CYGNA
ENERGY
SERVICES

101 California Street, Suite 1000, San Francisco, CA 94111 5894 415/397-5600

July 23, 1984
83090.014

Mr. S. Burwell
Licensing Project Manager
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Mr. J. B. George
Project Manager
Texas Utilities Generating Company
Comanche Peak Steam Electric Station
Highway FM 201
Glen Rose, Texas 76043

Subject: Request for Supplemental Information
Comanche Peak Steam Electric Station
Independent Assessment Program - Phases 1 and 2
Texas Utilities Generating Company
Job No. 83090

References: A) N.H. Williams (Cygna) letter to J.B. George (TUGCO); 83090.007; April 19, 1984 - NRC Meeting Follow-Up; April 24, 1984

B) N.H. Williams (Cygna) letter to S. Burwell (NRC) and H. Schmidt (TUGCO); 83090.013; DCC Satellite Review Results; June 30, 1984

Gentlemen:

During an April 19, 1984 meeting with the NRC Staff, Cygna was asked to provide supplemental information and/or perform follow-up work to facilitate staff review of the Phase 1 and 2 draft final report. These items, which are detailed in Reference A, are summarized below along with the individual status:

Item 1
Reaudit the Document Control Center (DCC) satellite distribution and control system.
Status: The reaudit is completed and documented in Reference B.

Review the Design Change Tracking Group (DCTG) data base verification activities.
Status: The review is complete; however, some questions remain. A letter with these questions will be issued by July 27, 1984.

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Item 2
Review a sample of 3" and 4" schedule 40 pipe to substantiate Cygna's resolution of Observation PI-00-01.
Status: The response is provided in Attachment 1 to this letter.

Item 3
Review a sample of welded attachments to ensure the use of a 20% increase in allowable for equation 9 is acceptable.
Status: No further work is required as a result of discussions between Cygna and the NRC staff on July 3, 1984.

Item 4
Revise Exhibit 4.3-1 in the Cable Tray Support Design Review Criteria document, DC-3, to properly reflect the safe shutdown allowables used in the Gibbs & Hill design.
Status: A copy of the revised exhibit was provided by Cygna during the April 19, 1984 meeting with the staff.

Item 5
Conduct a walkdown of the Phase 2 cable tray supports.
Status: This item shall be addressed as part of the Phase 4 walkdowns.

Item 6
Review valve 8811B for compliance with Regulatory Guide 1.106 and Branch Technical Position ICSB 18.
Status: The response is provided in Attachment 2 to this letter.

Item 7
Review the 79-14 as-built walkdown procedure to determine if sufficient references exist to justify differences in installation, not shown on the as-built drawing.
Status: Same as Item 5.

One additional item has been included in this letter for documentation purposes. During the April 19, 1984 NRC meeting Cygna responded to a question contained in the NRC letter of February 6, 1984 from Mr. B. J. Youngblood to Mr. R. J. Gary. This response is again provided in Attachment 3 to this letter.

Therefore, by copy of this letter, all Cygna action items except the DCTG data base verification activities are complete.

If you require addition information or clarification on any of these items don't hesitate to call.

Very truly yours,

N. H. Williams

N. H. Williams
Project Manager

Attachments

cc: See page 4

Mrs. Juanita Ellis
President, CASE
1426 S. Polk
Dallas, Texas 75224

Nicholas S. Reynolds, Esq.
Bishop, Liberman, Cook, Purcell & Reynolds
1200 Seventeenth Street, N.W.
Washington, D.C. 20036

Mr. R. Ballard
Gibbs & Hill, Inc.
393 Seventh Avenue
New York, New York 10001

Renea Hicks, Esq.
Assistant Attorney General
Environmental Protection Division
P.O. Box 12548, Capitol Station
Austin, Texas 78711

Mr. John T. Collins
U.S. NRC, Region IV
611 Ryan Plaza Drive
Suite 1000
Arlington, Texas 76011

Mr. B. R. Clements
Vice President Nuclear
Texas Utilities Generating Company
Skyway Tower
400 North Olive Street
L.B. 81
Dallas, Texas 75201

Peter B. Bloch, Esq.
Chairman, Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
4350 East West Highway, 4th Floor
Washington, D.C. 20814

Dr. Walter H. Jordan
881 W. Outer Drive
Oak Ridge, Tennessee 37830

Dr. Kenneth A. McCollom
Dean,
Division of Engineering Architecture and Technology
Oklahoma State University
Stillwater, Oklahoma 74074

Stuart A. Treby, Esq.
Office of the Executive Legal Director
U.S. Nuclear Regulatory Commission
7735 Old Georgetown Road
Bethesda, Maryland 20814

Mr. J. B. George
Texas Utilities Generating Company
Comanche Peak Steam Electric Station
Highway FM 201
Glen Rose, Texas 76043

Mr. David H. Wade
Texas Utilities Generating Company
400 North Olive Street, L.B. 81
Dallas, Texas 75201

Mr. David R. Pigott
Orrick, Herrington, & Sutcliffe
600 Montgomery Street
San Francisco, California 94111

Ms. Ellen C. Ginsburg
Atomic Safety and Licensing Board
4350 East West Highway
Bethesda, Maryland 20814

Mr. S. Burwell
Licensing Project Manager
U. S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Mr. H. Schmidt
c/o Westinghouse
4901 Fairmont Avenue
Bethesda, Maryland 20814

ATTACHMENT 1

Comanche Peak Steam Electric Station
Independent Assessment Program, Phases 1 and 2

REFERENCE: Response to NRC Letter of March 30, 1984,
From D. G. Eisenhut to M. D. Spence and L. L. Kammerzell,

QUESTION:

In observation PI-00-01, the applicant's piping designer (Gibbs & Hill) did not specify any weld mismatch (δ) when determining the stress intensification factor for as-welded girth butt welds. Consequently, a stress intensification factor of 1.0 was used in the piping analyses. Cygna was concerned that the use of a stress intensification factor of 1.8, which is specified in the ASME Code in Figure NC--3673.2(b)-1 for a wall thickness (t) less than 3/16 inch or a mismatch ratio (δ/t) greater than 0.1, could result in exceeding the allowable stress limit. For welds with a wall thickness less than 3/16 inch, the applicant used a stress intensification factor (SIF) of 1.8 as required. For welds in piping with wall thicknesses greater than 0.237 inch the stress intensification factor was also shown to be acceptable. However, the NRC staff does not find that an adequate justification was provided to allow the use of an SIF equal to 1.0 for girth butt welds between straight piping with wall thicknesses between 0.1875 and 0.237 inch. Cygna should provide an adequate explanation of whether girth butt welds between straight sections of piping (sizes 3 and 4 inch, schedule 40) conform to the ASME Code requirements for welded joints.

RESPONSE:

As noted in observation PI-00-01, the only welds of concern would be between straight sections of 3" and 4" sch 40. This is because Gibbs & Hill uses an SIF of 1.9 at all tapered transition joints, 2.0 at all reducers, and approprate indices at elbows (1.8 for 3" schedule 40 long radius, 1.9 for 4" schedule 40). Later ASME Codes (Winter, 1981) direct the analyst to use stress indices for the primary stress checks. For a butt weld with t > 3/16",

$$B_1 \frac{PD_o}{2t} + B_2 \frac{M_a}{Z} < 1.5S_h \qquad (8)$$

$$B_1 \frac{P_{max} D_o}{2t} + B_2 \frac{(M_a + M_b)}{Z} < 1.8S_h \qquad (9)$$

$$B_1 = .5$$

$$B_2 = 1.0$$

$\therefore$ Equations 8 and 9 become:

$$\frac{PD_o}{4t} + \frac{M_a}{Z} < 1.5S_h \qquad (8)\ \text{Design}$$

or

$$\frac{PD_o}{4t} + \frac{M_a + M_b}{Z} < 1.8S_h \qquad (9)\ \text{(Normal and Upset)}$$

Comparing the above with equations 8 and 9 of the code of record:

$$\frac{PD_o}{4t} + .75i\,\frac{M_a}{Z} < S_h \qquad (8)$$

$$\frac{PD_o}{4t} + .75i\,\frac{M_a + M_b}{Z} < 1.2S_h \qquad (9)$$

We see that the later code is less restrictive since .75i > 1. Thus Gibbs & Hill does meet the later Code primary stress limits for all butt welds.

The concern, therefore, would be for the secondary/fatigue stress limits (equation 10). As noted in Cygna's Observation Record Review, it is our experience that spool piece joint welds which do not occur at an elbow, tee, transition, or reducer are usually in long straight runs. Here, moment levels are small compared to those at nozzle points or on an elbow, so stress levels should be acceptable.

Cygna has reviewed the piping drawings for the high-energy (temperatures above 200°) piping and also a sample of the piping that passes between buildings, to account for maximum seismic anchor motion effects. The maximum corrected ratio for equation 11 of paragraph NC-3652.3 at an intermediate butt weld is

$$\frac{S_{max}}{S_{all}} = \frac{18700}{41675} = 0.45$$

As expected, the stress levels at the field weld locations are not large and in many cases are below 5000 psi. Therefore, the use of an SIF of 1.0, rather than 1.8, has no impact on the piping design at CPSES.

ATTACHMENT 2

Comanche Peak Steam Electric Station
Independent Assessment Program, Phases 1 and 2

REFERENCE: Response to NRC Letter of March 30, 1984,
From D. G. Eisenhut to M. D. Spence and L. L. Kammerzell,

NRC QUESTION:

With regard to design review of electrical, instrumentation, and control systems, the NRC staff reviewed the Cygna criteria and checklists for the electrical design review (Cygna Report, Appendix E, Document No. DC-5, Sections 2.0, 3.0, 4.0 and 5.0) to determine the adequacy of the criteria for assuring compliance with NRC regulatory requirements. The NRC staff notes that the review criteria did not include NRC Regulatory Guide 1.106 relative to bypassing of motor overload protection circuits and NRC Standard Review Plan Section 8.3, Appendix 8A, Branch Technical Position ICSB 18 (PSB) relative to the single failure of safety related valves. The NRC staff could not determine whether these two regulatory guidelines were included in the electrical design review of the valve control circuitry. Cygna should supplement the design review criteria and checklist for this valve and assess the design of the valve control circuitry against these two regulatory guidelines or otherwise justify their omission.

RESPONSE:

These two regulatory guidelines were not included in the design criteria since they did not apply to the scope or Cygna's review. The review scope only included the instrumentation and control side of the motor operated valves in relation to interlocks, logic, etc. and the power circuits to the pump.

Cygna has reviewed valve 8811B for compliance with Regulatory Guide 1.106 and Branch Technical Position ICSB 18. Checklist EE-02, Item 1 will be revised to include a satisfactory check for compliance with these documents and the following comment will be added:

> "Thermal overload contacts for the motor operators on valves 1-8811B, 1-8812B, 1-8701 and 1-8702B are used to annunciate an overload condition for the valve in the control room. They have not been included in the valve control circuits, where they could possibly inhibit the valve from moving to its desired position."

ATTACHMENT 3

Comanche Peak Steam Electric Station
Independent Assessment Program, Phases 1 and 2

REFERENCE: Response to NRC letter of February 6, 1984, from Mr. B.J. Youngblood to Mr. R.J. Gary

QUESTION:

In the course of the NRC staff's review of the Cygna Report we have found an inconsistency which requires explanation. In Appendix E, Document No. D-5, Cygna describes the electrical system review criteria to include the control circuit (the manual and automatic logic) that operates valve 1-8811B. This review is detailed in Appendix H, Checklist EE-02. FSAR Section 7.6.5 (FSAR Pages 7.6-17 through 7.6-19) describes the control and interlock requirements for the recirculation sump isolation valves (8811A and 8811B). These valves open automatically when two of four refueling water storage tank level signals are less than the Lo-Lo-1 level setpoint in conjunction with the initiation of the engineered safety feature actuation signal ("S" signal). The design provides for the retention of the "S" signal to allow automatic switchover from injection mode to recirculation mode of the ECCS. The recirculation sump isolation valves are also interlocked such that they must be closed before the following valves can be opened:

1. RWST/RHR pump suction isolation valves, 8812A and 8812B.
2. RHR inner or outer isolation valves 8701A, 8701B, 8702A, and 8702B.

In the Cygna Report, Appendix H, Checklist No. EE-02, it only mentions that valve 1-8811B should be interlocked to prevent opening until the pressure decays to 425 psig. The interlock described by Checklist EE-02 is not in conformance with FSAR Section 7.6.5 requirements. Conversely, the Cygna Report is silent on the control and interlock requirements described in FSAR Section 7.6.5.

Cygna should explain this inconsistency and confirm that the control and interlock circuitry for valve 1-8811B is designed consistent with the description given in FSAR Section 7.6.5.

RESPONSE:

Concerning the review of the control and interlock requirements for the recirculation sump isolation valves (1-8811A and 1-8811B) as detailed in Appendix H, Checklist EE-02, Cygna offers the following explanation for what may appear to be an inconsistency in the draft report.

Cygna's review of the control circuit for valve 1-8811B included the interlocks with the control circuits of valves 1-8701B, 1-8702B, and 1-8812B to ensure compliance with the requirements of FSAR section 7.6.5. The pressure interlocks in the open and closed circuits of valves 1-8702B and 1-8701B were reviewed as a result of this association.

Cygna's review found that valve 1-8701B, not 1-8811B, is interlocked to prevent opening until the reactor coolant system pressure decays to 425 psig. Quoting FSAR paragraph 7.6.2.1, "Each valve is interlocked so that it cannot be opened unless the RCS pressure is below approximately (sic) 425 psig." The valves being referenced in this quote are the inner and outer RHR isolation valves, not the RWST/RHR suction valve as was incorrectly noted in the comments column of checklist EE-02.

Second, our review did corroborate that valve 1-8818B meets the interlocking requirements described in FSAR paragraph 7.6.5.

The checklist EE-02, Item 1.b comments shall be revised as follows:

Design of valve 1-8811B's control circuit complies with FSAR section 7.6.5.

- o Automatically opens when (2/4) RWST level signals are lower than the lo-lo setpoint in conjunction with an "s" signal.

- o Is interlocked such that it must be closed before valves 1-8701B, 1-8702B, and 1-8812B can be opened.

Design of valves 1-8701B's and 1-8702B's control circuits comply with FSAR section 7.6.2.1.

- o Open circuits will not energize until RCS pressure is below approximately 425 psig.

- o Close circuits will automatically close when RCS pressure increases above approximately 425 psig.