ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION CHANGE
BROWNS FERRY NUCLEAR PLANT
UNITS 1, 2, AND 3

(TVA BFN TECHNICAL SPECIFICATION AMENDMENT 334)

Technical Specification 334
Effective Page Listing

Unit 1

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

Unit 2

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

Unit 3

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

PROPOSED TECHNICAL SPECIFICATION CHANGE
BROWNS FERRY NUCLEAR PLANT
UNIT 1

(TVA BFN TECHNICAL SPECIFICATION AMENDMENT 334)

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.

3.6/4.6 PRIMARY SYSTEM BOUNDARY

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.

3.6/4.6 BASES

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

PROPOSED TECHNICAL SPECIFICATION CHANGE
BROWNS FERRY NUCLEAR PLANT
UNIT 2

(TVA BFN TECHNICAL SPECIFICATION AMENDMENT 334)

3.6/4.6 PRIMARY SYSTEM BOUNDARY

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.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

PROPOSED TECHNICAL SPECIFICATION CHANGE
BROWNS FERRY NUCLEAR PLANT
UNIT 3

(TVA BFN TECHNICAL SPECIFICATION AMENDMENT 334)

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.6.B. Coolant Chemistry	**4.6.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	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. 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	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 five gpm, as specified in 3.6.C, the experimental and analytical data

ENCLOSURE 2

BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
(TVA BFN TECHNICAL SPECIFICATION AMENDMENT 334)
REASON FOR THE CHANGE, DESCRIPTION AND JUSTIFICATION

REASON FOR THE CHANGE

The proposed change revises Specification 3.6.B/4.6.B, "Coolant Chemistry" and its associated bases for Unit 3 to make it consistent with the Units 1 and 2 Specifications 3.6.B/4.6.B. This proposed change reduces the potential for human factor related errors that could result from the subtle differences in the existing specifications. For Units 1 and 2, the proposed change revises Specification 3.6.B/4.6.B to clarify some of the requirements to ensure consistency throughout the specification.

The proposed change for Units 1, 2, and 3 revises Specification 3.6.B/4.6.B to eliminate from the technical specifications the reactor coolant chemistry limits and associated sampling requirements when there is no fuel in the reactor vessel. The appropriate reactor coolant chemistry limits and associated sampling requirements for the defueled condition are maintained by the BFN "Chemistry Program".

DESCRIPTION OF THE PROPOSED CHANGE

1. For Unit 3, Specification 3.6.B.2.a reads:

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

   The revised specification reads:

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

2. For Unit 3, Specifications 3.6.B.3.a and 3.6.B.3.b read:

   "a. Conductivity time above 2 μmho/cm at 25°C - 4 weeks/year.
   Maximum Limit - 10 μmho/cm at 25°C."

   "b. Chloride concentration time above 0.2 ppm - 4 weeks/year.
   Maximum Limit - 0.5 ppm."

The revised specifications read:

"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."

3. For Unit 3, a new Specification 3.6.B.3.c is added and reads:

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

4. For Units 1, 2, and 3, Specification 3.6.B.4 reads:

"When the reactor is not pressurized except during the STARTUP CONDITION, the reactor water shall be maintained within the following limits."

The revised specification reads:

"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."

5. For Unit 3, a new Specification 3.6.B.4.c is added and reads:

"c. pH shall be between 5.3 and 8.6."

6. For Unit 3, a new Specification 3.6.B.5 is added and reads:

"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."

7. For Unit 3, Specification 3.6.B.5 reads in part:

   "This limit may be exceeded following power transients for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed the equilibrium values by a factor of more than 10 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 the equilibrium limit by a factor ten, the reactor shall be shut down, and the steam line isolation valves shall be closed immediately."

   The revised specification is renumbered to 3.6.B.6 and reads in part:

   "This limit may be exceeded following power transient for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed 26μCi/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 26μCi/gm, the reactor shall be shutdown, and the steamline isolation valves shall be closed immediately."

8. For Units 1, 2, and 3, a new Specification 3.6.B.7 is added and reads:

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

9. For Unit 3, Specification 4.6.B.1 is deleted.

   A new Specification 4.6.B.1 is added and reads:

   "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

7. For Unit 3, Specification 3.6.B.5 reads in part:

   "This limit may be exceeded following power transients for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed the equilibrium values by a factor of more than 10 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 the equilibrium limit by a factor ten, the reactor shall be shut down, and the steam line isolation valves shall be closed immediately."

   The revised specification is renumbered to 3.6.B.6 and reads in part:

   "This limit may be exceeded following power transient for a maximum of 48 hours. During this activity transient the iodine concentrations shall not exceed 26μCi/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 26μCi/gm, the reactor shall be shutdown, and the steamline isolation valves shall be closed immediately."

8. For Units 1, 2, and 3, a new Specification 3.6.B.7 is added and reads:

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

9. For Unit 3, Specification 4.6.B.1 is deleted.

   A new Specification 4.6.B.1 is added and reads:

   "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."

For Units 1 and 2, Specification 4.6.B.1 reads in part:

"1. Reactor coolant shall be continuously monitored for conductivity.

a. Whenever the continuous conductivity monitor is inoperable and the condensate demineralizers are bypassed, a sample of reactor coolant shall be analyzed for conductivity every 4 hours. If the condensate demineralizers are in service, a sample of reactor coolant shall be analyzed for conductivity every 8 hours."

The revised specification reads:

"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."

10. For Unit 3, Specification 4.6.B.2 is renumbered to Specification 4.6.B.5. A new Specification 4.6.B.2 is added and reads:

"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."

11. For Unit 3, Specification 4.6.B.3 is renumbered to Specification 4.6.B.6. In new Specifications 4.6.B.6 and 4.6.B.6.d references to "3.6.B.5" are revised to reference "3.6.B.6." In new Specification 4.6.B.6.c, the term "μuCI/sec" is corrected to read "μCi/sec." A new Specification 4.6.B.3 is added and reads:

"3. Whenever the reactor is operating (including HOT STANDBY CONDITION) measurement 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."

12. For Unit 3, a new Specification 4.6.B.4 is added and reads:

"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."

For Units 1 and 2, Specification 4.6.B.4 reads:

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

The revised specification reads:

"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."

13. For Units 1, 2, and 3, a new Specification 4.B.6.7 is added and reads:

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

14. For Units 1 and 2, Specification 4.6.B.3.a reads:

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

The revised specification reads:

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

15. For Units 1 and 2, Specification 4.6.B.3.c, the words "primary coolant" are changed to read "reactor coolant".

16. For Units 1, 2 and 3, new Specification 4.6.B.6 reads in part:

"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. If the total iodine activity of the sample is below 0.32 (0.032 for Unit 3) μCi/gm, an isotopic analysis to determine equivalent I-131 is not required."

The revised specification reads:

"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."

17. For Units 1, 2 and 3, the Bases 3.6.B/4.6.B on page 3.6/4.6-28 reads in part:

"The conductivity of the reactor coolant is continuously monitored. The samples of the coolant which are taken every 96 hours will serve as reference for calibration of these monitors and is considered adequate to assure accurate readings of the monitors."

The revised Bases reads in part:

"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 reading of the monitors."

18. For Units 1, 2, and 3, delete from the Bases 3.6.B/4.6.B on page 3.6/4.6-29 the following sentences:

"Daily sampling is performed when increased chloride concentrations are most probable. Reactor coolant sampling is increased to once per shift when the continuous conductivity monitor is unavailable."

19. For Unit 3, the Bases 3.6.B/4.6.B on page 3.6/4.6-29 reads in part:

    "The basis for the equilibrium coolant iodine activity limit is a computed dose to the thyroid 30 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 2.9×10^{-4} Sec/^{3}."

The revised Bases reads in part:

    "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."

JUSTIFICATION FOR THE PROPOSED CHANGE

Unit 3 Specification 3.6.B/4.6.B, as it essentially exists today, was issued August 2, 1976, as part of the original technical specifications and was patterned after the Units 1 and 2 Specification 3.6.B/4.6.B. On August 20, 1976, Units 1 and 2 Specification 3.6.B/4.6.B was reissued, as it essentially exists today, and Unit 3 specification was not revised to be identical. This proposed change does not involve any change to the existing physical plant configuration. The proposed change adds an additional requirement to control pH, reduces limits on conductivity and chloride, and clarifies some shutdown requirements. The proposed change revises Unit 3 Specification 3.6.B/4.6.B and associated bases to make it consistent with the Units 1 and 2 Specification 3.6.B/4.6.B. For Units 1 and 2, the proposed change clarifies some of the requirements to ensure consistency throughout the specification. For Units 1, 2 and 3, the proposed change eliminates from the technical specifications the reactor coolant chemistry limits and associated sampling when there is no fuel in the reactor vessel.

Poor reactor coolant chemistry contributes to the long-term degradation of system materials. The reactor coolant chemistry technical specification does not provide requirements related to: 1) installed instrumentation used to detect, and indicate in the control room, a significant abnormal degradation of the Reactor Coolant Pressure Boundary (RCPB), or 2) a process variable that is an initial condition of a Design Basis Accident (DBA) or transient analyses that either assume the failure of or present a challenge to the integrity of a FP barrier, or 3) a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a Fire Protection (FP) barrier. Therefore, its requirements can be relocated to the BFN Chemistry Program. During the defueled condition, these reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 program.

On a programmatic basis, the reactor coolant quality and monitoring frequency are controlled for all conditions including the defueled reactor vessel condition. The removal from technical specifications of the requirements on reactor coolant quality and monitoring for the defueled condition will not eliminate the requirement from the chemistry program. Thus, the chemistry program will maintain the appropriate reactor coolant within the limits to ensure that reactor pressure vessel/internals are not affected.

A more detailed discussion for each change is provided below in order in which it appears in the description of the proposed change section of this enclosure.

1. For Unit 3, the proposed Specification 3.6.B.2.a limit on conductivity is reduced from 2.0 µmho/cm to 1.0 µmho/cm to agree with the Units 1 and 2 requirements.

2. For Unit 3, the proposed Specification 3.6.B.3.a limit on conductivity is reduced from 2.0 µmho/cm to 1.0 µmho/cm. The Specifications 3.6.B.3.a and 3.6.B.3.b time limits on exceeding the conductivity/chloride limits are reduced from 4 weeks/year to 2 weeks/year. These proposed changes revise the Unit 3 specifications to agree with the Units 1 and 2 specifications.

3. For Unit 3, the proposed Specification 3.6.B.3.c is added and contains requirements to control pH or to shutdown the reactor if the limits are not maintained for a 24-hour period. The proposed change revises the Unit 3 specification to agree with the Units 1 and 2 specifications.

4. For Units 1, 2, and 3, the proposed Specification 3.6.B.4 states that the technical specification reactor coolant chemistry limits do not apply when there is no fuel in the reactor vessel.

5. For Unit 3, the proposed Specification 3.6.B.4.c is added and contains pH limits. The proposed change revises the Unit 3 specification to agree with the Units 1 and 2 specification.

6. For Unit 3, the proposed Specification 3.6.B.5 is added and contains a requirement to shutdown the reactor if the time limits or maximum conductivity or chloride concentration limits are exceeded. The proposed change revises the Unit 3 specification to agree with the Unit 1 and 2 specification.

7. For Unit 3, Specification 3.6.B.5 is renumbered to proposed Specification 3.6.B.6 and a specific iodine concentration of 26 μCi/gm is proposed instead of the existing 10 times the equilibrium iodine concentration. The proposed changes revise the Unit 3 specification to agree with the Units 1 and 2 specification.

8. For Units 1, 2, and 3, the proposed Specification 3.6.B.7 is added and states that the technical specification reactor coolant chemistry limits do not apply when there is no fuel in the reactor vessel. During the defueled condition, these reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program.

9. For Unit 3, the existing Specification 4.6.B.1 is deleted and replaced by proposed Specification 4.6.B.1 which contains the requirements for the continuous monitoring of reactor coolant conductivity when there is fuel in the reactor vessel. The requirements of the existing Specification 4.6.B.1 for monitoring chloride is addressed by proposed Specification 4.6.B.3. The requirements of existing specification are addressed by proposed Specifications 4.6.B.1 and 4.6.B.3. The proposed changes revise the Unit 3 specification to agree with the Units 1 and 2 specification.

   For Units 1 and 2, the proposed Specification 4.6.B.1 states that the monitoring of reactor coolant conductivity is required only when there is fuel in the reactor vessel. During the defueled condition, these reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program.

For Units 1 and 2, the proposed change clarifies the sampling requirements when the continuous conductivity monitor is inoperable.

10. For Unit 3, the existing Specification 4.6.B.2 is renumbered to proposed Specification 4.6.B.5. The proposed Specification 4.6.B.2 is added and states the requirements to measure reactor coolant chemistry during startup prior to pressurizing the reactor. The proposed changes revise the Unit 3 specification to agree with the Units 1 and 2 specifications.

11. For Unit 3, Specification 4.6.B.3 is renumbered to proposed Specification 4.6.B.6 and the references to 3.6.B.5 are revised to agree with the renumbering. Proposed Specification 4.6.B.3 is added and states the requirements to monitor chloride and pH during reactor operation. The requirements to monitor chloride is contained in existing Specification 4.6.B.1. The proposed change revises the Unit 3 specification to agree with the Units 1 and 2 specification.

12. For Unit 3, proposed Specification 4.6.B.4 is added and contains the requirement to sample for conductivity, chloride and pH whenever the reactor is not pressurized with fuel in the reactor vessel. For Units 1 and 2, existing specification is revised to require sampling for conductivity, chloride and pH only when there is fuel in the reactor vessel. During the defueled condition, the reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program. The proposed change also revises the Unit 3 specification to agree with the Units 1 and 2 specification.

13. For Units 1, 2, and 3, the proposed Specification 4.6.B.7 is added and states that sampling of reactor coolant chemistry at technical specification frequency is not required when there is no fuel in the reactor vessel. During the defueled condition, the reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program.

14. For Units 1 and 2, Specification 4.6.B.3.a is changed to require pH measurement every 96 hours. The proposed change provides the surveillance to support the Specification 3.6.B.3.c.

15. For Units 1 and 2, Specification 4.6.B.3.c, the words "primary coolant" are changed to read "reactor coolant". The proposed change ensures consistency through the specification.

16. For Units 1, 2 and 3, Specification 4.6.B.6 is changed to require isotopic analysis for all samples, not just when the total iodine activity is above 0.32 (0.032 for Unit 3) μCi/gm. This change is in the conservative direction.

17. For Units 1, 2 and 3, the Bases 3.6.B/4.6.B on page 3.6/4.6-28 is revised to reflect the requirement to monitor reactor coolant chemistry only when there is fuel in the reactor vessel. The proposed change revises the bases to be consistent with the proposed specification changes. The proposed change clarifies that the calibration required by Specification 4.6.B.1.b is weekly and this makes the bases consistent with the specification.

18. For Units 1, 2, and 3, the Bases 3.6.B/4.6.B on page 3.6/4.6-29 is revised to delete reference to daily sampling and shift sampling requirements. These requirements were previously replaced on Units 1 and 2 by Specification 4.6.B.1 and are being replaced on Unit 3 by Specification 4.6.B.1. The proposed change revises the bases to be consistent the existing and proposed specifications.

19. For Unit 3, the Bases 3.6.B/4.6.B on page 3.6/4.6-29 is revised to change the computed dose to the thyroid and the X/Q value used in the dose calculation. These are administrative changes to revise the Unit 3 bases to agree with the Units 1 and 2 Bases.

ENCLOSURE 3

BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
(TVA BFN TECHNICAL SPECIFICATION NO. 334)
PROPOSED NO SIGNIFICANT HAZARDS CONSIDERATIONS DETERMINATION

DESCRIPTION OF THE PROPOSED TECHNICAL SPECIFICATION CHANGE

The BFN technical specifications are being revised as follows:

1. For Unit 3, revise Specification 3.6.B.2.a to reduce the conductivity limit to 1.0 µmho/cm.

2. For Unit 3, revise Specifications 3.6.B.3.a and 3.6.B.3.b to reduce the conductivity limit to 1.0 µmho/cm and to reduce the time limits on exceeding the conductivity/chloride limits to 2 weeks/year.

3. For Unit 3, add Specification 3.6.B.3.c that contains a requirement to control pH or to shutdown the reactor.

4. For Units, 1, 2, and 3, revise Specification 3.6.B.4 to state that the reactor coolant chemistry limits apply only when there is fuel in the reactor vessel.

5. For Unit 3, add Specification 3.6.B.4.c to contain pH limits.

6. For Unit 3, add Specification 3.6.B.5 that contains a requirement to shutdown the reactor if the time limits or maximum conductivity or chloride concentration limits are exceeded.

7. For Unit 3, renumber Specification 3.6.B.5 to Specification 3.6.B.6 and revise to include a specific iodine concentration limit for use following power transients.

8. For Units 1, 2, and 3, add Specification 3.6.B.7 to state that the technical specification reactor coolant chemistry limits do not apply when there is no fuel in the reactor vessel.

9. For Unit 3, delete existing Specification 4.6.B.1 and replace with Specification 4.6.B.1 that contains the requirement for continuous monitoring of reactor coolant conductivity only when there is fuel in the reactor vessel. For Units 1 and 2, revise Specification 4.6.B.1 to state that monitoring of reactor coolant conductivity is required only when there is fuel in the reactor vessel. For Units 1 and 2 clarify the sampling requirements when the continuous conductivity monitor is inoperable.

ENCLOSURE 3 (Continued)

10. For Unit 3, renumber Specification 4.6.B.2 to Specification 4.6.B.5 and add Specification 4.6.B.2 to require the measurement of reactor water quality during startup prior to pressurizing the reactor.

11. For Unit 3, renumber Specification 4.6.B.3 to Specification 4.6.B.6 and correct the reference 3.6.B.5 to agree with the renumbering. Add Specification 4.6.B.3 (replacing existing 4.6.B.1) to require the monitoring of chloride and pH during reactor operation.

12. For Unit 3, add Specification 4.6.B.4 that contains the requirement to sample for conductivity, chloride and pH whenever the reactor is not pressurized with fuel in the reactor vessel. For Units 1 and 2, revise Specification 4.6.B.4 to require sampling for conductivity, chloride and pH only when there is fuel in the reactor vessel.

13. For Units 1, 2, and 3, add Specification 4.6.B.7 to state that sampling of reactor coolant chemistry at technical specification frequency is not required when there is no fuel in the reactor vessel.

14. For Units 1 and 2, revise Specification 4.6.B.3.a to require pH measurement every 96 hours.

15. For Units 1 and 2, revise Specification 4.6.B.3.c to change the words "primary coolant" to read "reactor coolant".

16. For Units 1, 2 and 3, Specification 4.6.B.6, add a requirement to perform an isotopic analysis for all samples, not just when iodine activity is above 0.32 (0.032 for Unit 3) μCi/gm.

17. For Units 1, 2 and 3, revise the Bases 3.6.B/4.6.B to state that continuous conductivity monitoring is performed only when fuel is in the reactor vessel and that the calibration is performed weekly.

18. For Units 1, 2 and 3, revise the Bases 3.6.B/4.6.B to delete the daily and shift sampling requirements discussion.

19. For Unit 3, revise Bases 3.6.B/4.6.B to agree with the Units 1 and 2 bases.

BASES FOR PROPOSED NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

NRC has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92(c). A proposed amendment to an operating license involves no significant hazards considerations if operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, or (2) create the possibility of a new or different kind of accident from an accident previously evaluated, or (3) involve a significant reduction in a margin of safety. The proposed TS change is judged to involve no significant hazards considerations based on the following:

1. The proposed amendment does not involve a significant increase in the probability or consequences of any accident previously evaluated.

   The proposed changes revise Unit 3 Specification 3.6.B/4.6.B and the associated bases to make it consistent with the Units 1 and 2 Specification 3.6.B/4.6.B. The changes include 1) a reduction of the conductivity limit and the maximum time allowed to exceed the conductivity and chloride limits; 2) a requirement to control and measure the pH; and 3) clarification of the requirements for the various operating modes.

   The proposed changes revise Units 1 and 2 Specification 3.6.B/4.6.B and the associated bases to ensure consistent requirements throughout the specifications. The changes include: 1) clarifying sampling frequency for pH, 2) clarifying the sampling requirements when the continuous monitor is inoperable and, 3) adding a requirement for an isotopic analysis for all samples taken to track elevated iodine levels.

   The proposed change for Units 1, 2, and 3, eliminates from the BFN technical specifications the reactor coolant chemistry limits and associated sampling when there is no fuel in the reactor vessel. During the defueled condition, the reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program.

On a programmatic basis, the reactor coolant quality and monitoring frequency are controlled for all conditions including the defueled reactor vessel condition. The removal from technical specifications of the requirements on reactor coolant quality and monitoring for the defueled condition will not eliminate the requirement from the chemistry program. Thus, the chemistry program will maintain the reactor coolant within the appropriate limits to ensure that reactor pressure vessel/internals are not affected.

These changes do not affect any of the design bases accidents. They do not involve an increase in the probability or consequences of an accident previously evaluated.

2. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed changes revise Unit 3 Specification 3.6.B/4.6.B and its associated bases to make it consistent with the Units 1 and 2 Specification 3.6.B/4.6.B. The proposed changes revise Units 1 and 2 Specification 3.6.B/4.6.B and the associated Bases to ensure consistent requirements throughout the specifications. The changes include: 1) clarifying the sampling frequency for pH, 2) clarifying the sampling requirements when the continuous monitor is inoperable and, 3) adding a requirement for an isotopic analysis for all samples taken to track elevated iodine levels. These proposed change reduces the potential for human factor related errors that could result from the subtle differences in the existing specifications.

The proposed change for Units 1, 2, and 3, eliminates from the BFN technical specifications the reactor coolant chemistry limits and associated sampling when there is no fuel in the reactor vessel. During the defueled condition, the reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program.

No modifications to any plant equipment are involved. There are no effects on system interactions made by these changes. They do not create the possibility of a new or different kind of accident from an accident previously evaluated.

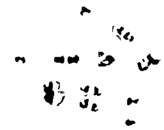
3. The proposed amendment does not involve a significant reduction in the margin of safety.

The proposed changes revise Unit 3 Specification 3.6.B/4.6.B and its associated bases to make it consistent with the Units 1 and 2 Specification 3.6.B/4.6.B. The changes include 1) a reduction of the conductivity limit and the maximum time allowed to exceed the conductivity and chloride limits; 2) a requirement to control and measure the pH; and 3) clarification of the requirements to address the various operating modes.

The proposed changes revise Units 1 and 2 Specification 3.6.B/4.6.B to ensure consistent requirements throughout the specifications. The changes include: 1) clarifying the sample frequency for pH, 2) clarifying the sampling requirements when the continuous monitor is inoperable and, 3) adding a requirement for an isotopic analysis for all samples taken to track elevated iodine levels.
The proposed change for Units 1, 2, and 3, eliminates the reactor coolant chemistry limits and associated sampling when there is no fuel in the reactor vessel. During the defueled condition, the reactor coolant chemistry limits and monitoring frequency are controlled by the "Chemistry Program" which is under the BFN 10 CFR 50.59 process program. The coolant chemistry technical specification does not provide requirements related to: 1) installed instrumentation used to detect, and indicate in the control room, a significant abnormal degradation of the RCPB, or 2) a process variable that is an initial condition of a DBA or transient analyses that either assume the failure of or present a challenge to the integrity of a FP barrier, or 3) a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a FP barrier. Therefore, its requirements can be relocated to the BFN Chemistry Program.

On a programmatic basis, the reactor coolant quality and monitoring frequency are controlled for all conditions including the defueled reactor vessel condition. The removal from technical specifications of the requirements on reactor coolant quality and monitoring for the defueled condition will not eliminate the requirement from the chemistry program. Thus, the chemistry program will maintain the reactor coolant within the appropriate limits to ensure that reactor pressure vessel/internals are not affected.

Therefore, the changes do not involve a significant reduction in any margin of safety.



CONCLUSION

TVA has evaluated the proposed amendment described above against the criteria given in 10 CFR 50.92(c) in accordance with the requirements of 10 CFR 50.91(a)(1). This evaluation has determined that the proposed amendment will not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility for a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. Thus, TVA has concluded that the proposed amendment does not involve a significant hazards consideration.