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

June 28, 1994

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

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

Dear Mr. Kingsley:

SUBJECT: ISSUANCE OF TECHNICAL SPECIFICATION AMENDMENTS FOR THE BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3 (TAC NOS. M87272, M87273, AND M87274) (TS 334)

The Commission has issued the enclosed Amendment Nos. 208 , 224 , and 181 to Facility Operating Licenses Nos. DPR-33, DPR-52, and DPR-68 for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, respectively. These amendments are in response to your application dated July 19, 1993, regarding reactor coolant chemistry limits and sampling requirements.

The amendments remove the Technical Specifications (TS) addressing reactor coolant chemistry limits and associated sampling requirements that are applicable when the reactor is defueled. The TS requirements being removed have been conservatively incorporated into the BFN chemistry program as elements of a licensee-controlled procedure. Any future changes to these chemistry requirements must be evaluated in accordance with 10 CFR 50.59 to determine whether the changes involve an unreviewed safety question. A change involving an unreviewed safety question would require a license amendment and NRC review and approval prior to implementation. Additional changes to the reactor coolant chemistry TS are included within these amendments to provide clarification and to ensure consistency in requirements among units.

In addition, the amendments make certain changes to the chemistry limiting conditions for operation (LCOs) and surveillance requirements (SRs) when there is fuel in the reactor vessel. These changes have been determined to be acceptable as discussed in the enclosed safety evaluation.

CP-1

DF01

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

Sincerely,

ORIGINAL SIGNED BY:

David C. Trimble, Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 208 to License No. DPR-33
2. Amendment No. 224 to License No. DPR-52
3. Amendment No. 181 to License No. DPR-68
4. Safety Evaluation

cc w/enclosures:
See next page

PDII-4/LA	PDII-4/PM	PDII-4/PM	OTSB #94-129	EMCB	OGC	PDII-4/D
BClayton	JWilliams	DTrimble	CGrimes	JStrosnider	SETurk	FHebdon
6/17/94	6/16/94	6/12/94	6/17/94	6/17/94	6/24/94	6/28/94

DOCUMENT NAME: TS334.AMD

AMENDMENT NO. 208 FOR BROWNS FERRY UNIT 1 - DOCKET NO. 50-259
AMENDMENT NO. 224 FOR BROWNS FERRY UNIT 2 - DOCKET NO. 50-260
AMENDMENT NO. 181 FOR BROWNS FERRY UNIT 3 - DOCKET NO. 50-296
DATED: June 28, 1994

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 208
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 July 19, 1993, complies with the standards and requirements of the Atomic Energy of 1954, as amended of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-33 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 208, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon

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

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: June 28, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 208

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
3.6/4.6-5	3.6/4.6-5
3.6/4.6-6	3.6/4.6-6
3.6/4.6-7	3.6/4.6-7
3.6/4.6-8	3.6/4.6-8
3.6/4.6-28	3.6/4.6-28
3.6/4.6-29	3.6/4.6-29

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

1. PRIOR TO STARTUP and at steaming rates less than 100,000 lb/hr, the following limits shall apply.

   a. Conductivity, µmho/cm at 25°C 2.0

   b. Chloride, ppm 0.1

2. At steaming rates greater than 100,000 lb/hr, the following limits shall apply.

   a. Conductivity, µmho/cm at 25°C 1.0

   b. Chloride, ppm 0.2

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

1. Reactor coolant shall be continuously monitored for conductivity except when there is no fuel in the reactor vessel.

   a. Whenever the continuous conductivity monitor is inoperable, a sample of reactor coolant shall be analyzed for conductivity every 4 hours except as listed below. If the reactor is in COLD SHUTDOWN CONDITION, a sample of reactor coolant shall be analyzed for conductivity every 8 hours.

   b. Once a week the continuous monitor shall be checked with an in-line flow cell. This in-line conductivity calibration shall be performed every 24 hours whenever the reactor coolant conductivity is >1.0 µmho/cm at 25°C.

2. During startup prior to pressurizing the reactor above atmospheric pressure, measurements of reactor water quality shall be performed to show conformance with 3.6.B.1 of limiting conditions.

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3. At steaming rates greater than 100,000 lb/hr, the reactor water quality may exceed Specification 3.6.B.2 only for the time limits specified below. Exceeding these time limits of the following maximum quality limits shall be cause for placing the reactor in the COLD SHUTDOWN CONDITION.

   a. Conductivity time above 1 µmho/cm at 25°C - 2 weeks/year. Maximum Limit 10 µmho/cm at 25°C

   b. Chloride concentration time above 0.2 ppm - 2 weeks/year. Maximum Limit - 0.5 ppm.

   c. The reactor shall be placed in the SHUTDOWN CONDITION if pH <5.6 or >8.6 for a 24-hour period.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

3. Whenever the reactor is operating (including HOT STANDBY CONDITION) measurements of reactor water quality shall be performed according to the following schedule:

   a. Chloride ion content and pH shall be measured at least once every 96 hours.

   b. Chloride ion content shall be measured at least every 8 hours whenever reactor conductivity is >1.0 µmho/cm at 25°C.

   c. A sample of reactor coolant shall be measured for pH at least once every 8 hours whenever the reactor coolant conductivity is >1.0 µmho/cm at 25°C.

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

4. When the reactor is not pressurized with fuel in the reactor vessel, except during the STARTUP CONDITION, the reactor water shall be maintained within the following limits.

   a. Conductivity - 10 μmho/cm at 25°C

   b. Chloride - 0.5 ppm

   c. pH shall be between 5.3 and 8.6.

5. When the time limits or maximum conductivity or chloride concentration limits are exceeded, an orderly shutdown shall be initiated immediately. The reactor shall be brought to the COLD SHUTDOWN CONDITION as rapidly as cooldown rate permits.

6. Whenever the reactor is critical, the limits on activity concentrations in the reactor coolant shall not exceed the equilibrium value of 3.2 μCi/gm of dose equivalent I-131.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4. Whenever the reactor is not pressurized with fuel in the reactor vessel, a sample of the reactor coolant shall be analyzed at least every 96 hours for conductivity, chloride ion content and pH.

5. During equilibrium power operation an isotopic analysis, including quantitative measurements for at least I-131, I-132, I-133, and I-134 shall be performed monthly on a coolant liquid sample.

6. Additional coolant samples shall be taken whenever the reactor activity exceeds one percent of the equilibrium concentration specified in 3.6.B.6 and one of the following conditions are met:

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3.6.B.6 (Cont'd)

This limit may be exceeded following power transients for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed 26 μCi/gm whenever the reactor is critical. The reactor shall not be operated more than 5% of its yearly power operation under this exception for the equilibrium activity limits. If the iodine concentration in the coolant exceeds 26 μCi/gm, the reactor shall be shut down, and the steam line isolation valves shall be closed immediately.

7. When there is no fuel in the reactor vessel, technical specification reactor coolant chemistry limits do not apply.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4.6.B.6 (Cont'd)

a. During the STARTUP CONDITION

b. Following a significant power change**

c. Following an increase in the equilibrium off-gas level exceeding 10,000 μCi/sec (at the steam jet air ejector) within a 48-hour period.

d. Whenever the equilibrium iodine limit specified in 3.6.B.6 is exceeded.

The additional coolant liquid samples shall be taken at 4 hour intervals for 48 hours, or until a stable iodine concentration below the limiting value (3.2 μCi/gm) is established. However, at least 3 consecutive samples shall be taken in all cases. An isotopic analysis shall be performed for each sample, and quantitative measurements made to determine the dose equivalent I-131 concentration.

7. When there is no fuel in the reactor vessel, sampling of reactor coolant chemistry at technical specification frequency is not required.

** For the purpose of this section on sampling frequency, a significant power exchange is defined as a change exceeding 15% of rated power in less than 1 hour.

3.6.A/4.6.A (Cont'd)

total of 100°F. The partial boltup is restricted to the full loading of eight studs at 70°F, which is stud NDT temperature (10°F) plus 60°F. The neutron radiation fluence at the closure flanges is well below 10^{17} nvt $\geq$ 1 Mev; therefore, radiation effects will be minor and will not influence this temperature.

3.6.B/4.6.B Coolant Chemistry

Materials in the primary system are primarily 304 stainless steel and the Zircaloy cladding. The reactor water chemistry limits are established to prevent damage to these materials. Limits are placed on conductivity and chloride concentrations. Conductivity is limited because it is continuously measured and gives an indication of abnormal conditions and the presence of unusual materials in the coolant. Chloride limits are specified to prevent stress corrosion cracking of stainless steel.

Zircaloy does not exhibit similar stress corrosion failures. However, there are some operating conditions under which the dissolved oxygen content of the reactor coolant water could be higher than .2-.3 ppm, such as reactor STARTUP and Hot Standby. During these periods, the most restrictive limits for conductivity and chlorides have been established. When steaming rates exceed 100,000 lb/hr, boiling deaerates the reactor water. This reduces dissolved oxygen concentration and assures minimal chloride-oxygen content, which together tend to induce stress corrosion cracking.

When conductivity is in its normal range, pH and chloride and other impurities affecting conductivity must also be within their normal range. When conductivity becomes abnormal, then chloride measurements are made to determine whether or not they are also out of their normal operating values. This would not necessarily be the case. Conductivity could be high due to the presence of a neutral salt which would not have an effect on pH or chloride. In such a case, high conductivity alone is not a cause for shutdown. In some types of water-cooled reactors, conductivities are in fact high due to purposeful addition of additives. In the case of BWRs, however, where no additives are used and where near neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water. Significant changes therein provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change before limiting conditions, with respect to variables affecting the boundaries of the reactor coolant, are exceeded. Methods available to the operator for correcting the off-standard condition include operation of the reactor cleanup system, reducing the input of impurities and placing the reactor in the Cold Shutdown condition. The major benefit of Cold Shutdown is to reduce the temperature dependent corrosion rates and provide time for the cleanup system to reestablish the purity of the reactor coolant.

The conductivity of the reactor coolant is continuously monitored when there is fuel in the reactor vessel. Once a week the continuous monitor is checked with an in-line flow cell and is considered adequate to assure accurate readings of the monitors. If conductivity is within its

3.6/4.6 BASES

3.6.B/4.6.B (Cont'd)

normal range, chlorides and other impurities will also be within their normal ranges. The reactor coolant samples will also be used to determine the chlorides. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride ion content.

The basis for the equilibrium coolant iodine activity limit is a computed dose to the thyroid of 36 rem at the exclusion distance during the two-hour period following a steam line break. This dose is computed with the conservative assumption of a release of 140,000 lbs of coolant prior to closure of the isolation valves, and a X/Q value of 3.4×10^{-4} Sec/m^3.

The maximum activity limit during a short term transient is established from consideration of a maximum iodine inhalation dose less than 300 rem. The probability of a steam line break accident coincident with an iodine concentration transient is significantly lower than that of the accident alone, since operation of the reactor with iodine levels above the equilibrium value is limited to 5 percent of total operation.

The sampling frequencies are established in order to detect the occurrence of an iodine transient which may exceed the equilibrium concentration limit, and to assure that the maximum coolant iodine concentrations are not exceeded. Additional sampling is required following power changes and off-gas transients, since present data indicate that the iodine peaking phenomenon is related to these events.

3.6.C/4.6.C Coolant Leakage

Allowable leakage rates of coolant from the reactor coolant system have been based on the predicted and experimentally observed behavior of cracks in pipes and on the ability to makeup coolant system leakage in the event of loss of offsite ac power. The normally expected background leakage due to equipment design and the detection capability for determining coolant system leakage were also considered in establishing the limits. The behavior of cracks in piping systems has been experimentally and analytically investigated as part of the USAEC sponsored Reactor Primary Coolant System Rupture Study (the Pipe Rupture Study). Work utilizing the data obtained in this study indicates that leakage from a crack can be detected before the crack grows to a dangerous or critical size by mechanically or thermally induced cyclic loading, or stress corrosion cracking or some other mechanism characterized by gradual crack growth. This evidence suggests that for leakage somewhat greater than the limit specified for unidentified leakage, the probability is small that imperfections or cracks associated with such leakage would grow rapidly. However, the establishment of allowable unidentified leakage greater than that given in 3.6.C on the basis of the data presently available would be premature because of uncertainties associated with the data. For leakage of the order of five gpm, as specified in 3.6.C, the experimental and analytical data

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 224
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 July 19, 1993, 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) <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 224, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon

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

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: June 28, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 224

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
3.6/4.6-5	3.6/4.6-5
3.6/4.6-6	3.6/4.6-6
3.6/4.6-7	3.6/4.6-7
3.6/4.6-8	3.6/4.6-8
3.6/4.6-28	3.6/4.6-28
3.6/4.6-29	3.6/4.6-29

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

1. PRIOR TO STARTUP and at steaming rates less than 100,000 lb/hr, the following limits shall apply.

a.	Conductivity, µmho/cm at 25°C	2.0
b.	Chloride, ppm	0.1

2. At steaming rates greater than 100,000 lb/hr, the following limits shall apply.

a.	Conductivity, µmho/cm at 25°C	1.0
b.	Chloride, ppm	0.2

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

1. Reactor coolant shall be continuously monitored for conductivity except when there is no fuel in the reactor vessel.

   a. Whenever the continuous conductivity monitor is inoperable, a sample of reactor coolant shall be analyzed for conductivity every 4 hours except as listed below. If the reactor is in COLD SHUTDOWN CONDITION, a sample of reactor coolant shall be analyzed for conductivity every 8 hours.

   b. Once a week the continuous monitor shall be checked with an in-line flow cell. This in-line conductivity calibration shall be performed every 24 hours whenever the reactor coolant conductivity is >1.0 µmho/cm at 25°C.

2. During startup prior to pressurizing the reactor above atmospheric pressure, measurements of reactor water quality shall be performed to show conformance with 3.6.B.1 of limiting conditions.

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3. At steaming rates greater than 100,000 lb/hr, the reactor water quality may exceed Specification 3.6.B.2 only for the time limits specified below. Exceeding these time limits of the following maximum quality limits shall be cause for placing the reactor in the COLD SHUTDOWN CONDITION.

   a. Conductivity time above 1 μmho/cm at 25°C - 2 weeks/year.
   Maximum Limit 10 μmho/cm at 25°C

   b. Chloride concentration time above 0.2 ppm - 2 weeks/year.
   Maximum Limit - 0.5 ppm.

   c. The reactor shall be placed in the SHUTDOWN CONDITION if pH <5.6 or >8.6 for a 24-hour period.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

3. Whenever the reactor is operating (including HOT STANDBY CONDITION) measurements of reactor water quality shall be performed according to the following schedule:

   a. Chloride ion content and pH shall be measured at least once every 96 hours.

   b. Chloride ion content shall be measured at least every 8 hours whenever reactor conductivity is >1.0 μmho/cm at 25°C.

   c. A sample of reactor coolant shall be measured for pH at least once every 8 hours whenever the reactor coolant conductivity is >1.0 μmho/cm at 25°C.

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

4. When the reactor is not pressurized with fuel in the reactor vessel, except during the STARTUP CONDITION, the reactor water shall be maintained within the following limits.

   a. Conductivity - 10 µmho/cm at 25°C

   b. Chloride - 0.5 ppm

   c. pH shall be between 5.3 and 8.6.

5. When the time limits or maximum conductivity or chloride concentration limits are exceeded, an orderly shutdown shall be initiated immediately. The reactor shall be brought to the COLD SHUTDOWN CONDITION as rapidly as cooldown rate permits.

6. Whenever the reactor is critical, the limits on activity concentrations in the reactor coolant shall not exceed the equilibrium value of 3.2 µCi/gm of dose equivalent I-131.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4. Whenever the reactor is not pressurized with fuel in the reactor vessel, a sample of the reactor coolant shall be analyzed at least every 96 hours for conductivity, chloride ion content and pH.

5. During equilibrium power operation an isotopic analysis, including quantitative measurements for at least I-131, I-132, I-133, and I-134 shall be performed monthly on a coolant liquid sample.

6. Additional coolant samples shall be taken whenever the reactor activity exceeds one percent of the equilibrium concentration specified in 3.6.B.6 and one of the following conditions are met:

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3.6.B.6 (Cont'd)

This limit may be exceeded following power transients for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed 26 μCi/gm whenever the reactor is critical. The reactor shall not be operated more than 5% of its yearly power operation under this exception for the equilibrium activity limits. If the iodine concentration in the coolant exceeds 26 μCi/gm, the reactor shall be shut down, and the steam line isolation valves shall be closed immediately.

7. When there is no fuel in the reactor vessel, technical specification reactor coolant chemistry limits do not apply.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4.6.B.6 (Cont'd)

a. During the STARTUP CONDITION

b. Following a significant power change**

c. Following an increase in the equilibrium off-gas level exceeding 10,000 μCi/sec (at the steam jet air ejector) within a 48-hour period.

d. Whenever the equilibrium iodine limit specified in 3.6.B.6 is exceeded.

The additional coolant liquid samples shall be taken at 4 hour intervals for 48 hours, or until a stable iodine concentration below the limiting value (3.2 μCi/gm) is established. However, at least 3 consecutive samples shall be taken in all cases. An isotopic analysis shall be performed for each sample, and quantitative measurements made to determine the dose equivalent I-131 concentration.

7. When there is no fuel in the reactor vessel, sampling of reactor coolant chemistry at technical specification frequency is not required.

** For the purpose of this section on sampling frequency, a significant power exchange is defined as a change exceeding 15% of rated power in less than 1 hour.

3.6.A/4.6.A (Cont'd)

eight studs at 70°F, which is stud NDT temperature (10°F) plus 60°F. The neutron radiation fluence at the closure flanges is well below 10^{17} nvt $\geq$ 1 Mev; therefore, radiation effects will be minor and will not influence this temperature.

3.6.B/4.6.B Coolant Chemistry

Materials in the primary system are primarily 304 stainless steel and the Zircaloy cladding. The reactor water chemistry limits are established to prevent damage to these materials. Limits are placed on conductivity and chloride concentrations. Conductivity is limited because it is continuously measured and gives an indication of abnormal conditions and the presence of unusual materials in the coolant. Chloride limits are specified to prevent stress corrosion cracking of stainless steel.

Zircaloy does not exhibit similar stress corrosion failures. However, there are some operating conditions under which the dissolved oxygen content of the reactor coolant water could be higher than .2-.3 ppm, such as reactor startup and hot standby. During these periods, the most restrictive limits for conductivity and chlorides have been established. When steaming rates exceed 100,000 lb/hr, boiling deaerates the reactor water. This reduces dissolved oxygen concentration and assures minimal chloride-oxygen content, which together tend to induce stress corrosion cracking.

When conductivity is in its normal range, pH and chloride and other impurities affecting conductivity must also be within their normal range. When conductivity becomes abnormal, then chloride measurements are made to determine whether or not they are also out of their normal operating values. This would not necessarily be the case. Conductivity could be high due to the presence of a neutral salt which would not have an effect on pH or chloride. In such a case, high conductivity alone is not a cause for shutdown. In some types of water-cooled reactors, conductivities are in fact high due to purposeful addition of additives. In the case of BWRs, however, where no additives are used and where near neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water. Significant changes therein provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change before limiting conditions, with respect to variables affecting the boundaries of the reactor coolant, are exceeded. Methods available to the operator for correcting the off-standard condition include operation of the reactor cleanup system, reducing the input of impurities and placing the reactor in the Cold Shutdown condition. The major benefit of Cold Shutdown is to reduce the temperature dependent corrosion rates and provide time for the cleanup system to reestablish the purity of the reactor coolant.

The conductivity of the reactor coolant is continuously monitored when there is fuel in the reactor vessel. Once a week the continuous monitor is checked with an in-line flow cell and is considered adequate to assure accurate readings of the monitors. If conductivity is within

3.6/4.6 BASES

3.6.B/4.6.B (Cont'd)

its normal range, chlorides and other impurities will also be within their normal ranges. The reactor coolant samples will also be used to determine the chlorides. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride ion content.

The basis for the equilibrium coolant iodine activity limit is a computed dose to the thyroid of 36 rem at the exclusion distance during the two-hour period following a steam line break. This dose is computed with the conservative assumption of a release of 140,000 lbs of coolant prior to closure of the isolation valves, and a X/Q value of 3.4×10^{-4} Sec/m^3.

The maximum activity limit during a short term transient is established from consideration of a maximum iodine inhalation dose less than 300 rem. The probability of a steam line break accident coincident with an iodine concentration transient is significantly lower than that of the accident alone, since operation of the reactor with iodine levels above the equilibrium value is limited to 5 percent of total operation.

The sampling frequencies are established in order to detect the occurrence of an iodine transient which may exceed the equilibrium concentration limit, and to assure that the maximum coolant iodine concentrations are not exceeded. Additional sampling is required following power changes and off-gas transients, since present data indicate that the iodine peaking phenomenon is related to these events.

3.6.C/4.6.C Coolant Leakage

Allowable leakage rates of coolant from the reactor coolant system have been based on the predicted and experimentally observed behavior of cracks in pipes and on the ability to makeup coolant system leakage in the event of loss of offsite ac power. The normally expected background leakage due to equipment design and the detection capability for determining coolant system leakage were also considered in establishing the limits. The behavior of cracks in piping systems has been experimentally and analytically investigated as part of the USAEC sponsored Reactor Primary Coolant System Rupture Study (the Pipe Rupture Study). Work utilizing the data obtained in this study indicates that leakage from a crack can be detected before the crack grows to a dangerous or critical size by mechanically or thermally induced cyclic loading, or stress corrosion cracking or some other mechanism characterized by gradual crack growth. This evidence suggests that for leakage somewhat greater than the limit specified for unidentified leakage, the probability is small that imperfections or cracks associated with such leakage would grow rapidly. However, the establishment of allowable unidentified leakage greater than that given in 3.6.C on the basis of the data presently available would be premature because of uncertainties associated with the data. For leakage of the order of

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 181
License No. DPR-68

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

A. The application for amendment by Tennessee Valley Authority (the licensee) dated July 19, 1993, 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. 181, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon

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

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: June 28, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 181

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
3.6/4.6-5	3.6/4.6-5
3.6/4.6-6	3.6/4.6-6
3.6/4.6-7	3.6/4.6-7
3.6/4.6-8	3.6/4.6-8
3.6/4.6-28	3.6/4.6-28
3.6/4.6-29	3.6/4.6-29

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

1. PRIOR TO STARTUP and at steaming rates less than 100,000 lb/hr, the following limits shall apply.

a.	Conductivity, μmho/cm at 25°C	2.0
b.	Chloride, ppm	0.1

2. At steaming rates greater than 100,000 lb/hr, the following limits shall apply.

a.	Conductivity, μmho/cm at 25°C	1.0
b.	Chloride, ppm	0.2

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

1. Reactor coolant shall be continuously monitored for conductivity except when there is no fuel in the reactor vessel.

   a. Whenever the continuous conductivity monitor is inoperable, a sample of reactor coolant shall be analyzed for conductivity every 4 hours except as listed below. If the reactor is in COLD SHUTDOWN CONDITION, a sample of reactor coolant shall be analyzed for conductivity every 8 hours.

   b. Once a week the continuous monitor shall be checked with an in-line flow cell. This in-line conductivity calibration shall be performed every 24 hours whenever the reactor coolant conductivity is >1.0 μmho/cm at 25°C.

2. During startup prior to pressurizing the reactor above atmospheric pressure, measurements of reactor water quality shall be performed to show conformance with 3.6.B.1 of limiting conditions.

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3. At steaming rates greater than 100,000 lb/hr, the reactor water quality may exceed Specification 3.6.B.2 only for the time limits specified below. Exceeding these time limits of the following maximum quality limits shall be cause for placing the reactor in the COLD SHUTDOWN CONDITION.

   a. Conductivity time above 1 µmho/cm at 25°C - 2 weeks/year.
      Maximum Limit 10 µmho/cm at 25°C

   b. Chloride concentration time above 0.2 ppm - 2 weeks/year.
      Maximum Limit - 0.5 ppm.

   c. The reactor shall be placed in the SHUTDOWN CONDITION if pH <5.6 or >8.6 for a 24-hour period.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

3. Whenever the reactor is operating (including HOT STANDBY CONDITION) measurements of reactor water quality shall be performed according to the following schedule:

   a. Chloride ion content and pH shall be measured at least once every 96 hours.

   b. Chloride ion content shall be measured at least every 8 hours whenever reactor conductivity is >1.0 µmho/cm at 25°C.

   c. A sample of reactor coolant shall be measured for pH at least once every 8 hours whenever the reactor coolant conductivity is >1.0 µmho/cm at 25°C.

3.6/4.6 PRIMARY SYSTEM BOUNDARY

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

4. When the reactor is not pressurized with fuel in the reactor vessel, except during the STARTUP CONDITION, the reactor water shall be maintained within the following limits.

   a. Conductivity - 10 µmho/cm at 25°C

   b. Chloride - 0.5 ppm

   c. pH shall be between 5.3 and 8.6.

5. When the time limits or maximum conductivity or chloride concentration limits are exceeded, an orderly shutdown shall be initiated immediately. The reactor shall be brought to the COLD SHUTDOWN CONDITION as rapidly as cooldown rate permits.

6. Whenever the reactor is critical, the limits on activity concentrations in the reactor coolant shall not exceed the equilibrium value of 3.2 µCi/gm of dose equivalent I-131.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4. Whenever the reactor is not pressurized with fuel in the reactor vessel, a sample of the reactor coolant shall be analyzed at least every 96 hours for conductivity, chloride ion content and pH.

5. During equilibrium power operation an isotopic analysis, including quantitative measurements for at least I-131, I-132, I-133, and I-134 shall be performed monthly on a coolant liquid sample.

6. Additional coolant samples shall be taken whenever the reactor activity exceeds one percent of the equilibrium concentration specified in 3.6.B.6 and one of the following conditions are met:

LIMITING CONDITIONS FOR OPERATION

3.6.B. Coolant Chemistry

3.6.B.6 (Cont'd)

This limit may be exceeded following power transients for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed 26 μCi/gm whenever the reactor is critical. The reactor shall not be operated more than 5% of its yearly power operation under this exception for the equilibrium activity limits. If the iodine concentration in the coolant exceeds 26 μCi/gm, the reactor shall be shut down, and the steam line isolation valves shall be closed immediately.

7. When there is no fuel in the reactor vessel, technical specification reactor coolant chemistry limits do not apply.

SURVEILLANCE REQUIREMENTS

4.6.B. Coolant Chemistry

4.6.B.6 (Cont'd)

a. During the STARTUP CONDITION

b. Following a significant power change**

c. Following an increase in the equilibrium off-gas level exceeding 10,000 μCi/sec (at the steam jet air ejector) within a 48-hour period.

d. Whenever the equilibrium iodine limit specified in 3.6.B.6 is exceeded.

The additional coolant liquid samples shall be taken at 4 hour intervals for 48 hours, or until a stable iodine concentration below the limiting value (3.2 μCi/gm) is established. However, at least 3 consecutive samples shall be taken in all cases. An isotopic analysis shall be performed for each sample, and quantitative measurements made to determine the dose equivalent I-131 concentration.

7. When there is no fuel in the reactor vessel, sampling of reactor coolant chemistry at technical specification frequency is not required.

** For the purpose of this section on sampling frequency, a significant power exchange is defined as a change exceeding 15% of rated power in less than 1 hour.

3.6/4.6 BASES

3.6.A/4.6.A (Cont'd)

eight studs at 70°F, which is stud NDT temperature (10°F) plus 60°F. The neutron radiation fluence at the closure flanges is well below 10^{17} nvt $\geq$ 1 Mev; therefore, radiation effects will be minor and will not influence this temperature.

3.6.B/4.6.B Coolant Chemistry

Materials in the primary system are primarily 304 stainless steel and the Zircaloy cladding. The reactor water chemistry limits are established to prevent damage to these materials. Limits are placed on conductivity and chloride concentrations. Conductivity is limited because it is continuously measured and gives an indication of abnormal conditions and the presence of unusual materials in the coolant. Chloride limits are specified to prevent stress corrosion cracking of stainless steel.

Zircaloy does not exhibit similar stress corrosion failures. However, there are some operating conditions under which the dissolved oxygen content of the reactor coolant water could be higher than .2-.3 ppm, such as reactor startup and hot standby. During these periods, the most restrictive limits for conductivity and chlorides have been established. When steaming rates exceed 100,000 lb/hr, boiling deaerates the reactor water. This reduces dissolved oxygen concentration and assures minimal chloride-oxygen content, which together tend to induce stress corrosion cracking.

When conductivity is in its normal range, pH and chloride and other impurities affecting conductivity must also be within their normal range. When conductivity becomes abnormal, then chloride measurements are made to determine whether or not they are also out of their normal operating values. This would not necessarily be the case. Conductivity could be high due to the presence of a neutral salt which would not have an effect on pH or chloride. In such a case, high conductivity alone is not a cause for shutdown. In some types of water-cooled reactors, conductivities are in fact high due to purposeful addition of additives. In the case of BWRs, however, where no additives are used and where near neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water. Significant changes therein provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change before limiting conditions, with respect to variables affecting the boundaries of the reactor coolant, are exceeded. Methods available to the operator for correcting the off-standard condition include operation of the reactor cleanup system, reducing the input of impurities and placing the reactor in the Cold Shutdown condition. The major benefit of Cold Shutdown is to reduce the temperature dependent corrosion rates and provide time for the cleanup system to reestablish the purity of the reactor coolant.

The conductivity of the reactor coolant is continuously monitored when there is fuel in the reactor vessel. Once a week the continuous monitor is checked with an in-line flow cell and is considered adequate to assure accurate readings of the monitors. If conductivity is within

3.6/4.6 BASES

3.6.B/4.6.B (Cont'd)

its normal range, chlorides and other impurities will also be within their normal ranges. The reactor coolant samples will also be used to determine the chlorides. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride ion content.

The basis for the equilibrium coolant iodine activity limit is a computed dose to the thyroid of 36 rem at the exclusion distance during the two-hour period following a steam line break. This dose is computed with the conservative assumption of a release of 140,000 lbs of coolant prior to closure of the isolation valves, and a X/Q value of 3.4×10^{-4} Sec/m^3.

The maximum activity limit during a short term transient is established from consideration of a maximum iodine inhalation dose less than 300 rem. The probability of a steam line break accident coincident with an iodine concentration transient is significantly lower than that of the accident alone, since operation of the reactor with iodine levels above the equilibrium value is limited to 5 percent of total operation.

The sampling frequencies are established in order to detect the occurrence of an iodine transient which may exceed the equilibrium concentration limit, and to assure that the maximum coolant iodine concentrations are not exceeded. Additional sampling is required following power changes and off-gas transients, since present data indicate that the iodine peaking phenomenon is related to these events.

3.6.C/4.6.C Coolant Leakage

Allowable leakage rates of coolant from the reactor coolant system have been based on the predicted and experimentally observed behavior of cracks in pipes and on the ability to makeup coolant system leakage in the event of loss of offsite ac power. The normally expected background leakage due to equipment design and the detection capability for determining coolant system leakage were also considered in establishing the limits. The behavior of cracks in piping systems has been experimentally and analytically investigated as part of the USAEC sponsored Reactor Primary Coolant System Rupture Study (the Pipe Rupture Study). Work utilizing the data obtained in this study indicates that leakage from a crack can be detected before the crack grows to a dangerous or critical size by mechanically or thermally induced cyclic loading, or stress corrosion cracking or some other mechanism characterized by gradual crack growth. This evidence suggests that for leakage somewhat greater than the limit specified for unidentified leakage, the probability is small that imperfections or cracks associated with such leakage would grow rapidly. However, the establishment of allowable unidentified leakage greater than that given in 3.6.C on the basis of the data presently available would be premature because of uncertainties associated with the data. For leakage of the order of five gpm, as specified in 3.6.C, the experimental and analytical data

UNITED STATES
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ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 208 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 224 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 181 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

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

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

1.0 INTRODUCTION

By letter dated July 19, 1993, the Tennessee Valley Authority (TVA), the licensee, requested that the Nuclear Regulatory Commission (NRC) approve a change to the Browns Ferry Nuclear Station (BFN) Units 1, 2 and 3 Technical Specification (TS) 3.6.B./4.6.B., "Coolant Chemistry." The amendment request involves a number of changes to the TS Limiting Conditions for Operation (LCO) and Surveillance Requirements (SR) in Section 3.6.B./4.6.B. for BFN Units 1, 2 and 3, and removes the reactor coolant chemistry limits and associated sampling (surveillance) requirements that are applicable when the reactor is defueled from the TS. The chemistry requirements that were applicable during defueled conditions have already been incorporated into a licensee-controlled procedure under the jurisdiction of the licensee's Chemistry Program. Because chemical procedures are procedures described in the BFN Updated Final Safety Analysis Report (UFSAR), the provisions of 10 CFR 50.59 apply, requiring that associated procedure changes be evaluated to determine whether they involve an unreviewed safety question. Any change involving an unreviewed safety question would require a license amendment and NRC review and approval prior to implementation.

The proposed changes to TS Section 3.6.B./4.6.B. for both BFN Unit 1 & Unit 2 are identical. These proposed changes are listed in Attachment 1 to this Safety Evaluation (SE).

The proposed changes to TS Section 3.6.B./4.6.B. for BFN Unit 3 are more numerous and detailed than those proposed for the respective TS section of either the BFN Unit 1 TS or BFN Unit 2 TS. The licensee's intent is to make TS Section 3.6.B./4.6.B. consistent for all three Units, upon approval of this license amendment. These proposed changes to the TS for BFN Unit 3 are listed in Attachment 2 to this SE.

The proposed changes also include editorial changes to the Units 1 and 2 TS Section 3.6.B./4.6.B. and corresponding changes to the TS Bases Section for BFN Units 1, 2 and 3.

2.0 EVALUATION

10 CFR 50.36(c) requires that TS include items in specific categories, including safety limits, LCOs, and SRs; however, the rule does not specify the particular requirements to be included in a plant's TS. The NRC developed criteria, as described in the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 FR 39132), to determine which of the design conditions and associated surveillance provisions need to be located in the TS because they are "necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety." Briefly, those criteria are (1) detection of abnormal degradation of the reactor coolant pressure boundary, (2) boundary conditions for design basis accidents and transients, (3) primary success paths to prevent or mitigate design basis accidents and transients, and (4) functions determined by probablistic risk assessment or operating experience to be important to public health and safety.

The licensee's proposal would: (1) relocate the limits and SRs on reactor coolant chemistry applicable during defueled conditions from the TS to the licensee's chemistry program and (2) control changes to the chemistry program in accordance with the provisions of 10 CFR 50.59. Chemistry limits ensure that degradation of the reactor coolant pressure boundary (RCPB) is not exacerbated by poor chemistry conditions. However degradation of the RCPB is a long-term process; and there are other direct means, such as in-service inspection, to detect and correct degradation of the RCPB, which will continue to be required by regulations and TS. On the basis that the relocation of chemistry limits will be limited to defueled conditions only and that additional means for the detection of degradation of the RCPB will continue to be required by TS, the staff concludes that the proposed amendment is acceptable.

The reactor coolant chemistry requirements applicable during defueled conditions will be controlled by a licensee chemistry procedure, which is a procedure described in the Updated Final Safety Analysis Report. In accordance with 10 CFR 50.59, any changes to these chemistry requirements must be evaluated to determine if they involve an unreviewed safety question. If the changes involve an unreviewed safety question, the licensee must submit a license amendment to obtain NRC review and approval of the changes prior to implementation. The staff has concluded that control of these design conditions in the TS (a) is not specifically required by 10 CFR 50.36 or other regulations, (b) is not required to avert an immediate threat to the public health and safety, and (c) is not necessary because changes that are deemed to involve an unreviewed safety question will require prior NRC approval and a license amendment as provided by 10 CFR §50.59(c).

In addition to the foregoing changes, the amendment would retain the chemistry LCOs and SRs when there is fuel in the reactor vessel, with the following changes.

1. The licensee has proposed to amend the TS to require that iodine isotopic analyses be performed on all samples that are required to be taken during STARTUP, periods of high off-gas activity (> 10,000 μCi/s)

or after significant power changes have been made, not just at times when the dose equivalent iodine activity is above 0.32 for Units 1 and 2 (0.032 for Unit 3) μCi/gm as is currently required. These changes apply to Units 1, 2 and 3, and are conservative.

2. Another proposed change to the reactor coolant chemistry specifications would require the licensee to perform a pH analysis every 96 hours whenever the plant is in the hot standby or power operation condition. This change represents an addition to the TS for BFN Units 1, 2 & 3 and is conservative. The licensee has proposed a limit of $5.6 < pH < 8.6$ for Unit 3 whenever the reactor is operating at a steaming rate greater than 100,000 lb./hr. This pH range is acceptable.

3. The licensee has added a requirement for sampling and analysis of conductivity, chloride and pH during times when the Unit 3 reactor is depressurized, with fuel in the reactor (except during the startup condition). The licensee has set a limiting condition during these times which requires that the coolant pH be maintained in the 5.3 - 8.6 range. This pH range is reasonable. These changes are conservative and therefore acceptable.

4. The licensee has also lowered a number of the chemistry parameter limits (on conductivity and chloride content) and added a limitation on range of pH for Unit 3. These changes are all conservative with respect to the previous licensing basis, and therefore acceptable.

5. The licensee has also lowered the Unit 3 time limits (from 4 weeks/yr to 2 weeks/yr) which are applicable during times when the steaming rates are in excess of 100,000 lbs/hr. These time limits represent the collective amount of time during the year in which the licensee may exceed the normal conductivity or chloride limits (1.0 μmhos/cm and 0.2 ppm, respectively). The changes to the Unit 3 time limits are conservative, and therefore acceptable.

6. The licensee has opted to change, in regard to the Unit 3 TS, the maximum allowable dose equivalent iodine - 131 (I-131) activity [from 10 x equilibrium iodine activity] to a concrete specified value, set at 26 μCi/gm. This maximum allowable dose equivalent I-131 activity is included in the TS to place a ceiling on total I-131 activity during the period in which the dose equivalent I-131 activity may be out of specification with the normal 3.2 μCi/gm limit (the I-131 activity may be out of specification for a 48 hour period). This change has been previously approved for Units 1 and 2, and is acceptable.

The proposed changes to Section 3.6.B./4.6.B. described above will make the BFN Unit 3 LCOs and SRs on "Coolant Chemistry" consistent with those stated in the corresponding TS sections (TS LCOs and SRs in 3.6.B/4.6.B, "Coolant Chemistry,") for BFN Units 1 and 2. These changes are all conservative and will improve the quality of operations for Unit 3, and make operations of Unit 3 more consistent with the operations of Units 1 and 2.

The NRC staff has concluded that the licensee's proposed changes to the BFN Unit 3 TS will provide adequate control of the important parameters for the reactor coolant chemistry. The licensee has shown that all of the changes to reactor coolant chemistry parameters, surveillances, and activity requirements in Section 3.6.B./4.6.B. are conservative. These changes will make the BFN Unit 3 TS Section 3.6.B./4.6.B. consistent with the corresponding sections in the TS for Units 1 and 2, and are, therefore, acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes the Surveillance Requirements and Bases. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (58 FR 59756). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based upon the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Jim Medoff

Date: June 28, 1994

Attachments:
As stated

Attachment 1

Proposed Changes to Section 3.6.B/4.6.B

in the BFN Unit 1 and Unit 2 Technical Specifications

1. Amends SR 4.6.B.1. to state that continuous conductivity monitoring is no longer required when the reactor vessel is defueled.

2. Amends SR 4.6.B.1.a. to require a reactor coolant sample and conductivity analysis every 4 hours whenever the continuous conductivity monitor is inoperable, with the exception being that the sample and test will be conducted every 8 hours when the reactor is in a "cold shutdown" condition. This change removes any reference to the operational status of the condensate demineralizers from the surveillance requirement.

3. Adds a 96 hour surveillance requirement (SR 4.6.B.3.a.) on reactor coolant pH whenever the unit is in the operational or hot standby conditions.

4. Editorially changes SR 4.6.B.3.c.

5. Amends LCO 3.6.B.4 to state that the LCOs on conductivity, chloride and pH are only applicable when the reactor is not pressurized with <u>fuel in the reactor</u> (i.e, the LCOs do not apply when the reactor is defueled).

6. Amends SR 4.6.B.4. to change the applicability of the surveillance to periods when the reactor is pressurized with <u>fuel in the reactor</u>, and adds a conductivity analysis (once every 96 hours) to pH and chloride analyses required by the SR.

7. Changes SR 4.6.B.6. to require isotopic dose 1-131 quantitative analyses whenever reactor operation is in the startup condition or involves a significant power change, or whenever an increase in the off-gas activity occurs which exceeds 10,000 μCi/sec in any 48 hour period or the maximum dose iodine equivalent activity of 3.2 μCi/gm is exceeded, not just when the iodine activity is above 0.32 μCi/gm.

7. Adds a provision to the LCO 3.6.B.7. which states that reactor chemistry coolant limits do not apply when the reactor is defueled.

8. Adds a provision to the SR 4.6.B.7. which states that reactor chemistry coolant sampling requirements do not apply when the reactor is defueled.

Attachment 2

Proposed Changes to Section 3.6.B/4.6.B

in the BFN Unit 3 Technical Specifications

1. Changes SR 4.6.B.1. to require continuous conductivity monitoring at all times except when the reactor is defueled. This changes surveillance of conductivity from a periodic sampling and analysis basis to an online monitoring basis.

2. Changes some of the existing conductivity surveillance requirements of SR 4.6.B.1. to SR 4.6.B.1.a., which requires that a conductivity sample and analysis be performed every 4 hours during periods when the continuous conductivity meter is inoperable, except when the continuous conductivity meter is inoperable, and the reactor is in the Cold Shutdown Condition, upon which the conductivity sample and analysis will be performed every 8 hours.

3. Adds SR 4.6.B.1.b. which requires that a weekly calibration of the continuous conductivity monitor be performed, with the exception being that this surveillance will be performed daily whenever the reactor coolant continuous conductivity is greater than 1.0 μmhos/cm.

4. Adds SR 4.6.B.2. to require reactor coolant measurements of conductivity and chloride during startup, prior to pressurization of the reactor above atmospheric pressure. The measurements specified by this SR will be performed to show conformance with the requirements of LCO 3.6.B.1.

5. Reduces the allowable coolant chemistry conductivity in LCO 3.6.B.2.a. during operation and steaming rates > 100,000 lb/hr from 2.0 μmhos/cm to 1.0 μmhos/cm.

6. Renumbers existing SR 4.6.B.3. to SR 4.6.B.6., and adds a new 96 hour surveillance requirement, SR 4.6.B.3, which requires that the reactor coolant chloride content and pH be measured, as follows, whenever the BFN Unit 3 is in the operational or hot standby condition:

   a) chloride ion content and pH to be measured, as a minimum, once every 96 hours, or

   b) chloride ion and pH measurements once every eight hours if the reactor coolant conductivity exceeds 1.0 μmhos/cm.

7. Amends the time limits and maximum limits (LCO 3.6.B.3, applicable at steaming rates greater than 100,000 lb/hr) in which a reactor coolant parameter (conductivity, chloride, and pH) may exceed the normal limit as follows:

   a) amends LCO 3.6.B.3.a. to lower the allowable, normal limit from 2.0 μmhos/cm to 1.0 μmhos/cm.

   b) amends LCO 3.6.B.3.a. to lower the time in which the Unit 3 conductivity may exceed 1.0 μmhos/cm from 4 weeks/yr to 2 weeks/yr.

c) amends LCO 3.6.B.3.b. to lower the time at which the Unit 3 chloride may exceed 0.2 ppm from 4 weeks/yr to 2 weeks/yr.

8. Adds an LCO 3.6.B.3.c. to require a shutdown of the reactor if the reactor coolant pH < 5.6 or > 8.6 for a 24 hour period.

9. Adds a LCO 3.6.B.4.c. which requires that the reactor coolant pH be maintained between 5.3 and 8.6 during periods when the reactor vessel is depressurized and fuel is in the reactor vessel.

10. Amends LCO 3.6.B.4. qualify that the limits on conductivity, chloride content and pH (in stated LCO 3.6.B.4.a., b. and c.) which are applicable at times when the reactor is depressurized, do not apply when the reactor vessel is defueled.

11. Amends SR 4.6.B.4. to require that a reactor coolant sample be taken and analyzed for conductivity, chloride and pH at least every 96 hours, whenever the reactor is depressurized with fuel inside the reactor vessel.

12. Adds LCO 3.6.B.5. which requires a commencement to cold shutdown (as rapidly as cooldown rate permits) whenever the time limits or maximum conductivity or chloride limits are exceeded.

13. Renumbers the old, existing LCO 3.6.B.5. as LCO 3.6.B.6., and for periods when the reactor is critical, changes the maximum iodine activity [from 10 x equilibrium iodine concentration] to a specified 26 μCi/gm limit. This maximum limit places a ceiling on activity during the period in which the licensee is allowed by specification to exceed the normal limit (3.2 μCi/gm), without having to shut down the reactor. This change was previously approved for Units 1 and 2.

14. Administratively changes the SR on I-131, I-132, I-133 and 1-134 isotopic analyses from 4.6.B.2. to 4.6.B.5. SRs for dose iodine equivalent activity are consistent with those proposed for Units 1 and 2.

15. New SR 4.6.B.6. (old SR 4.6.B.3.) is changed to reflect, with the reactor critical, that isotopic iodine equivalent analyses are required for all sample, not just when the total iodine activity is above 0.032 μCi/gm. This change is conservative by design.

16. Adds a LCO 3.6.B.7. which states that reactor chemistry coolant limits do not apply when the reactor is defueled.

17. Adds a SR 4.6.B.7. which states that reactor chemistry coolant sampling requirements do not apply when the reactor is defueled.