclosed.

Sincerely,
Original Signed by
T. A. Ippolito

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Notified by phone that form letter is inadequate

7909110148

Enclosures:
See next page

OFFICE	ORB #3	ORB #3	AD:OPP	OELD	ORB #3
SURNAME	SSheppard	RClark/mjf	WCammill	CUTCHIN	TIppolito
DATE	8/8/79	8/10/79	8/14/79	8/13/79	8/10/79

Enclosures:
1. Amendment No. 52 to DPR-33
2. Amendment No. 47 to DPR-52
3. Amendment No. 24 to DPR-68
4. Environmental Impact Appraisal
5. Notice and Negative Declaration

cc:

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

Mr. Dennis McCloud
Tennessee Valley Authority
400 Chestnut Street, Tower II
Chattanooga, Tennessee 37401

Mr. Charles R. Christopher
Chairman, Limestone County Commission
P. O. 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. E. G. Beasley
Tennessee Valley Authority
400 Commerce Avenue
W 10C 131C
Knoxville, Tennessee 37902

Athens Public Library
South and Forrest
Athens, Alabama 35611

Director, Office of Urban & Federal
Affairs
108 Parkway Towers
404 James Robertson Way
Nashville, Tennessee 37219

Director, Technical Assessment Division
Office of Radiation Programs (AW-459)
US EPA
Crystal Mall #2
Arlington, Virginia 20460

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

Mr. Robert F. Sullivan
U. S. Nuclear Regulatory Commission
P. O. Box 1863
Decatur, Alabama 35602

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. 52
License No. DPR-33

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

   A. The application for amendments by Tennessee Valley Authority (the licensee) dated January 5, 1979, 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:

7909110157

(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 as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Change to the Technical
Specifications

Date of Issuance: August 15, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 52

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise Appendix B as follows:

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

   1/2
   3/4
   41/42

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

1.0 DEFINITIONS

The following terms are defined for uniform interpretation of these specifications.

Administrative Terminology

Environmental limiting condition for operation--any limiting condition for plant operation as stated in Section 2 of the Browns Ferry Nuclear Plant Environmental Technical Specifications.

Unusual event with the potential for a significant environmental impact--an event that results in noncompliance with an environmental technical specification, or an event that results in uncontrolled or unplanned releases of chemical, radioactive, thermal, or other discharges from the Browns Ferry Nuclear Plant in excess of applicable Federal, state, and local regulations.

Thermal Properties

Thermal limits--limits defined for temperatures, spatial changes in temperature, and temporal changes in temperature within Wheeler Reservoir that are attributable to thermal discharges from Browns Ferry Nuclear Plant.

Intake temperature--the average temperature at a given time within the intake system at a point beyond the intake pumps.

Discharge temperature--the average temperature at a given time in the cooling water return channel or at the condenser outlet butterfly valves.

Delta T (ΔT)--the difference in temperatures of the river at the control monitors attributable to thermal discharges from Browns Ferry Nuclear Plant.

Instrumentation Properties

Accuracy--a measure of the difference between the true and measured values of a given parameter, hence a measure of error.

Minimum detectable level--that level below which a specific detector, instrument, or analysis is unable to detect the presence of a given constituent.

Sensitivity--the minimum change in the variable detected by a given sensor.

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 THERMAL DISCHARGE LIMITS

Objective

The purpose of this specification is to limit the thermal stress on aquatic life in Wheeler Reservoir by operating Browns Ferry Nuclear Plant so as to meet the applicable water quality temperature standards of the State of Alabama.

Specification

The maximum plant-induced temperature rise in Wheeler Reservoir caused by the discharge of condenser cooling water shall not exceed the applicable maximum (currently 5°F). The maximum water temperature measured downstream of the plant discharge point shall not exceed the applicable maximum (currently 90°F †) due to the discharge of condenser cooling water. If these limiting conditions are predicted, the plant operator shall initiate control measures. The control measures shall be (1) to reduce the waste heat discharged to the reservoir and/or (2) to request modifications in the releases from TVA's Guntersville and/or Wheeler Dams to increase the streamflow by the Browns Ferry plant.

†TVA shall immediately advise the Commission if more stringent limitations (which would then govern) are imposed by EPA or the State.

Monitoring Requirement

Reservoir water temperatures used to help show compliance with applicable standards will be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application of the current Alabama temperature standards. Three thermal monitors spaced across the reservoir in the vicinity of river mile 293.5 shall be used to measure downstream mixed water temperatures. The system is designed so that the downstream monitors serve as backup for one another. The accuracy of the monitoring equipment and the sensitivity of the thermistor sensors are designed to be ±0.3°F and 0.01°F, respectively. The locations of temperature monitors are displayed in Figure 2.1-1.

The plant-induced temperature rise shall be computed using a computer model for the mixing of the plant discharge. This model requires measured plant data as well as downstream reservoir temperatures as inputs and will be updated as necessary to reflect current understanding of discharge mixing predictions.

All necessary plant and reservoir data is transmitted to the Browns Ferry meteorological station. The meteorological station will receive the data and record the readings once hourly. All data are automatically recorded and maintained for record keeping purposes. Calculations necessary to compute parameters for showing compliance with applicable thermal standards will be automatically completed by a computer situated in the meteorological station. All measured and and computed data which are used to help prevent exceeding the limiting conditions will be transmitted to the control room and will be visually displayed for monitoring purposes.

In the event the system described is out of service, an alternate method will be employed three times a day (once each shift) to measure the temperature rise and the maximum river water temperature below the plant. When such a method would result in an imminent and substantial endangerment to the safety of personnel, this paragraph shall not apply.

2.1 Continued

Bases

TVA, as a Federal agency, is required by Section 313 of the Federal Water Pollution Control Act Amendments of 1972 and 1977 and by Executive Order 11507, "Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities," to meet applicable Federal, State, and local water quality standards. On July 17, 1972, the State of Alabama adopted and on September 19, 1972, the Environmental Protection Agency approved thermal criteria for surface waters in the State of Alabama. The current applicable thermal standards are to limit the maximum temperature rise above natural temperature before the addition of artificial heat to 5°F and the maximum water temperature to 86°F. In the application of these temperature criteria the temperatures shall be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application for the criteria.

The Tennessee Valley Authority has taken action to comply with applicable thermal water quality standards of the State of Alabama in the operation of the 3-unit Browns Ferry facility by installing mechanical draft cooling towers. However, inadequate cooling tower performance has resulted in drastic curtailment of power generation during summer periods when peak load demands are critical on the TVA system to meet thermal standards.

The Browns Ferry Nuclear Plant Environmental Statement analyzed the environmental effects of operating the plant with a 10°F rise and 93°F maximum temperature limitation. This evaluation concluded that the 10°F and 93°F limitations would be adequate to protect aquatic life. Hydrologic studies recently conducted confirm that a 90°F limitation would not result in excessive temperature conditions in the cool water fisheries habitat downstream from the plant. An additional environmental assessment recently completed by TVA concludes that operation at or near the 90°F maximum temperature limitations will not result in adverse impacts on the biota of the reservoir.

TVA has requested from EPA and the State of Alabama that the maximum temperature limitation be increased to 90°F. The EPA stayed the 86°F maximum temperature requirements of the Browns Ferry NPDES permit in accordance with 40 CFR §125.35 and 40 CFR §125.36. EPA has requested while the stay is in effect that TVA comply with the 90°F maximum temperature limit. A letter confirming concurrence with EPA's position was received from the staff of Alabama Water Improvement Commission dated July 18, 1977.

All systems described for thermal discharge limits will be operational prior to any significant discharge of waste heat. The placement of the monitoring instruments shall be such that compliance with water quality criteria will be demonstrated. The placement of the temperature sensors in the waters of Wheeler Reservoir is in accordance with the requirements of the water quality criteria of the State of Alabama. Measured data is converted to digital data at the station on the reservoir. The transmission, computer storage, and monitoring equipment is being used at other facilities and has performed accurately and reliably. The diffuser-induced mixing is based upon results of field studies and laboratory tests.

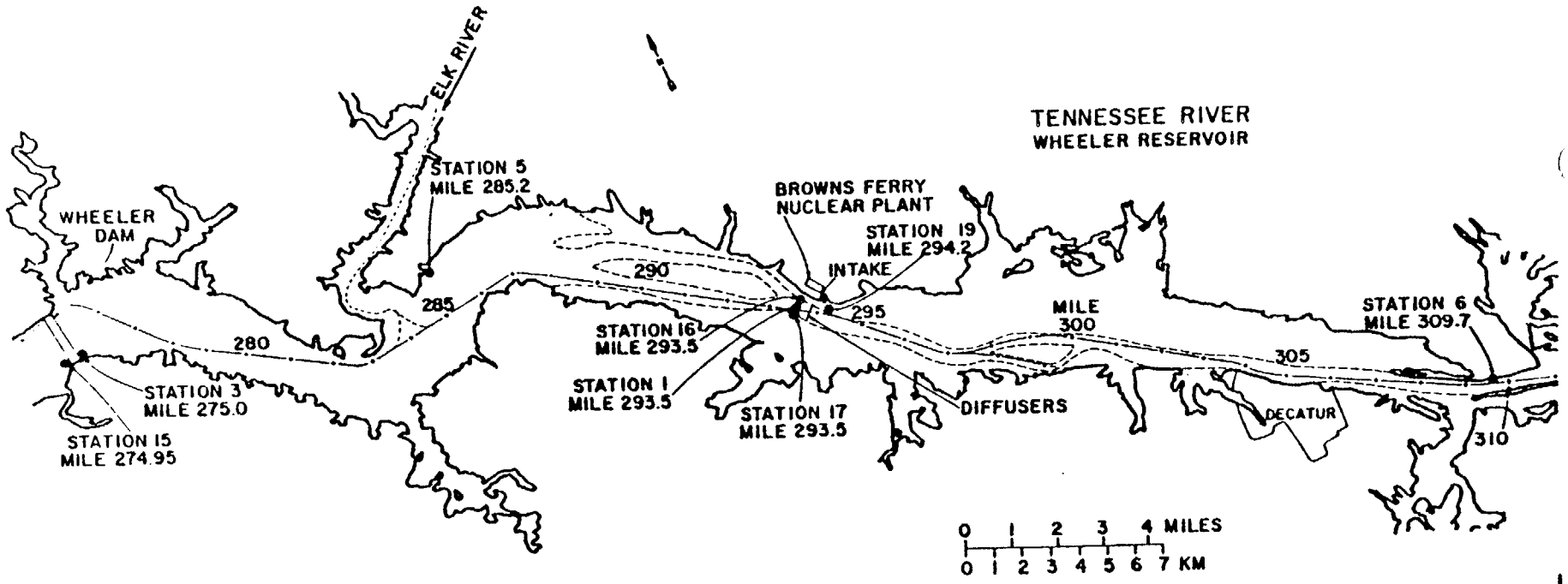


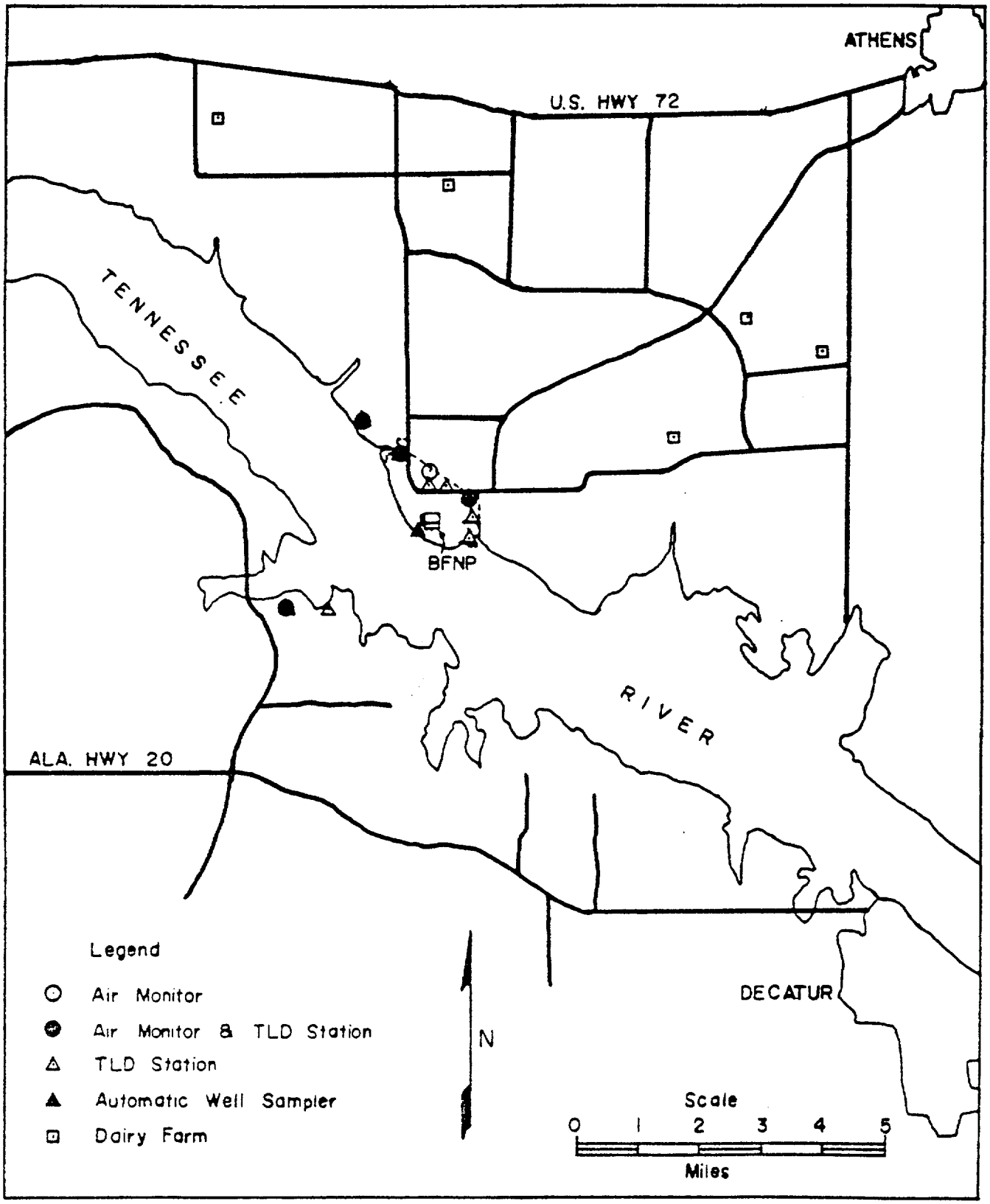
Figure 2.1-1

Location of Water Temperature Monitors in Wheeler Reservoir
Browns Ferry Nuclear Plant

Figure 4.2-1

LOCAL MONITORING STATIONS

BROWNS FERRY NUCLEAR PLANT



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. 47
License No. DPR-52

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

   A. The application for amendments by Tennessee Valley Authority (the licensee) dated January 5, 1979, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-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. 47 , 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

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 15, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 47

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise Appendix B as follows:

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

   1/2
   3/4
   41/42

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

1.0 DEFINITIONS

The following terms are defined for uniform interpretation of these specifications.

Administrative Terminology

Environmental limiting condition for operation--any limiting condition for plant operation as stated in Section 2 of the Browns Ferry Nuclear Plant Environmental Technical Specifications.

Unusual event with the potential for a significant environmental impact--an event that results in noncompliance with an environmental technical specification, or an event that results in uncontrolled or unplanned releases of chemical, radioactive, thermal, or other discharges from the Browns Ferry Nuclear Plant in excess of applicable Federal, state, and local regulations.

Thermal Properties

Thermal limits--limits defined for temperatures, spatial changes in temperature, and temporal changes in temperature within Wheeler Reservoir that are attributable to thermal discharges from Browns Ferry Nuclear Plant.

Intake temperature--the average temperature at a given time within the intake system at a point beyond the intake pumps.

Discharge temperature--the average temperature at a given time in the cooling water return channel or at the condenser outlet butterfly valves.

Delta T (ΔT)--the difference in temperatures of the river at the control monitors attributable to thermal discharges from Browns Ferry Nuclear Plant.

Instrumentation Properties

Accuracy--a measure of the difference between the true and measured values of a given parameter, hence a measure of error.

Minimum detectable level--that level below which a specific detector, instrument, or analysis is unable to detect the presence of a given constituent.

Sensitivity--the minimum change in the variable detected by a given sensor.

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 THERMAL DISCHARGE LIMITS

Objective

The purpose of this specification is to limit the thermal stress on aquatic life in Wheeler Reservoir by operating Browns Ferry Nuclear Plant so as to meet the applicable water quality temperature standards of the State of Alabama.

Specification

The maximum plant-induced temperature rise in Wheeler Reservoir caused by the discharge of condenser cooling water shall not exceed the applicable maximum (currently 5°F). The maximum water temperature measured downstream of the plant discharge point shall not exceed the applicable maximum (currently 90°F †) due to the discharge of condenser cooling water. If these limiting conditions are predicted, the plant operator shall initiate control measures. The control measures shall be (1) to reduce the waste heat discharged to the reservoir and/or (2) to request modifications in the releases from TVA's Guntersville and/or Wheeler Dams to increase the streamflow by the Browns Ferry plant.

†TVA shall immediately advise the Commission if more stringent limitations (which would then govern) are imposed by EPA or the State.

Monitoring Requirement

Reservoir water temperatures used to help show compliance with applicable standards will be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application of the current Alabama temperature standards. Three thermal monitors spaced across the reservoir in the vicinity of river mile 293.5 shall be used to measure downstream mixed water temperatures. The system is designed so that the downstream monitors serve as backup for one another. The accuracy of the monitoring equipment and the sensitivity of the thermistor sensors are designed to be ±0.3°F and 0.01°F, respectively. The locations of temperature monitors are displayed in Figure 2.1-1.

The plant-induced temperature rise shall be computed using a computer model for the mixing of the plant discharge. This model requires measured plant data as well as downstream reservoir temperatures as inputs and will be updated as necessary to reflect current understanding of discharge mixing predictions.

All necessary plant and reservoir data is transmitted to the Browns Ferry meteorological station. The meteorological station will receive the data and record the readings once hourly. All data are automatically recorded and maintained for record keeping purposes. Calculations necessary to compute parameters for showing compliance with applicable thermal standards will be automatically completed by a computer situated in the meteorological station. All measured and and computed data which are used to help prevent exceeding the limiting conditions will be transmitted to the control room and will be visually displayed for monitoring purposes.

In the event the system described is out of service, an alternate method will be employed three times a day (once each shift) to measure the temperature rise and the maximum river water temperature below the plant. When such a method would result in an imminent and substantial endangerment to the safety of personnel, this paragraph shall not apply.

2.1 Continued

Bases

TVA, as a Federal agency, is required by Section 313 of the Federal Water Pollution Control Act Amendments of 1972 and 1977 and by Executive Order 11507, "Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities," to meet applicable Federal, State, and local water quality standards. On July 17, 1972, the State of Alabama adopted and on September 19, 1972, the Environmental Protection Agency approved thermal criteria for surface waters in the State of Alabama. The current applicable thermal standards are to limit the maximum temperature rise above natural temperature before the addition of artificial heat to 5°F and the maximum water temperature to 86°F. In the application of these temperature criteria the temperatures shall be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application for the criteria.

The Tennessee Valley Authority has taken action to comply with applicable thermal water quality standards of the State of Alabama in the operation of the 3-unit Browns Ferry facility by installing mechanical draft cooling towers. However, inadequate cooling tower performance has resulted in drastic curtailment of power generation during summer periods when peak load demands are critical on the TVA system to meet thermal standards.

The Browns Ferry Nuclear Plant Environmental Statement analyzed the environmental effects of operating the plant with a 10°F rise and 93°F maximum temperature limitation. This evaluation concluded that the 10°F and 93°F limitations would be adequate to protect aquatic life. Hydrologic studies recently conducted confirm that a 90°F limitation would not result in excessive temperature conditions in the cool water fisheries habitat downstream from the plant. An additional environmental assessment recently completed by TVA concludes that operation at or near the 90°F maximum temperature limitations will not result in adverse impacts on the biota of the reservoir.

TVA has requested from EPA and the State of Alabama that the maximum temperature limitation be increased to 90°F. The EPA stayed the 86°F maximum temperature requirements of the Browns Ferry NPDES permit in accordance with 40 CFR §125.35 and 40 CFR §125.36. EPA has requested while the stay is in effect that TVA comply with the 90°F maximum temperature limit. A letter confirming concurrence with EPA's position was received from the staff of Alabama Water Improvement Commission dated July 18, 1977.

All systems described for thermal discharge limits will be operational prior to any significant discharge of waste heat. The placement of the monitoring instruments shall be such that compliance with water quality criteria will be demonstrated. The placement of the temperature sensors in the waters of Wheeler Reservoir is in accordance with the requirements of the water quality criteria of the State of Alabama. Measured data is converted to digital data at the station on the reservoir. The transmission, computer storage, and monitoring equipment is being used at other facilities and has performed accurately and reliably. The diffuser-induced mixing is based upon results of field studies and laboratory tests.

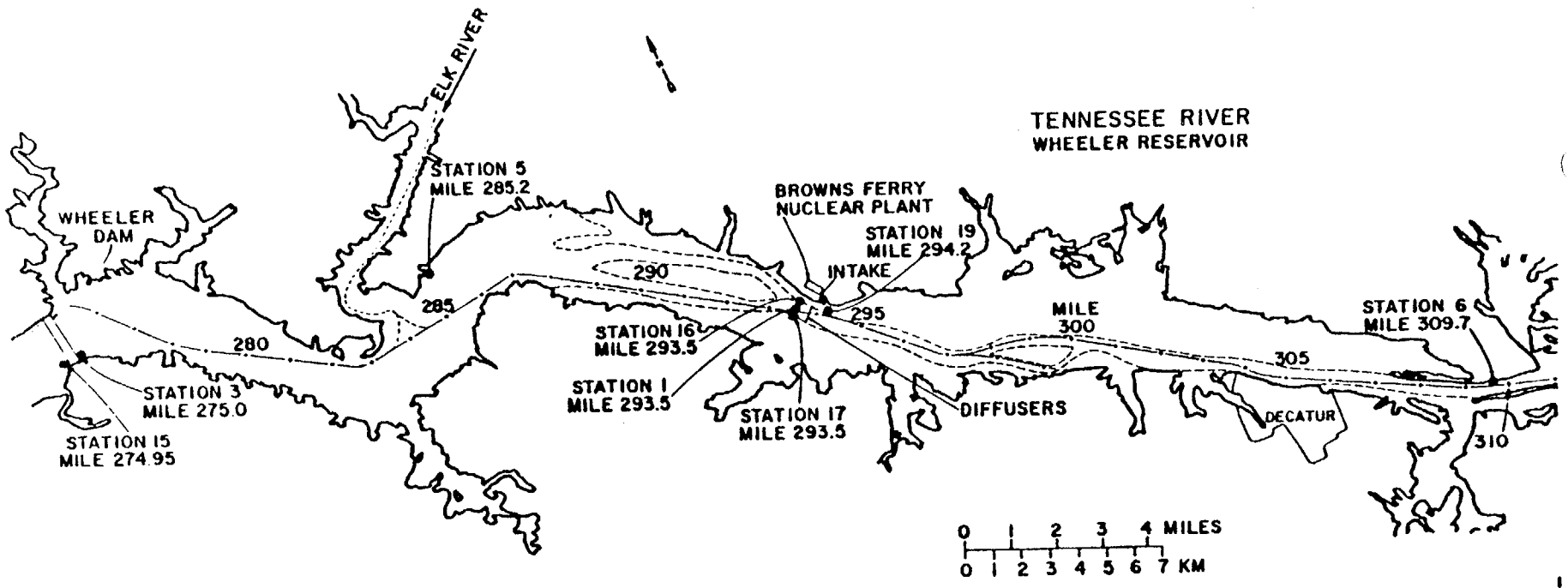


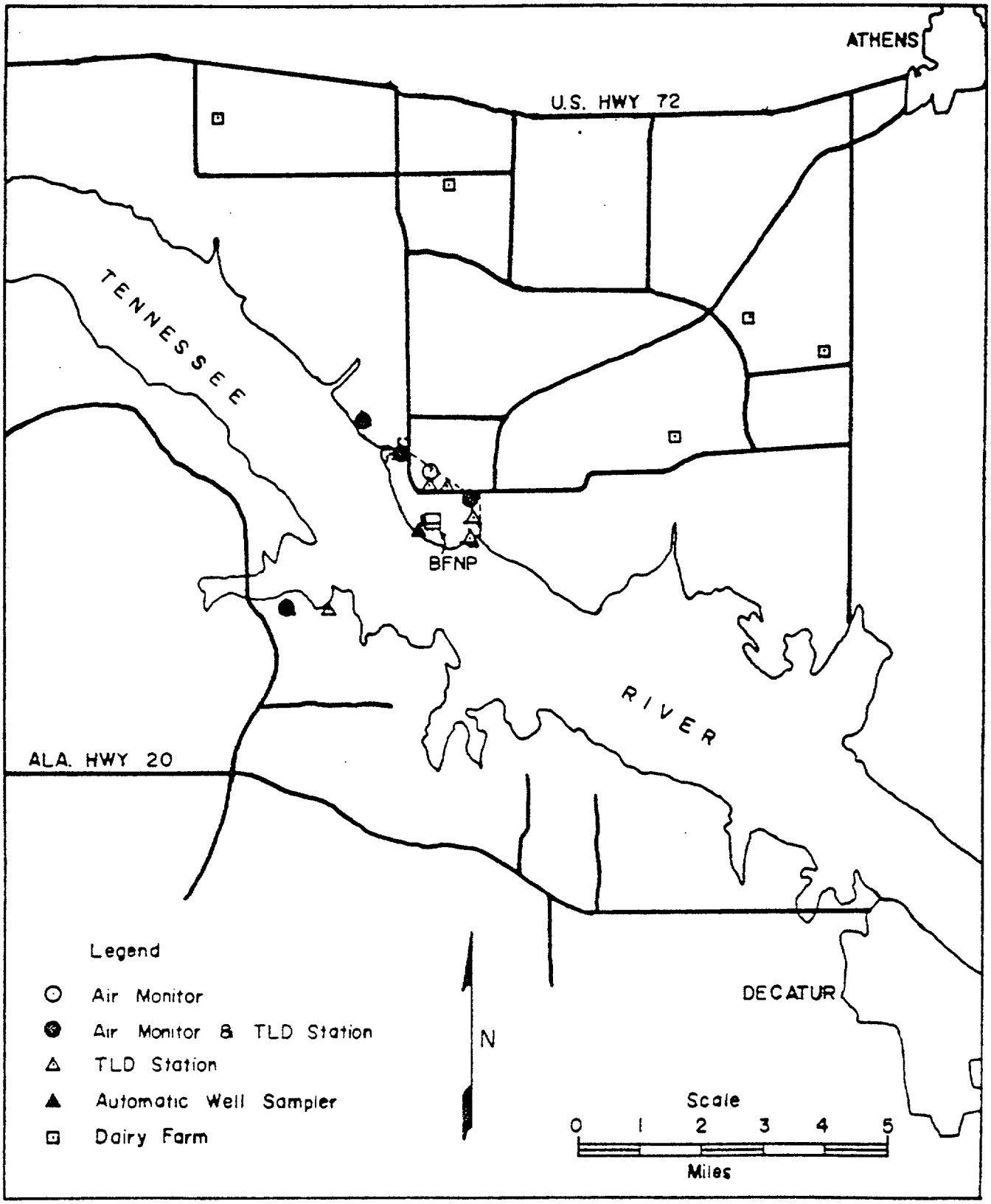
Figure 2.1-1

Location of Water Temperature Monitors in Wheeler Reservoir
Browns Ferry Nuclear Plant

Figure 4.2-1

LOCAL MONITORING STATIONS

BROWNS FERRY NUCLEAR PLANT



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. 24
License No. DPR-68

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

   A. The application for amendments by Tennessee Valley Authority (the licensee) dated January 5, 1979, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 24 , 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

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 15, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 24

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:

   2
   3
   4
   41

2. Marginal lines indicate revised area.

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 THERMAL DISCHARGE LIMITS

Objective

The purpose of this specification is to limit the thermal stress on aquatic life in Wheeler Reservoir by operating Browns Ferry Nuclear Plant so as to meet the applicable water quality temperature standards of the State of Alabama.

Specification

The maximum plant-induced temperature rise in Wheeler Reservoir caused by the discharge of condenser cooling water shall not exceed the applicable maximum (currently 5°F). The maximum water temperature measured downstream of the plant discharge point shall not exceed the applicable maximum (currently 90°F †) due to the discharge of condenser cooling water. If these limiting conditions are predicted, the plant operator shall initiate control measures. The control measures shall be (1) to reduce the waste heat discharged to the reservoir and/or (2) to request modifications in the releases from TVA's Guntersville and/or Wheeler Dams to increase the streamflow by the Browns Ferry plant.

†TVA shall immediately advise the Commission if more stringent limitations (which would then govern) are imposed by EPA or the State.

Monitoring Requirement

Reservoir water temperatures used to help show compliance with applicable standards will be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application of the current Alabama temperature standards. Three thermal monitors spaced across the reservoir in the vicinity of river mile 293.5 shall be used to measure downstream mixed water temperatures. The system is designed so that the downstream monitors serve as backup for one another. The accuracy of the monitoring equipment and the sensitivity of the thermistor sensors are designed to be ±0.3°F and 0.01°F, respectively. The locations of temperature monitors are displayed in Figure 2.1-1.

The plant-induced temperature rise shall be computed using a computer model for the mixing of the plant discharge. This model requires measured plant data as well as downstream reservoir temperatures as inputs and will be updated as necessary to reflect current understanding of discharge mixing predictions.

All necessary plant and reservoir data is transmitted to the Browns Ferry meteorological station. The meteorological station will receive the data and record the readings once hourly. All data are automatically recorded and maintained for record keeping purposes. Calculations necessary to compute parameters for showing compliance with applicable thermal standards will be automatically completed by a computer situated in the meteorological station. All measured and and computed data which are used to help prevent exceeding the limiting conditions will be transmitted to the control room and will be visually displayed for monitoring purposes.

In the event the system described is out of service, an alternate method will be employed three times a day (once each shift) to measure the temperature rise and the maximum river water temperature below the plant. When such a method would result in an imminent and substantial endangerment to the safety of personnel, this paragraph shall not apply.

2.1 Continued

Bases

TVA, as a Federal agency, is required by Section 313 of the Federal Water Pollution Control Act Amendments of 1972 and 1977 and by Executive Order 11507, "Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities," to meet applicable Federal, State, and local water quality standards. On July 17, 1972, the State of Alabama adopted and on September 19, 1972, the Environmental Protection Agency approved thermal criteria for surface waters in the State of Alabama. The current applicable thermal standards are to limit the maximum temperature rise above natural temperature before the addition of artificial heat to 5°F and the maximum water temperature to 86°F. In the application of these temperature criteria the temperatures shall be measured at the one-meter and two-meter depths and averaged to give a temperature applicable to the five-foot depth, which is the point of application for the criteria.

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TVA has requested from EPA and the State of Alabama that the maximum temperature limitation be increased to 90°F. The EPA stayed the 86°F maximum temperature requirements of the Browns Ferry NPDES permit in accordance with 40 CFR §125.35 and 40 CFR §125.36. EPA has requested while the stay is in effect that TVA comply with the 90°F maximum temperature limit. A letter confirming concurrence with EPA's position was received from the staff of Alabama Water Improvement Commission dated July 18, 1977.

All systems described for thermal discharge limits will be operational prior to any significant discharge of waste heat. The placement of the monitoring instruments shall be such that compliance with water quality criteria will be demonstrated. The placement of the temperature sensors in the waters of Wheeler Reservoir is in accordance with the requirements of the water quality criteria of the State of Alabama. Measured data is converted to digital data at the station on the reservoir. The transmission, computer storage, and monitoring equipment is being used at other facilities and has performed accurately and reliably. The diffuser-induced mixing is based upon results of field studies and laboratory tests.

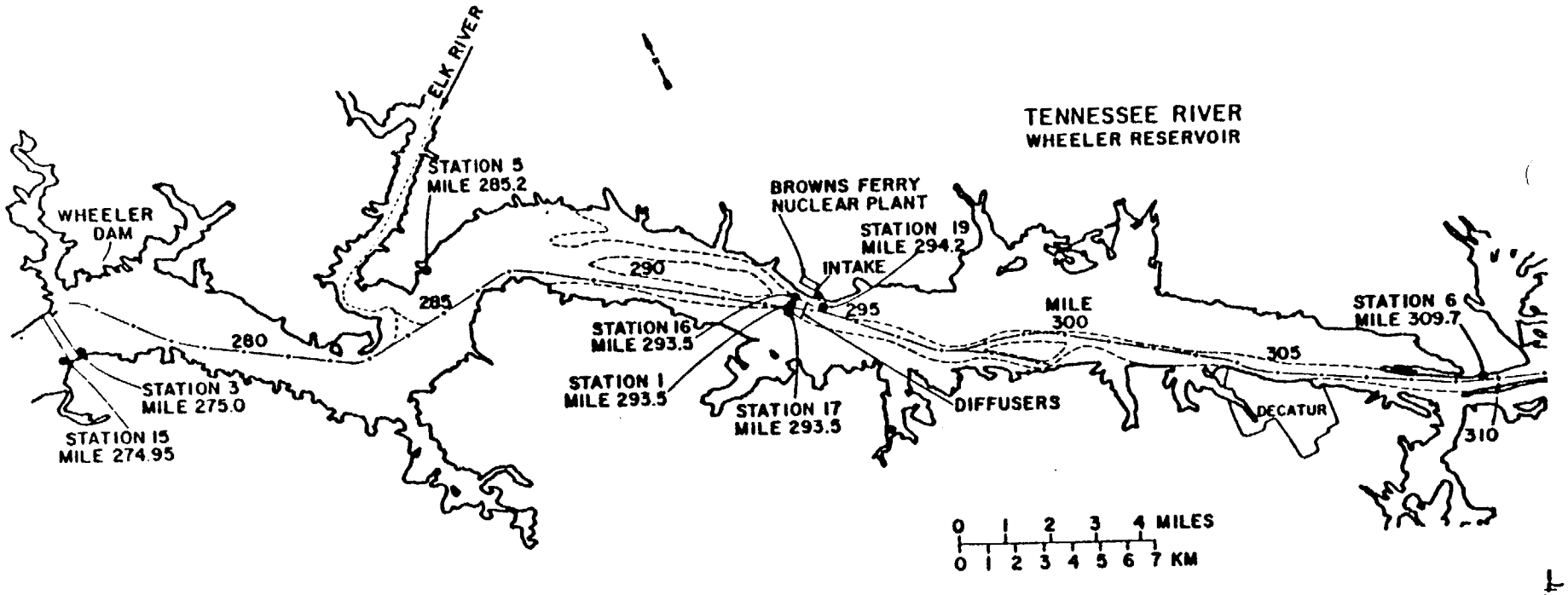

Figure 2.1-1

Location of Water Temperature Monitors in Wheeler Reservoir
Browns Ferry Nuclear Plant

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

ENVIRONMENTAL IMPACT APPRAISAL

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO

MONITORING WATER TEMPERATURES IN WHEELER RESERVOIR

FACILITY OPERATING LICENSES DPR-33, DPR-52, AND DPR-68

TENNESSEE VALLEY AUTHORITY

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

DOCKETS NOS. 50-269, 50-260 AND 50-296

1.0 Description of Proposed Action

By letter dated January 5, 1979, the Tennessee Valley Authority (the licensee or TVA) requested changes to the Technical Specifications (Appendix B) 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 amendments and revised Technical Specifications would modify the method by which the plant determines compliance with the State of Alabama water temperature standards.

2.0 Background

At present, the state standards require that the maximum temperature outside of the mixing zone must be under 86°F and that the maximum increase in river temperature outside the mixing zone be less than 5°F. Recently, TVA has been granted a relaxation of the state standards allowing a maximum temperature of 90°F, but the 5°F increase is still in effect.

The plant discharges heated water through three multiport diffusers located in the old river channel of the Tennessee River in Lake Wheeler adjacent to the site. The plant may operate once-through, or with the partial or total reliance on mechanical draft cooling towers.

Compliance with state thermal standards is presently determined with a series of monitoring stations upstream and downstream of the discharge. There has been considerable difficulty in measuring a representative upstream temperature so that compliance with the 5°F temperature rise limitation could be determined. Solar heating of the shallow overbank regions of Wheeler Lake and stratification confuse the upstream thermal measurements, and do not allow true representation of thermal

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modifications from the Browns Ferry discharge. A vivid example of this confusion is that on several occasions, monitoring indicated that the plant was in violation of thermal standards during periods when the plant was shut down and there were no thermal discharges. Relocation of the monitoring stations has been of only limited help.

These false indications have been responsible for curtailments in power generation during periods of heavy demand.

Direct monitoring of river temperature at the site has proven to be inadequate. There is no straightforward way to separate the background natural temperature variations from the measurement records to distinguish the true temperature rise induced by the plant. The licensee has instead proposed to use a mathematical simulation of thermal plume dispersion to model the temperature rise and determine compliance. The inputs to the model would be the river flow, plant flow, plant heat rejection, and downstream mixed temperature. The ambient upstream temperature will then be back-calculated iteratively with the model, thereby establishing the temperature rise. River flow would not be measured directly at the site, but will be estimated from the known discharges at the upstream and downstream dams using a flow routing model. The licensee has stated his intention to continually refine the river temperature model in light of operating experience. This model has been tested and verified through detailed surveillance of the thermal plume at the Browns Ferry site. In addition, the licensee proposes to reduce the size of the legal mixing zone to a more natural one determined from the established properties of thermal plume.

3.0 Evaluation and Assessment

In assessing the acceptability of the proposed revisions to the monitoring plans, we have reviewed in detail the report from TVA accompanying the letter of July 5, 1979 (Ref. 1) and a paper describing the modeling of the plume (Ref. 2). We have also been in contact with members of the staff at TVA and at the Massachusetts Institute of Technology concerning the monitoring problems at Browns Ferry for several years.

The proposed compliance system will utilize the following measurements which experience has shown can be measured with much greater accuracy than the parameters presently used to determine compliance:

1. Mixed temperature: Three monitors will be situated approximately one to two diffuser lengths (1800-3600 feet) downstream of the diffusers. One will be situated at the left side of the navigation channel, one near the right side of the navigation channel, and one between the navigation channel and the right bank. Measurements will be made every 15 minutes at one-meter and two-meter depths at each monitor and transmitted to the plant site.

2. River Flow: Discharges from Guntersville and Wheeler Dams will be transmitted to the plant site at least hourly.

3. Discharge Temperature: A monitor at the diffuser gate structure will measure the temperature of water entering each diffuser and transmit the data to the plant site.

4. Discharge flow: The number of condenser cooling water pumps in operation and the position (open-closed) of appropriate gate structure will be monitored on site.

These measurements will be received by a dedicated computer which will calculate the following information:

1. Discharge flow will be computed from the number of condenser cooling water pumps in operation. The position of gate structures will allow determination of the operating diffusers.

2. River flow will be computed using an unsteady flow routing model and the previous 48 hours of Guntersville and Wheeler Dam discharges.

3. The temperature rise will be computed using the theory of diffuser mixing. The temperature rise and ambient river temperature will be calculated by an iterative procedure until the difference between successive calculations is small.

4. The ambient river temperature will be initially calculated as the present downstream temperature less the temperature rise of the previous hour. The ambient river temperature will be recalculated through successive iterative computations of the temperature rise.

5. The mixed temperature will be calculated using temperature data from the downstream monitor associated with the appropriate operating diffuser. Data at the one- and two-meter depths will be averaged to give temperature at the 1.5-meter (~5-foot) depth. Temperatures at each monitor will be temporarily averaged using the current temperature and the previous four 15-minute observations.

The river flow, temperature rise, and the mixed and ambient river temperatures will be transmitted to the plant control room. A permanent record will be stored for compliance purposes.

The proposed compliance system is expected to provide a more accurate value of the plant-induced temperature rise. The mathematical model of diffuser mixing has been verified to give reasonable predictions of diffuser mixing. Measurements of plant parameters can be readily scanned for accuracy and downstream temperature measurements are expected to be primarily affected by diffuser-induced mixing. The compliance system will be unaffected by natural temperature variations.

The compliance system will also provide hourly updates to the predictive computer model for cooling modes at Browns Ferry. This will permit more accurate forecasting of the effect of plant operation on plant-induced thermal effects. The hourly updates and forecasts will provide the data the plant needs to take corrective action (i.e., to switch from open cycle to helper mode of operation or from helper to closed cycle) before the state water temperature standards are exceeded.

We conclude that the proposed monitoring will be more reliable than the present system in determining compliance with the 5°F temperature rise standard. The proposed model has been adequately field tested at the Browns Ferry site. The state

water temperature standard was established to insure that there is no significant impact on the environment from thermal enrichment. While there will be no environmental impact from the proposed action (i.e., approving the amendment request), the proposed action will help to assure that the Browns Ferry plant remains in compliance with state water temperature standards, which, in turn, helps to insure that there is no significant environmental impact associated with plant operation.

4.0 Basis and Conclusion for not Preparing an Environmental Impact Statement

We have reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6 and have applied, weighted, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 FR 42801. We have determined that the proposed license amendment will not significantly affect the quality of the human environment and that there will be no significant environmental impact attributable to the proposed action other than which has already been predicted and described in the Final Environmental Statement for the facility dated September 1972. Therefore, the staff has found that an environmental impact statement need not be prepared, and that pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to this effect is appropriate.

Dated: August 15, 1979

References

1. Ungate, C. D., "Assessment of Water Temperature Monitoring at the Browns Ferry Nuclear Plant," Report No.WM28-1-67-101, Tennessee Valley Authority, Norris, Tennessee, August 1978.

2. Almquist, C. W., C. D. Ungate and W. R. Waldrup, "Field and Model Results for Multiport Diffusion Plume," in Verification of Mathematical and Physical Models in Hydraulic Engineering Proceedings, 26th Annual Hydraulic Division in Hydraulic Engineering Conference, August 8-11, 1978, American Society of Civil Engineers.

UNITED STATES NUCLEAR REGULATORY COMMISSION

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

TENNESSEE VALLEY AUTHORITY

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY
OPERATING LICENSES
AND
NEGATIVE DECLARATION

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 52 to Facility Operating License No. DPR-33, Amendment No. 47 to Facility Operating License No. DPR-52 and Amendment No. 24 to Facility Operating License No. DPR-68, issued to Tennessee Valley Authority (the licensee), which revised Technical Specifications for operation of the Browns Ferry Nuclear Plant, Units Nos. 1, 2 and 3, located in Limestone County, Alabama. The amendments are effective as of date of issuance.

The amendments change the Technical Specifications and authorize the licensee to substitute a computational thermal model for in-situ temperature monitoring stations to determine compliance with the mixing zone temperature limits and the State of Alabama water temperature standards.

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

The Commission has prepared an environmental impact appraisal for these amendments and has concluded that an environmental impact statement for this particular action is not warranted because there will be no environmental impact attributable to the action other than that which has already been predicted and described in the Final Environmental Statement for the facility dated September 1, 1972.

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For further details with respect to this action, see (1) the application for amendments dated January 5, 1979, (2) Amendment No. 52 to License No. DPR-33, Amendment No. 47 to License No. DPR-52, and Amendment No. 24 to License No. DPR-68, and (3) the Commission's related Environmental Impact Appraisal. 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 Operating Reactors.

Dated at Bethesda, Maryland this 15th day of August, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

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