TXU Energy
Comanche Peak Steam
Electric Station
P.O. Box 1002 (E01)
Glen Rose, TX 76043
Tel 254 897 8920
Fax: 254 897 6652
lance terry@txu.com

C. Lance Terry
Senior Vice President &
Principal Nuclear Officer

Ref: 10CFR50.54(f)

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February 27, 2003

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING NRC BULLETIN 2002-01, "REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY" (TAC Nos. MB4537 and MB4538)

REF:
1. Letter logged TXX-02067 from C. L. Terry to the NRC dated April 2, 2002.
2. Letter logged TXX-02094 from C. L. Terry to the NRC dated May 17, 2002
3. Letter from Mr. D. H. Jaffe of NRR to Mr. C. L. Terry dated November 22, 2002.

Gentlemen:

By letter dated March 18, 2002, the U.S. Nuclear Regulatory Commission issued NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity." TXU Generation Company LP (TXU Energy) provided the requested 60-day response in Reference 2 of this letter.

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The staff evaluated the 60-day response and as a result TXU Energy received a request for additional information on December 2, 2002 via Reference 3. TXU Energy's response to these additional questions, as it pertains to the reactor coolant pressure boundary other than the reactor pressure vessel head, are contained in the Attachment of this letter.

This communication contains the following new commitment regarding CPSES Units 1 and 2.

Commitment Number	Commitment
27278	CPSES is actively participating in industry activities directed toward enhancement of boric acid corrosion control programs. Appropriate enhancements will be implemented for Units 1 and 2 to the extent practical prior to the Fall 2003 refueling outage in Unit 2 with full implementation for Units 1 and 2 prior to the Spring 2004 refueling outage in Unit 1.

If you have any questions regarding this response, please contact Mr. J. D. Seawright at (254) 897-0140.

I state under penalty of perjury that the foregoing is true and correct.

Executed on February 27, 2003.

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC,
Its General Partner

C. L. Terry
Senior Vice President and Principal Nuclear Officer

By: Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

JDS/js
Attachment

c - E. W. Merschoff, Region IV
W. D. Johnson, Region IV
D. H. Jaffe, NRR
Resident Inspectors, CPSES

Comanche Peak Steam Electric Station Response to Request for Additional Information concerning NRC Bulletin 2002-01,"Reactor Pressure Vessel Head Degradation And Reactor Coolant Pressure Boundary Integrity"

This is the Comanche Peak Steam Electric Station (CPSES) response to the Nuclear Regulatory Commission (NRC) request for additional information related to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," 60-day response.

The responses below provide information required by the NRC about the CPSES Boric Acid Corrosion Detection and Evaluation Program as it pertains to the Reactor Coolant Pressure Boundary (RCPB) other than the reactor pressure vessel head. The inspections/examinations of the Steam Generator Tubes and Tube Sheet are not included in these responses because they are covered by inspections independent of the requirements of the CPSES Generic Letter 88-05,"Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants" program. The information demonstrates full compliance with Generic Letter 88-05, the requirements of 10CFR50.55(a), Section XI of the American Society of Mechanical Engineers (ASME) Code, and CPSES Technical Specifications 3.4.13, "RCS Operational LEAKAGE ".

CPSES has multiple programs that address Reactor Coolant Pressure Boundary boric acid corrosion detection and evaluation including the Alloy 600 pressure boundary materials and dissimilar metal Alloy 82/182 welds and connections. These programs include the Boric Acid Corrosion Detection and Evaluation Program and the ASME Section XI Inservice Inspection (ISI) Program.

Although CPSES has determined that the existing Boric Acid Corrosion Detection and Evaluation Program meets the original intent of GL 88-05 and assures compliance with all other applicable license requirements, recent industry experience has highlighted the need for the subject program to be carefully re-evaluated and enhanced as necessary. CPSES is actively participating in industry activities directed toward enhancement of boric acid corrosion control programs. Appropriate enhancements will be implemented for Units 1 and 2 to the extent practical prior to the Fall 2003 refueling outage in Unit 2 with full implementation for Units 1 and 2 prior to the Spring 2004 refueling outage in Unit 1.

NRC Request for Information, Item 1:

> **Provide detailed information on, and the technical basis for, the inspection techniques, scope, extent of coverage, and frequency of inspections, personnel qualifications, and degree of insulation removal for examination of Alloy 600 pressure boundary material and dissimilar metal Alloy 82/182 welds and connections in the reactor coolant pressure boundary (RCPB). Include specific discussion of inspection of locations where reactor coolant leaks have the potential to come in contact with and degrade the subject material (e.g., reactor pressure vessel (RPV) bottom head).**

TXU Energy Response, Item 1:

TXU Energy's practice is to minimize boric acid induced corrosion by applying an administrative program that provides for: (1) early detection of borated water leaks; (2) prompt action to mitigate the borated water leak, perform repairs, and avoid future damage; (3) thorough inspection of the areas surrounding identified borated water leakage; and (4) proper evaluation of areas where borated water leakage has occurred.

Scope and Frequency:
The RCS pressure boundary is examined near the beginning of each refueling outage in accordance with CPSES Procedure STA-737, "Boric Acid Corrosion Detection and Evaluation" using Engineering personnel familiar with the systems and the boric acid corrosion issue. This procedure was developed to address NRC Generic Letter 88-05 concerns and contains a listing of potential leakage sources of borated water within containment with potential targets of low alloy steel structures or components in the RCS Pressure Boundary that could be adversely affected by such leakage. Although the focus of the Boric Acid Corrosion Detection and Evaluation procedure and Generic Letter 88-05 is mechanical connections, the outage walkdowns are conducted to identify borated water leaks from any location within containment regardless of the source or potential target(s). All identified borated water leakage, including that from Alloy 600/82/182 pressure boundary material is evaluated for boric acid corrosion.

Techniques Used:
Visual inspection is the technique used in the CPSES "Boric Acid Corrosion Detection and Evaluation" Program to identify borated water leakage. The inspections are consistent with industry experience that a small leak can be detected prior to the occurrence of significant corrosion.

Extent of Coverage:
Piping isometrics of the Chemical and Volume Control System (CS), Reactor Coolant System (RC), Residual Heat Removal System (RH), and Safety Injection System (SI) are used as a guide to inspect the piping and components that form the Reactor Coolant Pressure Boundary (RCPB). A visual inspection of the identified principle locations and external pressure boundary components in containment is performed by Engineering personnel at or near RCS normal operating pressure and temperature. CPSES performs a scheduled refueling outage inspection activity prior to beginning containment decontamination to ensure that all information necessary for an engineering evaluation is compiled prior to removal of boric acid indications. Every location with boric acid accumulation must be evaluated. Principle locations are identified and targeted for inspection where leaks less than allowable TS limits could cause degradation of the RCPB. A discussion of identification aids is included within the procedure with emphasis on investigation of any oxide (rust) stains on insulation and/or any accumulation of boric acid crystals. Leaks found during the inspections are tracked back to the source with insulation removed as necessary to accommodate source determination.

In addition to the Boric Acid Corrosion Detection and Evaluation Program, the ASME Section XI In Service Inspection (ISI) Program inspects piping welds, including dissimilar metal welds. The ASME Section XI In Service Inspection Program examines RCS system pipe-to-nozzle welds using ultrasonic (UT) inspection methods. The Reactor Vessel 10 year ISI was performed in the seventh refueling outage for Unit 1 (9/99) and the sixth refueling outage for Unit 2 (3/02) which involved UT inspection of Reactor Vessel fabrication welds and the safe end to pipe and safe end to nozzle welds.

The ISI program also includes VT-2 system leakage tests for Class 1, 2, and 3 ASME systems per the ASME Section XI Code requirements. The RCS Class 1 system is VT-2 inspected every outage and the remaining systems are VT-2 inspected 3 times in a 10 year interval.

For bolted connections in borated water systems, CPSES Code Relief Requests A-1 and A-2 (Unit 1 - TXX-93290; Unit 2 - TXX-94332) apply. Relief Request A-1 suggests that the time and radiation exposure associated with removal of all bolting at a connection is not warranted to determine the condition of the bolted connection. Leakage does not typically occur in a uniform pattern around a bolted connection, but rather in a localized area along the perimeter. The bolt closest to the leakage source will reveal sufficient evidence to indicate the overall condition of the bolted connection since it will be most susceptible to damage. Relief Request A-2 suggests that significant leakage from insulated bolted connections will be apparent at exposed insulation joints and surfaces and would be detected during a VT-2 examination of these insulation joints and surfaces.

In addition to the outage walkdowns, boric acid corrosion may be identified by station personnel during normal activities. Engineering uses these observations as part of the complete Boric Acid Corrosion Detection and Evaluation Program if they are within the scope of the program. Containment Air Cooling and Recirculation Units were inspected during the most recent outages for boric acid indications from the containment atmosphere.

Where evidence of borated water leakage is found during inspections, the following is determined:

- Source of Leakage
- Magnitude of Leakage
- Priority for Refurbishment:
    1) Repair Now
    2) Schedule Repair at next window of opportunity
    3) Monitor

Consideration is given to any increase in leakage rates or spread of corrosion effects and the methodology of transporting leaking borated water to materials susceptible to boric acid corrosion (BAC). Corrective action efforts are based on the priorities assigned.

Personnel Qualifications:

The physical walkdowns to identify borated water leakage are led by Engineering. Personnel performing the Boric Acid Corrosion Detection and Evaluation inspections are experienced engineers that are familiar with the program and trained on their responsibilities. Pre-Job Briefs are performed to confirm requirements and expectations of the inspection. Post-Job Briefs are performed to document results and further actions.

Insulation Removal:

Insulation is not required to be removed for inspection purposes under the program unless indications of borated water leakage are observed. Such an inspection consists of an observation of the component location for abnormal conditions that might indicate a borated water leak. Such conditions include boric acid residue on or at the base of a nozzle where it protrudes from a wall penetration, or residue at seams in insulation. Insulation is removed where required to identify the source of the leakage.

Under Reactor Vessel Inspection:
Each unit undergoes a visual inspection under the Reactor Vessel each outage of the exterior surface of the accessible Reactor Vessel insulation and of the general area, except when radiological conditions have not allowed access. At present, routine insulation removal is not performed for this inspection, although insulation would be removed for leak source identification or evaluation of RCPB components for potential boric acid damage if necessary. The inspection identifies any changes to the conditions previously found and identified. A comparison to documentation of previous walkdowns is performed using descriptions and photographs. Refueling cavity leaks have occurred in previous outages resulting in some accumulation of boric acid deposits on the side of the reactor vessel insulation exterior. Changes to the appearance of these accumulations are readily identifiable and particular attention is paid to these areas during the inspection.

Summary:
In summary, containment walkdowns are performed in accordance with CPSES procedure STA-737, "Boric Acid Corrosion Detection and Evaluation" prior to each refueling outage at normal operating pressure and temperature. The ASME Section XI In Service Inspection program supplements the Boric Acid Corrosion Detection and Evaluation program. In addition, walkdowns of accessible areas are performed by Operations personnel on a routine basis during normal operation. The walkdowns, inspections, and normal plant activities have been adequate to identify and correct borated water leaks. Station personnel have a heightened awareness of potential boric acid corrosion damage due to recent industry events. Visual examination techniques have proven to be effective in detecting borated water leakage at CPSES. The inspections comply with GL 88-05 and ASME Section XI requirements.

The effectiveness of visual examination for identifying leaks in insulated systems is demonstrated by the fact that leaks have been first identified through visual examination. The personnel performing the boric acid corrosion detection and evaluations walkdowns have a combination of training and experience to allow them to adequately perform the inspections. Personnel that enter plant areas where borated water leaks could occur have an awareness of the boric acid corrosion issues and routinely enter indications of leakage into the corrective action program.

The current program would detect and correct any ongoing borated water leaks.

NRC Request for Information, Item 2:

> **Provide the technical basis for determining whether or not insulation is removed to examine all locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surfaces or locations that are susceptible to primary water stress corrosion cracking (Alloy 600 base metal and dissimilar metal Alloy 82/182 welds). Also include in your response actions involving removal of insulation required by your procedures to identify the source of leakage when**

relevant conditions (e.g., rust stains, boric acid stains, or boric acid deposits) are found.

TXU Energy Response, Item 2:

Insulation is not routinely removed for borated water leak inspection. Procedures require the identification of sources of leakage or boric acid accumulation. Insulation removal has not been necessary to identify small leaks. Borated water systems readily leave evidence of leakage, even for very small leak rates. Leakage that is sufficient to cause significant degradation of carbon/low alloy steel leaves indications which have historically been detectable without insulation removal because leaks tend to find a release path around the insulation. The boric acid deposits are then easily identified during subsequent examinations by station personnel as a part of normal walkdowns or containment entry inspections. Insulation is removed to investigate identified leakage and to clean up any residual boron on or in contact with the affected surface.

All high temperature insulated equipment, piping, fittings, valves etc. inside the containment building are insulated with removable 304 stainless steel mirror insulation. However, the removal of insulation, inspection of components, and reinstallation of insulation can result in significant radiation dose to personnel involved. All activities are conducted in accordance with ALARA practices.

NRC Request for Information, Item 3:

Describe the technical basis for the extent and frequency of walkdowns and the method for evaluating the potential for leakage in inaccessible areas. In addition, describe the degree of inaccessibility and identify any leakage detection systems that are being used to detect potential leakage from components in inaccessible areas.

TXU Energy Response, Item 3:

The Boric Acid Corrosion Detection and Evaluation program involves visual inspections for borated water leakage indications in areas that are reasonably accessible. Leakage in areas not directly accessible will be evident from boric acid accumulation at insulation seams or piping penetrations.

Containment leak detection systems are in place to monitor unidentified RCS leakage and to take corrective actions as soon as detected to preclude reaching levels of 1 gpm or greater. These systems include:

- Containment radiation monitors
- Containment sump monitors
- Containment Air Cooling and Recirculation condensate monitors
- Containment Particulate, Iodine, and Gas monitors

Leakage is evaluated as described above, and corrective actions are performed within established site programs and procedures based on the severity of the conditions identified. Visual identification of conditions is the basis for the current program.

RCS inventory balance is performed by Operations in accordance with Technical Specification requirements (3.4.13, "RCS Operational LEAKAGE ") to document any unidentified leakage.

NRC Request for Information, Item 4:

> **Describe the evaluations that would be conducted upon discovery of leakage from mechanical joints (e.g., bolted connections) to demonstrate that continued operation with the observed leakage is acceptable. Also describe the acceptance criteria established to make such a determination. Provide the technical basis used to establish the acceptance criteria. In addition, if observed leakage is determined to be acceptable for continued operation, describe what inspection/monitoring actions are taken to trend/evaluate changes in leakage, or if observed leakage is not determined to be acceptable, describe what corrective actions are taken to address the leakage.**

TXU Energy Response, Item 4:

Leakage from mechanical joints may be visually identified over the course of a normal operating cycle as a result of routine operations and maintenance activities. Any such observations are identified and evaluated promptly. A Smart Form is generated in accordance with the CPSES Corrective Action Program that requires an Engineering Evaluation to document Operability and appropriate corrective actions. Scheduling of the corrective action is based upon the Engineering Evaluation. Operability is determined base upon the design and licensing basis of the plant. Whenever possible, immediate, non-invasive actions are taken to correct the condition. Otherwise, a work order is developed to perform the necessary repairs, and the work is scheduled in accordance with work control guidelines. The severity of the leakage and potential for further degradation are included as appropriate within the evaluation. However, no generic acceptance criteria have been developed for continued operation with such leakage. If it were deemed appropriate to defer corrective action, strict compliance with all applicable Codes, Standards, Licensing, and Design bases would be maintained. Clearly, the limited access to containment means this leak identification avenue will be less effective within containment than in other areas of the plant during non-outage periods.

Detailed walkdowns are completed within containment as early as practical at the start of each refueling outage and all identified borated water leakage locations and boric acid deposits are evaluated for corrective action as described above. These focused walkdowns are conducted in conjunction with an outage when necessary corrective action can generally be accomplished. Consideration is given to any expected increase in leakage rates or spread of corrosion effects and the methodology of transporting borated water to materials susceptible to boric acid corrosion. Corrective action efforts are based on the priorities assigned in accordance with work control guidelines.

Significant leakage would be evaluated on an individual basis as follows:

- Confirm if work documents exist which address the leakage.
- Initiate further corrective action, as warranted, to reduce the probability of future leakage, such as:
    - Changes to operating procedures;
    - Materials upgrades to a more suitable corrosion resistant material;
    - Application of protective coatings or cladding;
    - Evaluate any potential damage to target material.

All corrective actions would be developed to be in accordance with Technical Specifications, the Radioactive System Leakage Identification (RSLI) program, plant design and procedures, and industry events. Attributes considered as part of an evaluation include leakage rate, corrosion rate, target materials, duration of leak, and migratory action of leakage.

NRC Request for Information, Item 5:

> **Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in the bottom reactor pressure vessel head incore instrumentation nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. The NRC has had a concern with the bottom reactor pressure vessel head incore instrumentation nozzles because of the high consequences associated with loss of integrity of the bottom head nozzles. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.**

TXU Energy Response, Item 5:

Each unit undergoes a visual inspection under the Reactor Pressure Vessel each outage unless precluded by radiation fields. At present, insulation removal is not performed for this inspection, although if necessary for leakage source identification or evaluation of target material, insulation would be removed. The inspection identifies any changes to the conditions previously found and identified. A comparison to documentation of previous walkdowns is performed using descriptions and photographs of the areas observed during the previous walkdown. Changes are readily identifiable and particular attention is paid to these areas during the inspection of the Reactor Vessel Cavity.

If boric acid deposits were identified by this walkdown, an evaluation is performed to determine whether there is wastage of any system, structure, or component and determine necessary corrective actions. Significant occurrences of boric acid leakage or accumulation must be evaluated to determine the source and develop corrective actions.

NRC Request for Information, Item 6:

> **Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in the**

certain components and configurations for other small diameter nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.

TXU Energy Response, Item 6:

The capability to detect low levels of RCPB leakage that may result from through-wall cracking in nozzles is provided in the Boric Acid Corrosion Detection and Evaluation Program and the ASME Section XI In Service Inspection Program. Borated water systems readily leave evidence of leakage. For even very small leak rates, detectable evidence of boric acid deposits can be identified with visual examination. Leakage that is sufficient to cause degradation of carbon/low alloy steel would leave indications which have historically been detectable without insulation removal. The boric acid deposits are identified by station personnel as a part of normal walkdowns, containment entry inspections, and the focused walkdowns looking for evidence of boric acid leakage and corrosion each refueling outage. Visual examination techniques have proven effective in detecting borated water leakage.

When Boric Acid Leakage is detected, the leakage is traced to the source of the leak and the affected components are evaluated as necessary to determine required corrective actions.

NRC Request for Information, Item 7:

Explain how any aspects of your program (e.g., insulation removal, inaccessible areas, low levels of leakage, evaluation of relevant conditions) make use of susceptibility models or consequence models.

TXU Energy Response, Item 7:

Both Comanche Peak units are ranked in the Low Susceptibility Category as determined under both the guidance contained in USNRC Bulletin 2002-02,"Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs" and current industry guidance. However, the CPSES Boric Acid Corrosion Detection and Evaluation Program does not make use of formal susceptibility or consequence models, except in determining the formal reactor vessel head inspection program to be followed.

NRC Request for Information, Item 8:

Provide a summary of recommendations made by your reactor vendor on visual inspections of nozzles with Alloy 600/82/182 material actions you have taken or plan to take regarding vendor recommendations and the basis for any recommendations that are not followed.

TXU Energy Response, Item 8:

Reference:
Recommendation Letter Dated 12/13/02: WOG-02-223, CEOG-02-259 --
Westinghouse and Combustion Engineering Owners Group Transmittal of Response to NRC Request for Information, Bulletin 2002-01: Vendor Recommendations for Visual Inspections of Alloy 600/82/182 Component Locations (MUHP-5035, CEOG 2046).

Westinghouse has made no recommendations on visual inspections of nozzles with Alloy 600/82/182 material.

NRC Request for Information, Item 9:

> **Provide the basis for concluding that the inspections and evaluations described in your responses to the above questions comply with your plant Technical Specifications and Title 10 of the Code of Federal Regulations (10 CFR), Section 50.55(a), which incorporates Section XI of the American Society of Mechanical Engineers (ASME) Code by reference. Specifically, address how your boric acid corrosion control program complies with ASME Section XI, paragraph IWA-5250 (b) on corrective actions. Include a description of the procedures used to implement the corrective actions.**

TXU Energy Response, Item 9:

The CPSES Boric Acid Corrosion Detection and Evaluation Program is described in TXU Generation Company LP (TXU Energy) letter logged TXX-02067, "Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity" dated April 2, 2002. CPSES concluded that the actions identified in the Boric Acid Corrosion Detection and Evaluation Program will provide on a continuing basis, reasonable assurance that the applicable regulatory requirements discussed in Generic Letter 88-05 and NRC Bulletin 2002-01 are being met. CPSES In Service Inspection Program incorporates the requirements of ASME Section XI. Areas of degradation caused by Boric Acid Corrosion will be documented, evaluated, and repaired in accordance with site programs that comply with ASME Section XI requirements.

Plant Technical Specifications:
The limits for CPSES reactor coolant operational leakage are provided in Technical Specification 3.4.13, "RCS Operational LEAKAGE ". This includes no RCPB leakage, 1 gpm unidentified leakage, and 10 gpm identified leakage. If measurable leakage is detected by the containment leak detection systems, evaluations and actions will be performed per the Technical Specification requirements and site corrective action programs.

The Boric Acid Corrosion Detection and Evaluation Program is implemented to minimize boric acid induced corrosion by applying a program that provides for early detection of borated water leaks, thorough inspection of the areas surrounding identified borated water leakage, evaluation of areas where borated water leakage has occurred, and prompt action to mitigate the borated water leak, perform repairs, and avoid future damage. The requirements of ASME Section XI, paragraph IWA-5250 (b) are satisfied through engineering evaluations that determine whether adequate wall thickness exists for continued operation or whether corrective actions to repair or replace the affected component is required.

The inspections comply with CPSES procedure STA-737, "Boric Acid Corrosion Detection and Evaluation", GL 88-05, Technical Specifications, and ASME Section XI requirements.