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

October 5, 1993

Docket Nos. 50-445
and 50-446

Mr. William J. Cahill, Jr.
Group Vice President, Nuclear
TU Electric
400 North Olive Street, L.B. 81
Dallas, Texas 75201

Dear Mr. Cahill:

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 - AMENDMENT NOS. 19 AND 5 TO FACILITY OPERATING LICENSE NOS. NPF-87 AND NPF-89 (TAC NOS. M84914 AND M86189)

The Commission has issued the enclosed Amendment Nos. 19 and 5 to Facility Operating License Nos. NPF-87 and NPF-89 for the Comanche Peak Steam Electric Station (CPSES), Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated October 19, 1992 for CPSES Unit 1. By letter dated March 17, 1993, you expanded the application to include CPSES Unit 2. By letters of April 1, and August 6, 1993, additional information was provided in support of the application.

The amendments change the technical specifications to:

1) Increase the minimum boron content of fluid in the Refueling Water Storage Tank (RWST) from 2000 ppm to 2400 ppm in Modes 5 and 6.

2) Increase the boron content range of the RWST fluid from 2000-2200 ppm to 2400-2600 ppm in Modes 1, 2, 3 and 4 in TS 3/4.1.2.6 and 3/4.5.1.

3) Increase the boron content range of fluid in the cold leg injection accumulators from 1900-2200 ppm to 2300-2600 ppm in Modes 1, 2 and 3 in TS 3/4.5.1.

4) Increase the minimum boron content of fluid in the RWST from 2000 ppm to 2400 ppm in Mode 6 in TS 3/4.9.1.

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

Sincerely,

Original Signed By

Thomas A. Bergman, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 19 to NPF-87
2. Amendment No. 5 to NPF-89
3. Safety Evaluation

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

TEXAS UTILITIES ELECTRIC COMPANY, ET AL.*

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1

DOCKET NO. 50-445

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 19
License No. NPF-87

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

   A. The application for amendment by Texas Utilities Electric Company (TU Electric) acting for itself and as agent for Texas Municipal Power Agency (licensees) dated October 19, 1993, as supplemented by letters dated March 17, 1993, April 1, 1993, and August 6, 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, as amended, 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 license 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.

* The current owners of the Comanche Peak Steam Electric Station are: Texas Utilities Electric Company and Texas Municipal Power Agency. Transfer of ownership from Texas Municipal Power Agency to Texas Utilities Electric Company was previously authorized by Amendment No. 9 to Construction Permit CPPR-126 on August 25, 1988 to take place in 10 installments as set forth in the Agreement attached to the application for Amendment dated March 4, 1988. At the completion thereof, Texas Municipal Power Agency will no longer retain any ownership interest.

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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. NPF-87 is hereby amended to read as follows:

   2. Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 19 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance to be implemented prior to startup for Cycle 4.

FOR THE NUCLEAR REGULATORY COMMISSION

for Suzanne C. Black, Director
Project Directorate IV-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 5, 1993

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

TEXAS UTILITIES ELECTRIC COMPANY, ET AL.*

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 2

DOCKET NO. 50-446

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5
License No. NPF-89

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

   A. The application for amendment by Texas Utilities Electric Company (TU Electric) acting for itself and as agent for Texas Municipal Power Agency (licensees) dated October 19, 1992, as supplemented by letters dated March 17, 1993, April 1, 1993, and August 6, 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, as amended, 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 license 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.

* The current owners of the Comanche Peak Steam Electric Station are: Texas Utilities Electric Company and Texas Municipal Power Agency. Transfer of ownership from Texas Municipal Power Agency to Texas Utilities Electric Company was previously authorized by Amendment No. 8 to Construction Permit CPPR-127 on August 25, 1988 to take place in 10 installments as set forth in the Agreement attached to the application for Amendment dated March 4, 1988. At the completion thereof, Texas Municipal Power Agency will no longer retain any ownership interest.

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. NPF-89 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 5, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. TU Electric shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

for Suzanne C. Black, Director
Project Directorate IV-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 5, 1993

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that: (1) the reactor can be made subcritical from all operating conditions, (2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and (3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.6% $\Delta k/k$ for Unit 1 (1.3% $\Delta k/k$ for Unit 2) is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} less than 200°F, a SHUTDOWN MARGIN of 1.3% $\Delta k/k$ provides adequate protection and is based on the results of the boron dilution accident analysis.

Since the actual overall core reactivity balance comparison required by 4.1.1.1.2 cannot be performed until after criticality is attained, this comparison is not required (and the provisions of Specification 4.0.4 are not applicable) for entry into any Operational Mode within the first 31 EFPD following initial fuel load or refueling.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the value of this coefficient remains within the limiting condition assumed in the FSAR accident and transient analyses.

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison.

The most negative MTC value equivalent to the most positive moderator density coefficient (MDC) was obtained by incrementally correcting the MDC used in the FSAR analyses to nominal operating conditions. These corrections

MODERATOR TEMPERATURE COEFFICIENT (Continued)

involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition and, a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting End of Cycle Life (EOL) MTC value. The 300 ppm surveillance limit MTC value represents a conservative value (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and is obtained by making these corrections to the limiting EOL MTC value.

The Surveillance Requirements for measurement of the MTC at the beginning and near the end of the fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 551°F. This limitation is required to ensure: (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boron Injection System ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include: (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid transfer pumps, and (5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 1.6% $\Delta k/k$ for Unit 1 (1.3% $\Delta k/k$ for Unit 2) after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires 15,700 gallons of 7000 ppm borated water from the boric acid storage tanks or 70,702 gallons of 2400 ppm for Unit 1 (2000 ppm for Unit 2) borated water from the refueling water storage tank (RWST).

BORATION SYSTEMS (Continued)

With the RCS temperature below 200°F, one Boron Injection System is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single Boron Injection System becomes inoperable.

The limitation for a maximum of two charging pumps to be OPERABLE and the requirement to verify one charging pump to be inoperable below 350°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The limitation for minimum solution temperature of the borated water sources are sufficient to prevent boric acid crystallization with the highest allowable boron concentration.

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1.3% $\Delta k/k$ after xenon decay and cooldown from 200°F to 140°F. This condition requires either 1,100 gallons of 7000 ppm borated water from the boric acid storage tanks or 7,113 gallons of 2400 ppm for Unit 1 (2000 ppm for Unit 2) borated water from the RWST.

As listed below, the required indicated levels for the boric acid storage tanks and the RWST include allowances for required/analytical volume, unusable volume, measurement uncertainties (which include instrument error and tank tolerances, as applicable), margin, and other required volume.

Tank	MODES	Ind. Level	Unusable Volume (gal)	Required Volume (gal)	Measurement Uncertainty	Margin (gal)	Other (gal)
RWST	5,6	24%	98,900	7,113	4% of span	10,293	N/A
	1,2,3,4	95%	45,494	70,702	4% of span	N/A	357,535*
Boric Acid Storage Tank	5,6	10%	3,221	1,100	6% of span	N/A	N/A
	5,6 (gravity feed)	20%	3,221	1,100	6% of span	3,679	N/A
	1,2,3,4	50%	3,221	15,700	6% of span	N/A	N/A

The OPERABILITY of one Boron Injection System during REFUELING ensures that this system is available for reactivity control while in MODE 6.

*Additional volume required to meet Specification 3.5.4.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that: (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of rod misalignment on associated accident analyses are limited. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits. Verification that the Digital Rod Position Indicator agrees with the demanded position within ± 12 steps at 24, 48, 120, and 228 steps withdrawn for the Control Banks and 18, 210, and 228 steps withdrawn for the Shutdown Banks provides assurances that the Digital Rod Position Indicator is operating correctly over the full range of indication. Since the Digital Rod Position Indication System does not indicate the actual shutdown rod position between 18 steps and 210 steps, only points in the indicated ranges are picked for verification of agreement with demanded position.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met. Misalignment of a rod requires measurement of peaking factors and a restriction in THERMAL POWER. These restrictions provide assurance of fuel rod integrity during continued operation. In addition, those safety analyses affected by a misaligned rod are reevaluated to confirm that the results remain valid during future operation.

For Specification 3.1.3.1 ACTIONS b and c it is incumbent upon the plant to verify the trippability of the inoperable control rod(s). This may be by verification of a control system failure, usually electrical in nature, or that the failure is associated with the control rod stepping mechanism. In the event the plant is unable to verify the rod(s) trippability, it must be assumed to be untrippable and thus fall under the requirements of ACTION a. Assuming a controlled shutdown from 100% RATED THERMAL POWER, this allows approximately four hours for this verification.

The maximum rod drop time restriction is consistent with the assumed rod drop time used in the safety analyses. Measurement with T_{avg} greater than or equal to 551°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a Reactor trip at operating conditions.

Control rod positions and OPERABILITY of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCOs are satisfied.

3/4.5.1 ACCUMULATORS

The OPERABILITY of each Reactor Coolant System (RCS) accumulator ensures that a sufficient volume of borated water will be immediately forced into the reactor core through each of the cold legs in the event the RCS pressure falls below the pressure of the accumulators. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

The limits on accumulator volume, boron concentration and pressure ensure that the assumptions used for accumulator injection in the safety analysis are met. The required indicated accumulator volumes and pressures include a 5 percent measurement uncertainty. The indicated accumulator volumes of 39% and 61% are based on the analytical limits of 6119 gallons and 6597 gallons, respectively, plus a 1% tank tolerance.

The accumulator power operated isolation valves are considered to be "operating bypasses" in the context of IEEE Std. 279-1971, which requires that bypasses of a protective function be removed automatically whenever permissive conditions are not met. In addition, as these accumulator isolation valves fail to meet single failure criteria, removal of power to the valves is required by BTP ICSB 18. This is accomplished via key-lock control board cut-off switches.

The limits for operation with an accumulator inoperable for any reason except an isolation valve closed minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional accumulator which may result in unacceptable peak cladding temperatures. If a closed isolation valve cannot be immediately opened, the full capability of one accumulator is not available and prompt action is required to place the reactor in a mode where this capability is not required.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the accumulators is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. In addition, each ECCS subsystem provides long-term core cooling capability in the recirculation mode during the accident recovery period.

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

The limitation for a maximum of two charging pumps to be OPERABLE and the requirement to verify one charging pump and all safety injection pumps

ECCS SUBSYSTEMS (Continued)

to be inoperable below 350°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The requirement to remove power from certain valve operators is in accordance with Branch Technical Position ICSB-18 for valves that fail to meet single failure considerations. Power is removed via key-lock switches on the control board.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance Requirements for throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

3/4.5.4 REFUELING WATER STORAGE TANK

The OPERABILITY of the refueling water storage tank (RWST) as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS in the event of a LOCA. The limits on RWST minimum volume and boron concentration ensure that: (1) sufficient water is available within containment to permit recirculation cooling flow to the core, (2) for small break LOCA and steam line breaks, the reactor will remain subcritical in the cold condition following mixing of the RWST and the RCS water volumes with all control rods inserted except for the most reactive control assembly, (3) for large break LOCAs, the reactor will remain subcritical in the cold condition following mixing of the RWST and the RCS water volumes with all shutdown and control rods fully withdrawn, and (4) sufficient time is available for the operator to take manual action and complete switchover of ECCS and containment spray suction to the containment sump without emptying the RWST or losing suction.

The required indicated level includes a 4-percent measurement uncertainty, an unusable volume of 45,494 gallons and a required water volume of 428,237 gallons.

The limits on indicated water volume and boron concentration of the RWST also ensure a long-term pH value of between 8.25 for Unit 1 (8.5 for Unit 2) and 10.5 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

BASES

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: (1) the reactor will remain subcritical during CORE ALTERATIONS, and (2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the safety analyses. The value of 0.95 or less for K_{eff} includes a 1% $\Delta k/k$ conservative allowance for uncertainties. Similarly, the boron concentration value of 2400 ppm for Unit 1 (2000 ppm for Unit 2) or greater includes a conservative uncertainty allowance of 50 ppm boron. The locking closed of the required valves during refueling operations precludes the possibility of uncontrolled boron dilution of the filled portion of the RCS. This action prevents flow to the RCS of unborated water by closing flow paths from sources of unborated water.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the source range neutron flux monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the safety analyses.

3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

The requirements on containment building penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

3/4.9.5 COMMUNICATIONS

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity conditions during CORE ALTERATIONS.

3/4.9.6 REFUELING MACHINE

The OPERABILITY requirements for the refueling machine main hoist and auxiliary monorail hoist ensure that: (1) the main hoist will be used for movement of fuel assemblies, (2) the auxiliary monorail hoist will be used for latching, unlatching and movement of control rod drive shafts, (3) the main hoist has sufficient load capacity to lift a fuel assembly (with control rods), (4) the auxiliary monorail hoist has sufficient load capacity to latch, unlatch and move the control rod drive shafts, and (5) the core internals and reactor vessel are protected from excessive lifting force in the event they are inadvertently engaged during lifting operations.

3/4.9.7 CRANE TRAVEL - SPENT FUEL STORAGE AREAS

The restriction on movement of loads in excess of the nominal weight of a fuel and control rod assembly and associated handling tool over other fuel assemblies in a storage pool ensures that in the event this load is dropped: (1) the activity release will be limited to that contained in a single fuel assembly, and (2) any possible distortion of fuel in the storage racks will not result in a critical array. This assumption is consistent with the activity release assumed in the safety analyses.

3/4.9.8 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION

The requirement that at least one residual heat removal (RHR) loop be in operation ensures that: (1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor vessel below 140°F as required during the REFUELING MODE, and (2) sufficient coolant circulation is maintained through the core to minimize the effect of a boron dilution incident and prevent boron stratification.

The requirement to have two RHR loops OPERABLE when there is less than 23 feet of water above the reactor vessel flange ensures that a single failure of the operating RHR loop will not result in a complete loss of residual heat removal capability. With the reactor vessel head removed and at least 23 feet of water above the reactor pressure vessel flange, a large heat sink is available for core cooling. Thus, in the event of a failure of the operating RHR loop, adequate time is provided to initiate emergency procedures to cool the core.

BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 As a minimum, one of the following borated water sources shall be OPERABLE:

a. A boric acid storage tank with:

1) A minimum indicated borated water level of 10% when using the boric acid transfer pump,

2) A minimum indicated borated water level of 20% when using the gravity feed connection,

3) A minimum boron concentration of 7000 ppm, and

4) A minimum solution temperature of 65°F.

b. The refueling water storage tank (RWST) with:

1) A minimum indicated borated water level of 24%,

2) A minimum boron concentration of 2400 ppm for Unit 1 (2000 ppm for Unit 2), and

3) A minimum solution temperature of 40°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.5 The above required borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1) Verifying the boron concentration of the water,

2) Verifying the indicated borated water volume, and

3) Verifying the boric acid storage tank solution temperature when it is the source of borated water.

b. At least once per 24 hours by verifying the RWST temperature when it is the source of borated water and the outside air temperature is less than 40°F.

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 As a minimum, the following borated water source(s) shall be OPERABLE as required by Specification 3.1.2.2:

a. A boric acid storage tank with:

1) A minimum indicated borated water level of 50%,

2) A minimum boron concentration of 7000 ppm, and

3) A minimum solution temperature of 65°F.

b. The refueling water storage tank (RWST) with:

1) A minimum indicated borated water level of 95%,

2) A boron concentration between 2400 ppm for Unit 1 (2000 ppm for Unit 2) and 2600 ppm for Unit 1 (2200 ppm for Unit 2),

3) A minimum solution temperature of 40°F, and

4) A maximum solution temperature of 120°F.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With the boric acid storage tank inoperable and being used as one of the above required borated water sources, restore the tank to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1.3% $\Delta k/k$ at 200°F; restore the boric acid storage tank to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 Each borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1) Verifying the boron concentration in the water,

2) Verifying the indicated borated water volume of the water source, and

3) Verifying the boric acid storage tank solution temperature when it is the source of borated water.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is either less than 40°F or greater than 120°F.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

COLD LEG INJECTION

LIMITING CONDITION FOR OPERATION

3.5.1 Each cold leg injection accumulator shall be OPERABLE with:

a. The discharge isolation valve open with power removed,

b. An indicated borated water level of between 39% and 61%

c. A boron concentration of between 2300 ppm for Unit 1 (1900 ppm for Unit 2) and 2600 ppm for Unit 1 (2200 ppm for Unit 2), and

d. An indicated cover-pressure of between 623 and 644 psig.

APPLICABILITY: MODES 1, 2, and 3*.

ACTION:

a. With one cold leg injection accumulator inoperable, except as a result of a closed isolation valve or the boron concentration outside the required values, restore the inoperable accumulator to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

b. With one cold leg injection accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

c. With the boron concentration of one cold leg injection accumulator outside the required limit, restore the boron concentration to within the required limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.1 Each cold leg injection accumulator shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1) Verifying the indicated borated water level and nitrogen cover-pressure in the tanks, and

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*Pressurizer pressure above 1000 psig.

SURVEILLANCE REQUIREMENTS (Continued)

2) Verifying that each cold leg injection accumulator isolation valve is open.

b. At least once per 31 days and within 6 hours after each indicated solution volume increase of greater than or equal to 101 gallons (12% of span) by verifying the boron concentration of the solution in the water-filled accumulator;

c. At least once per 31 days when the RCS pressure is above 1000 psig by verifying that power to the isolation valve operator is removed.

4.5.1.2 Each accumulator water level and pressure channel shall be demonstrated OPERABLE:

a. At least once per 31 days by the performance of an ANALOG CHANNEL OPERATIONAL TEST, and

b. At least once per 18 months by the performance of a CHANNEL CALIBRATION.

3/4.5.3 ECCS SUBSYSTEMS - $T_{avg} < 350°F$

SAFETY INJECTION PUMPS

LIMITING CONDITION FOR OPERATION

3.5.3.2 All safety injection pumps shall be inoperable.

APPLICABILITY: Modes 4#, 5, and 6 with the reactor vessel head on.

ACTION:

With a safety injection pump OPERABLE, restore all safety injection pumps to an inoperable status within 4 hours.

SURVEILLANCE REQUIREMENTS

4.5.3.2 All safety injection pumps shall be demonstrated inoperable* by verifying that the motor circuit breakers are secured in the open position within 4 hours after entering MODE 4 from MODE 3 or prior to the temperature of one or more of the RCS cold legs decreasing below 325°F, whichever occurs first and at least once per 31 days thereafter.

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*An inoperable pump may be energized for testing or for filling accumulators provided the discharge at the pump has been isolated from the RCS by a closed isolation valve(s) with power removed from the valve operator(s), or by a manual isolation valve(s) secured in the closed position.

#Except when Specification 3.4.8.3 is not applicable.

3/4.5.4 REFUELING WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

3.5.4 The refueling water storage tank (RWST) shall be OPERABLE with:

a. A minimum indicated borated water level of 95%,

b. A boron concentration of between 2400 ppm for Unit 1 (2000 ppm for Unit 2) and 2600 ppm for Unit 1 (2200 ppm for Unit 2) of boron,

c. A minimum solution temperature of 40°F, and

d. A maximum solution temperature of 120°F.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The RWST shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1) Verifying the indicated borated water volume in the tank, and

2) Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 120°F.

3/4.9 REFUELING OPERATIONS

3/4.9.1 BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 The boron concentration of all filled portions of the Reactor Coolant System and the refueling canal shall be maintained uniform and sufficient to ensure that the more restrictive of the following reactivity conditions is met; either:

a. A K_{eff} of 0.95 or less, or

b. A boron concentration of greater than or equal to 2400 ppm for Unit 1 (2000 ppm for Unit 2).*

Additionally, either valve CS-8455 or valves CS-8560, FCV-111B, CS-8439, CS-8441 and CS-8453 shall be closed and secured in position.

APPLICABILITY: MODE 6.

ACTION:

a. With the requirements a. or b. of the above not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7000 ppm boron or its equivalent until K_{eff} is reduced to less than or equal to 0.95 or the boron concentration is restored to greater than or equal to 2400 ppm for Unit 1 (2000 ppm for Unit 2), whichever is the more restrictive.

b. If either valve CS-8455 or valves CS-8560, FCV-111B, CS-8439, CS-8441 and CS-8453 are not closed and secured in position, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and take action to isolate the dilution paths. Within 1 hour, verify the more restrictive of 3.9.1.a or 3.9.1.b or carry out Action a. above.

SURVEILLANCE REQUIREMENTS

4.9.1.1 The more restrictive of the above two reactivity conditions shall be determined prior to:

a. Removing or unbolting the reactor vessel head, and

b. Withdrawal of any control rod in excess of 3 feet from its fully inserted position within the reactor vessel.

4.9.1.2 The boron concentration of the Reactor Coolant System and the refueling canal shall be determined by chemical analysis at least once per 72 hours.

4.9.1.3 Either valve CS-8455 or valves CS-8560, FCV-111B, CS-8439, CS-8441 and CS-8453 shall be verified closed and secured in position by mechanical stops or by removal of air or electrical power at least once per 31 days to verify that dilution paths are isolated.

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*During initial fuel load, the boron concentration limitation for the refueling canal is not applicable provided the refueling canal level is verified to be below the reactor vessel flange elevation at least once per 12 hours.

3/4.9.2 INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two source range neutron flux monitors shall be OPERABLE, each with continuous visual indication in the control room and one with audible indication in the containment and control room.

APPLICABILITY: MODE 6.

ACTION:

a. With one of the above required monitors inoperable or not operating, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

b. With both of the above required monitors inoperable or not operating, determine the boron concentration of the Reactor Coolant System at least once per 12 hours.

SURVEILLANCE REQUIREMENTS

4.9.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL CHECK at least once per 12 hours,

b. An ANALOG CHANNEL OPERATIONAL TEST within 8 hours prior to the initial start of CORE ALTERATIONS, and

c. An ANALOG CHANNEL OPERATIONAL TEST at least once per 7 days.

ATTACHMENT TO LICENSE AMENDMENT NOS. 19 AND 5

FACILITY OPERATING LICENSE NOS. NPF-87 AND NPF-89

DOCKET NOS. 50-445 AND 50-446

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE	INSERT
3/4 1-11	3/4 1-11
3/4 1-13	3/4 1-13
3/4 5-1	3/4 5-1
3/4 5-10	3/4 5-10
3/4 9-1	3/4 9-1
B 3/4 1-2	B 3/4 1-2
B 3/4 1-3	B 3/4 1-3
B 3/4 5-2	B 3/4 5-2
B 3/4 9-1	B 3/4 9-1

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 19 AND 5 TO

FACILITY OPERATING LICENSE NOS. NPF-87 AND NPF-89

TEXAS UTILITIES ELECTRIC COMPANY, ET AL.

COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-445 AND 50-446

1.0 INTRODUCTION

By application dated October 19, 1993, Texas Utilities Electric Company (the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. NPF-87) for the Comanche Peak Steam Electric Station (CPSES), Unit No. 1. By letter dated March 17, 1993, the licensee expanded the application to include CPSES Unit 2 (Facility Operating License No. NPF-89). By letters of April 1, and August 6, 1993, additional information was provided in support of the application. These additional letters were clarifying in nature and thus, within the scope of the initial notice and did not affect the NRC staff's proposed no significant hazards considerations determination.

The license amendment request proposed changes to the CPSES Technical Specifications (TS) which are listed below:

- TS 3/4.1.2.5 - increase the minimum boron content of fluid in the Refueling Water Storage Tank (RWST) from 2000 ppm to 2400 ppm in Modes 5 and 6.

- TS 3/4.1.2.6 and 3/4.5.4 - increase the boron content range of the RWST fluid from 2000-2200 ppm to 2400-2600 ppm in Modes 1, 2, 3 and 4.

- TS 3/4.5.1 - increase the boron content range of fluid in the cold leg injection accumulators from 1900-2200 ppm to 2300-2600 ppm in Modes 1, 2 and 3.

- TS 3/4.9.1 - increase the minimum boron content of fluid in the RWST from 2000 ppm to 2400 ppm in Mode 6.

This increase in boron concentration is necessary to accommodate shutdown margin and safety analysis requirements associated with an extension of the reload cycle to 18 months.

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The RWST's primary purpose is to provide a source of borated water to the spent fuel pool during refueling operations. The boration path to the spent fuel pool during refueling operations is accomplished by way of the reactor vessel and the refueling cavity. Therefore, at the close of refueling when the reactor vessel is isolated from the refueling cavity, boron levels in the reactor coolant system (RCS) can be as high as 2600 ppm, prior to startup of the unit. The boron level of the RCS is diluted down to approximately 1800 - 1950 ppm prior to taking the reactor critical. Boron levels in the RCS continue to be diluted down as power operation continues throughout the operating cycle. This is done to allow the reactor to remain critical as xenon (a negative reactivity source) builds up during the operating cycle. The RWST also serves as an alternative source of borated water to the reactor coolant system, should the water level in the volume control tank fall below its low level setpoint.

2.0 EVALUATION

The licensee has performed preliminary evaluations of the effect of the proposed increased boron concentration limits on each of the Chapter 15 transients and accidents presented in the CPSES Final Safety Analysis Report (FSAR) and no adverse effects were observed. However, prior to operation with a revised core configuration, all of the accident analyses will be evaluated for continued applicability as part of the reload safety evaluation process. The increased RCS boron concentration required to support extended length fuel cycles, for example, will result in a more positive (less negative) moderator temperature coefficient (MTC). Therefore, this effect on those events which are adversely affected by a more positive MTC will be re-evaluated for the cycle-specific core design during the normal reload analysis process.

The effect of an increased boron concentration on the loss of coolant accident (LOCA) was evaluated. Since the boron concentration is increased, the reactor will, of course, remain shut down during the reflood and long-term cooling phase with the minimum proposed boron concentration even with no control rods inserted in the core. However, one effect of boration during a LOCA is the progressive increase over time of the boron concentration in the core. This occurs because the water vaporizes out of the break and leaves behind the boron it originally contained. If the concentration exceeds a critical value, boric acid can crystallize in the core and precipitate out of solution. The concern is that the precipitation of boric acid crystals could block core cooling. The boron solubility limit at 35°F coolant temperature is 4900 ppm. To preclude the possibility of crystallization of the RWST contents, the TS require the RWST temperature to be no less than 40°F. To assure boron solubility within the core, the licensee has also determined the required switchover time for the initiation of hot leg recirculation (which provides for proper core mixing) based on the proposed increased RWST and accumulator boron concentrations.

2.1 RWST and ECCS Accumulator Considerations

The licensee's submittal indicates that the proposed increases in boron concentrations to the CPSES RWST and ECCS accumulators do not constitute an

unreviewed safety issue in regard to the plant design. The proposed changes involve an increase in boron concentration of approximately twenty percent. As the insides of the RWST and ECCS accumulators are lined with stainless steel, the proposed increases in boron concentrations will not significantly increase the acidity (corrosiveness) of the borated solutions enough to threaten the structural integrity of the tanks.

2.2 Reactor Coolant System (RCS) Considerations

As stated above, the proposed modification to the RWST boron concentration will increase the RCS boron concentration to the 1800-1950 ppm range just prior to power operation of the unit. However, operation of CPSES at RCS boron concentrations > 1600 ppm requires a modified (elevated) lithium (Li) control program in order to maintain the RCS coolant in the normal 6.9 - 7.4 pH range. The table below, illustrates the lithium - boron correlation for the Comanche Peak RCS coolant at a T_{ave} of 310.8 degrees C.

Boron ppm	Min. Li ppm	Min. pH	Target Li ppm	Target pH	Max. Li ppm	Max. pH
2500	3.86	6.90	4.01	6.92	4.16	6.93
2300	3.46	6.90	3.61	6.92	3.76	6.93
2100	3.07	6.90	3.22	6.92	3.37	6.94
1900	2.71	6.90	2.86	6.92	3.01	6.94
1800	2.54	6.90	2.69	6.92	2.84	6.95
1600	2.20	6.90	2.35	6.93	2.50	6.95
1400	2.05	6.93	2.20	6.96	2.35	6.99

The Electric Power Research Institute (EPRI), in conjunction with the Westinghouse Electric Corporation, has studied the effects of boron and lithium water chemistry on Primary Water Stress Corrosion Cracking (PWSCC) of Inconel 600. According to the studies, Inconel 600 specimens immersed in aqueous solutions containing 3.5 ppm lithium have exhibited a significant increase in crack initiation rates when compared to identical specimens immersed in aqueous solutions containing 2.2 ppm lithium. EPRI therefore recommends that the RCS coolant pH be limited to a range to 6.9 - 7.4, and the RCS coolant Li level to a maximum of 2.2 ppm, when the boron concentration in the coolant is 1200 ppm or less. EPRI does not recommend operating for extended periods with RCS coolant lithium levels above 2.2 ppm.

As the table indicates, RCS coolant boron levels above 1600 ppm require the addition of elevated lithium levels in order to maintain the coolant pH in the 6.9 - 7.4 range. However, the CPSES RCS will contain elevated boron levels (above 1600 ppm) and elevated lithium levels (above 2.2 ppm) for a short time interval during initial startup and operation of the unit (approximately four

effective full power days of operation). This time interval is typically less than the crack initiation times needed to promote PWSCC cracks in Inconel 600.

Therefore, the elevated lithium and boron levels in the RCS coolant should not significantly increase the probability of PWSCC in the steam generator tubes or reactor vessel internals fabricated from Inconel 600.

2.3 Effects on Operation during Loss of Coolant Accident Conditions

The proposed technical specification changes will result in a decrease in containment sump volume pH from 8.5 to 8.25 during design basis accident (DBA) conditions. This decrease in pH could change the value of the elemental iodine partition coefficient which is used in the licensee's calculations for determining offsite iodine doses following a DBA.

The licensee indicated in their October 19, 1992 submittal that an iodine partition factor of 5,000 was consistent with decontamination factor of 100 which was assumed in the CPSES Safety Evaluation Report. The licensee stated further that, even with the slightly lower pH and the new boron concentrations, the partition factor of 5,000 would remain valid. With this being the case, the licensee stated that iodine decontamination factor would also remain unchanged. Since the decontamination factor of 100 remains unchanged, then the staff assessment of the radiological consequences of a loss of coolant accident also remains unchanged. Therefore, the staff is in agreement with the licensee's conclusion that the increase in boron concentration in the RWST and the ECCS will not alter the results of the CPSES accident analyses.

The licensee has submitted data which supports their position that an elemental iodine partition coefficient of 5000 remains conservative in spite of the drop in sump volume pH. The licensee's selection of the elemental iodine partition coefficient value agrees with values cited in industry literature for similar accident conditions. As the accident analyses still remain bounding, the proposed modifications do not significantly reduce the margins of any of the licensee's calculations of DBA offsite iodine doses which could be released following a design basis accident.

2.4 Precipitation of Boron in the RCS and Safety Injection Paths

The proposed technical specifications do not create an additional risk of precipitating boron in the RCS as the maximum boron concentration in the coolant would remain well within the boron solubility limit even at minimum coolant temperature (4600 ppm B at 35°F). Furthermore, the RWST and safety injection lines to the reactor vessel are heat traced where necessary to ensure that the boron will remain in solution in the tanks, and that precipitation does not occur during a postulated ECCS actuation during a DBA. The proposed modifications do not extend the boron concentrations beyond the boron solubility limits during normal, shutdown, and accident operations of the plant.

2.5 Summary

The staff has reviewed the effects of the proposed increased boron concentration limits on the non-LOCA and LOCA safety analyses and concludes that all pertinent safety criteria are satisfactorily met. Based on the above evaluation, the licensee's request to increase the boron concentration range in the RWST to 2400-2600 ppm and to 2300-2600 ppm in the accumulators is acceptable. In addition, the proposed increase in the minimum boron concentration during refueling operations for the RCS and the refueling canal to 2400 ppm is acceptable. Nonetheless, prior to operation with a revised core configuration, the effects on the accident analyses of the higher boron concentrations in the RWST, ECCS accumulators, and RCS will be explicitly evaluated by the licensee during the reload safety evaluation process.

The licensee has shown, through information provided in the licensee's original submittal and additional information in the subsequent submittals, that the proposed technical specification changes do not significantly change the corrosive nature of fluids in the RWST, ECCS Accumulators or RCS. The proposed modifications will not change the results of the licensee's calculations of the offsite iodine doses which are determined to be released following a design basis accident. Additionally, the licensee has properly evaluated the concern regarding boric acid crystallization.

The proposed modifications will cause elevated boron and lithium levels in the RCS; however, the elevated levels will only exist for a short time interval (during initial startup and operation of the unit). Therefore, the proposed modifications will not significantly increase the amount of PWSCC in the reactor vessel internals or steam generator components fabricated from Inconel 600. The staff, therefore, finds the technical specification changes acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. 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 25865). 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 amendment.

5.0 CONCLUSION

The Commission has concluded, based on the consideration 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: October 5, 1993