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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
TEXAS UTILITIES ELECTRIC COMPANY, et al.	)	Docket Nos. 50-445 and 50-446 OL
	)	
(Comanche Peak Steam Electric Station, Units 1 and 2)	)	(Application for Operating Licenses)

APPLICANTS' SUPPLEMENT TO MOTION
FOR AUTHORIZATION PURSUANT TO
10 C.F.R. § 50.57(c)

On August 7, 1984, Texas Utilities Electric Company, et al. ("Applicants") filed a motion with the Atomic Safety and Licensing Board ("Licensing Board") requesting that it authorize the NRC Staff to permit Applicants to load fuel and conduct certain precritical tests. By Memorandum of August 24, 1984, the Licensing Board requested additional information regarding (1) QA/QC oversight of contested systems, (2) the status of procedures for the requested activities, (3) calculations of K_{eff} and (4) boron concentrations. Applicants response is set forth below and in the attached affidavits of Antonio Vega, concerning QA/QC oversight, ("Vega Affidavit") (Attachment 1); David E. Deviney, concerning completion of procedures, ("Deviney Affidavit") (Attachment 2); and Edward Alarcon, concerning K_{eff} and boron, ("Alarcon Affidavit") (Attachment 3).

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QA/QC Oversight

The Licensing Board requested additional information concerning the adequacy of QA/QC oversight activities on systems that may be called upon to function to protect public health and safety during fuel loading and precritical testing. The Board stated that at least four systems were included in this category, i.e., (1) boron addition and monitoring equipment, (2) reactor monitoring equipment, (3) fuel loading equipment, and (4) reactor protection systems. Specifically, the Board requested "evidence concerning the current status of QA/QC oversight of these systems, including evidence that documentation is adequate to assure that unsatisfactory or non-conforming conditions have been corrected and evidence concerning whether or not there are allegations known to the Applicants or Staff about the intimidation of QA/QC personnel who were working on these systems." Licensing Board's "Memorandum (Request for Evidence Relevant to Fuel Loading)" (August 24, 1984) at 2.

In response to the Board's request, an evaluation of all plant systems was conducted to determine the systems that fell into the category specified by the Board, as noted above. Ten systems/equipment groupings were identified and are listed in Attachment B to Vega's Affidavit. (See also Alarcon Affidavit at 9-10.) With regard to these systems, a thorough review was conducted of the status of QA/QC oversight to determine if all required inspections had been conducted and verified, as applicable. This review reflected that QC inspections have been performed on the necessary mechanical, electrical and instrumentation components of these systems. These inspections included in-process inspections, final inspections, as-built verification inspections, and Authorized Nuclear Inspector (ANI) inspections, as applicable. Vega Affidavit at 2.

In addition, an extensive testing program on these systems has been implemented and will be completed prior to fuel load, including, as applicable, hydrostatic tests on pressure retaining systems, prerequisite testing on components to assure proper component functional operability and pre-operational testing to assure proper operation as a system. Preoperational testing provides assurance that the systems in question will operate as designed by requiring demonstration of the capability of the systems to meet safety-related performance requirements. Vega Affidavit at 3. A summary of the preoperational testing conducted for each of the systems in question is set forth in Attachment C to Vega's Affidavit.

Conditions found to be unsatisfactory or non-conforming as a result of the above QA/QC oversight activities have been documented, as appropriate, on Non-Conformance Reports, Inspection Reports, Test Deficiency Reports or in other prescribed manners. These methods of documentation assure positive control and tracking of such conditions to preclude inadvertent use of defective materials, components or systems. These unsatisfactory or non-conforming items are included in a tracking system which is developed and administered by the TUGCO Start-up organization to assure outstanding items are properly prioritized, assigned and resolved in a timely manner. Vega Affidavit at 3.

The Startup Tracking System was reviewed to assess the status of items identified as unsatisfactory or non-conforming through the QA/QC oversight of construction and testing activities on the ten systems identified in Attachment B. The review reflected that all such outstanding items are scheduled to be completed prior to fuel load. Vega Affidavit at 3-4.

In conclusion, based on a thorough review of the QA/QC oversight status of the ten systems/equipment groupings in question, there is a reasonable assurance that with regard to these systems/equipment groupings in question, necessary and appropriate QA/QC activities have been conducted, and non-conformances identified by such activities will be corrected on a schedule to support fuel load and precritical testing activities in a manner consistent with the health and safety of the public. Vega Affidavit at 4.

To respond to the Board's second question regarding the status of QA/QC oversight (i.e., "whether or not there are allegations known to Applicants or Staff about intimidation of QA/QC personnel who were working on these systems"), Mr. Vega discussed this issue with appropriate personnel in his QC organization, construction and QA/QC for operations, personally reviewed the Quality Assurance Investigation Files, and had cognizant individuals review allegations made through the QA Hot-line and allegations transmitted to Applicants by the NRC Staff. Mr. Vega also instructed Applicants' counsel to review the record compiled on the intimidation issue before the Board. Based upon these discussions and reviews, Mr. Vega is not aware of any specific allegations regarding intimidation of QA/QC personnel related to any of the ten systems discussed above. Vega Affidavit at 4-5.

Completion of QA/QC Procedures

The Licensing Board requested evidence "that appropriate QA/QC procedures have been completed for all phases of the activities for which a license is sought . . . ." Licensing Board Memorandum at 2.

In response to the Board's request, a review of the status of the procedures to be used for the requested activities was conducted. This review indicates that all such procedures have been prepared, reviewed and are either approved or in the process of being approved; all will be approved and available for use prior to fuel load. Deviney Affidavit at 1. The basic procedures to be used for these activities are the 21 initial startup procedures ("ISU") for fuel loading and precritical testing listed in Attachment B to the Deviney Affidavit. See also Alarcon Affidavit at 9-10. All but two of these procedures have received final approval. These two procedures, ISU-008A, Thermal

Expansion, and ISU-009A, Simulated Rod Control System Test, have been prepared and are undergoing final review. They will be approved well before fuel load. Deviney Affidavit at 2.

Other routine plant procedures may be referenced in or provide support for the ISU procedures and associated activities including System Operation Procedures, Nuclear Engineering Procedures and Maintenance and Surveillance Procedures. In addition, QC inspection, QA surveillance and QA audit procedures will be used to provide independent and additional assurance that plant activities including those related directly to fuel loading and precritical testing are properly conducted and documented. These additional coordinating/oversight procedures have also been completed, reviewed and approved and are currently in service. Deviney Affidavit at 2.

In conclusion, based on a complete and thorough review, virtually all QA/QC procedures relating to fuel load and precritical testing are currently available for use. The remaining few are in the approval cycle and will be available in time to support fuel load and precritical testing activities.

<u>Calculations Regarding K_{eff}</u>

The Licensing Board requested "evidence concerning the maximum K_{eff} to be permitted during precritical testing and the K_{eff} that analysis suggests may be achieved during precritical testing if all control rods were inadvertently removed while the boron concentration was 2000 ppm . . . ." Board Memorandum at 2.

The maximum K_{eff} permitted during precritical testing is established by Technical Specifications as .990 during cold shutdown (coolant temperature less than or equal to 200°F) and .984 at elevated temperatures (greater than 200°F). (It should be noted that as the coolant temperature increases, K_{eff} decreases.) Reactivity control requirements during refueling are based on boron concentration. Specifically, in accordance with Technical Specifications, the boron concentration must be maintained sufficient to assure that the more restrictive of the following reactivity condition is met: (1) K_{eff} of .950 or less, or (2) boron concentration of greater than or equal to 2000 ppm. For the initial fuel loading at CPSES, the limit of 2000 ppm boron concentration is the more restrictive limit and provides substantial conservatism. Alarcon Affidavit at 2-3.

Using conservative assumptions, the maximum K_{eff} expected during precritical testing (either hot or cold) was calculated to be .894. The conditions associated with this calculation are a boron concentration of 2000 ppm, a coolant temperature of 68°F and the most reactive control rod bank withdrawn. Alarcon Affidavit at 2-3.

In response to the Board's second question regarding the K_{eff} which may be achieved assuming a 2000 ppm boron concentration and all control rods fully withdrawn, Applicants submit that the likelihood of all control rods being simultaneously withdrawn is virtually nonexistent. In any event, even if all control rods were fully withdrawn at the worst case coolant temperature of $68^{0}F$, based on conservative calculations, K_{eff} would be only .932, still well below the Technical Specification limits of .990. Indeed, conservative calculations reflect that assuming a coolant temperature of $68^{o}F$ and all control rods fully withdrawn, the boron concentration could drop to below 1390 ppm and K_{eff} would still be below .990. Alarcon Affidavit 3-4.

Maintaining Boron Concentration

The Licensing Board requested evidence "that non-borated water will never be injected into the core, substantially diluting the boron below 2000 ppm" (Board Memorandum at 2).

Makeup water to the Reactor Coolant System ("RCS") is provided either from the Chemical and Volume Control System ("CVCS") or from the Refueling Water Storage Tank ("RWST"), a large tank normally containing several hundred thousand gallons of borated water. Prior to fuel loading the CVCS and RWST, as well as the RCS are borated to at least 2000 ppm. Alarcon Affidavit at 4-5.

Immediately prior to commencement of the fuel loading sequence, the RWST is again established and then maintained greater than or equal to 2000 ppm as required by CPSES Technical Specifications. Also, as required by this test procedure, the RCS is sampled and analysed for boron concentration at several places to assure uniformity of the 2000 ppm minimum boron concentration.

In short, prior to fuel loading the boron concentration in the RCS, CVCS and RWST will be at least 2000 ppm. Alarcon Affidavit at 5.

The only credible cause of an inadvertent boron dilution would involve the higly unlikely malfunction of equipment in the CVCS.[1] Administrative and procedural controls have been established effectively to preclude inadvertent injecting of unborated CVCS makeup water into the RCS due to operator error. For example, operation of the CVCS is performed under the direction of trained and licensed reactor operators in accordance with procedures which are step-by-step in nature. (With regard to fuel loading, in that the critical valves between the CVCS and RCS are closed and secured in that position, it is virtually impossible for an accidental dilution event to be initiated.) Alarcon Affidavit at 8.

In any event, assuming that such a highly unlikely event was initiated, numerous manual and automatic actions would assure that the dilution would be detected and mitigated prior to exceeding a K_{eff} of 0.990. First, every four hours during refueling and every eight hours during precritical testing, samples of the reactor coolant system are taken and analyzed by a chemistry technician. The results of the analysis are transmitted to the control room for review by the operators and ISU test engineer on duty. They

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1 The CPSES Final Safety Analysis Report Section 15.4.6 addresses the causes and automatic actions associated with an inadvertent boron dilution event.

compare the results of the analysis with the boron concentration that should be in the system. If there is a discrepancy, or if the concentration is below 2000 ppm, all activities which could add positive reactivity are halted and boron concentration is restored to at least 2000 ppm. Alarcon Affidavit at 8-9.

In addition, source range monitoring instrumentation in the continuously manned control room has both audio and visual indications of neutron flux levels in the core. The audio indication is in the form of continuous "clicks" (such as a typical radiation detector) which increase or decrease in frequency based on neutron flux changes in the reactor core. Any significant change in boron concentration in the reactor coolant system would result in a substantial and very noticeable change in the "clicking" frequency. Further, source range neutron instrumentation level indication is continuously logged on strip chart recorders in the Control Room, so that the operator may detect trends, such as changes in source range levels due to boron dilution. Any significant change in boron concentration would again be noticeable. Alarcon Affidavit at 8-9.

In addition, in the virtually impossible event that a dilution event occurs, is not detected by the periodic sampling, and the control room operators fail to notice the increased clicking or increase in neutron flux shown on the strip chart recorders, a safety-related, redundant flux doubling detection system has been provided. If the source range nuclear instrumentation detects a doubling of the neutron flux in any continuous approximate 10 minute period, an alarm is sounded for the operator and valve movement to terminate the dilution and start boration is automatically initiated. No immediate operator action is required. These automatic actions are carried out to stop any approach to criticality and regain any lost shutdown margin. Alarcon Affidavit at 9.

In conclusion, based on the foregoing, during fuel loading and precritical testing, it is a virtual impossibility for a boron dilution event to be initiated and continue until a K_{eff} of .990 is exceeded. Alarcon Affidavit at 9.

Respectfully submitted,

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