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March 15, 1984
84042.07

50-445/446

Mrs. Juanita Ellis, President
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Subject: Comanche Peak Steam Electric Station Independent Assessment Program - Response to CASE Questions

Reference: (1) Brief Summary of Generic Problems from CASE Witness Jack Doyle, 2/22/84.

(2) Brief Summary of Cross-examination Questions from CASE Witness Mark Walsh, 2/22/84.

Dear Mrs. Ellis:

Enclosed please find our responses to reference (1) item 10; and reference (2) items 2 and 11.

Further responses will be forthcoming.

Very truly yours,

N. H. Williams

Nancy H. Williams
Project Manager

NHW:eam
Enclosures: Attachment A, Partial Responses to CASE Questions

cc: See attachment

B001
1/1

CYGNA
ENERGY SERVICES

Mrs. J. Ellis
Response to CASE Questions

March 15, 1984
Attachment

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Comanche Peak ASLB Hearings
Response to CASE Questions
Question No.: Doyle #10
Exhibit No.: 893

1.0 CASE Question

Changing from a flare weld to a fillet weld induces flange bending. Has this been addressed by Cygna?

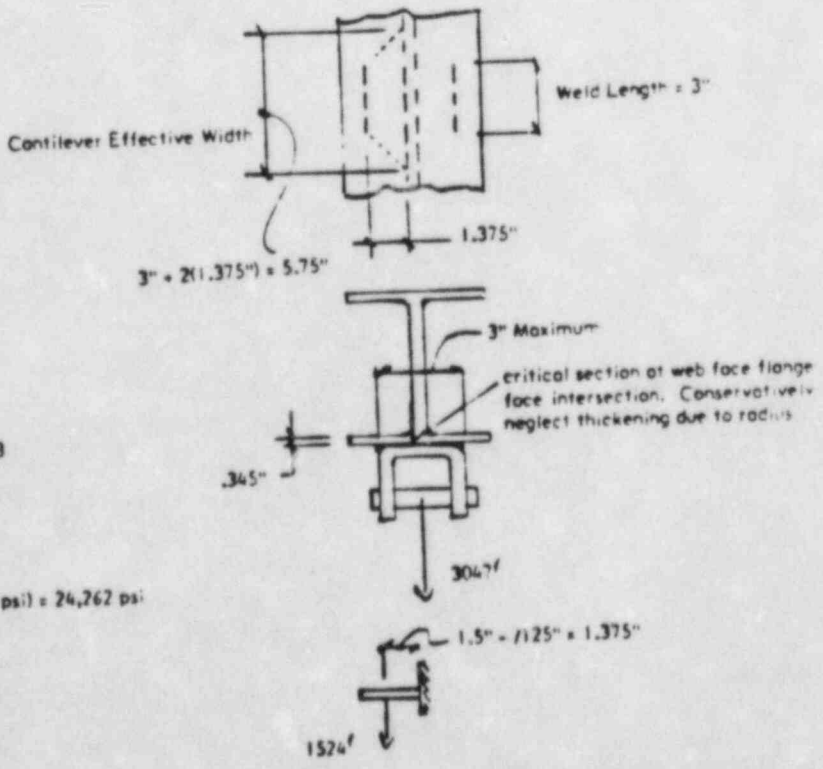
2.0 Cygna Interpretation

The calculation sheet attached to Exhibit 893 states that the weldment between the rear bracket and the beam flange was changed from a fillet to a flare/bevel weld. This fillet-to-flare change results in a 90 degree re-orientation of the weld lines, from perpendicular-to-parallel to the web of the wide flange. Did Cygna evaluate the additional loads on the flange?

3.0 Response

Cygna judged that this re-orientation would not cause an overstress in the flange. The following calculation verifies that judgement:

Check Flange Bending
Support No. SI-1-079-001-S325



$$S = \frac{bt^2}{6} = \frac{5.75}{6}(.345)^2 = .114 \text{ in}^3$$

$$= \frac{M}{S} = \frac{1524(1.375)}{.114} = 18,382 \text{ psi}$$

Allowable stress = $.75F_y$ = .75(32,350 psi) = 24,262 psi

18,382 < 24,262 psi

Comanche Peak ASLB Hearings
Response to CASE Questions
Question No.: Walsh #2
Exhibit No.: None

1.0 CASE Question

Observation Record PS-02-01. The applicant did not consider shear cone interaction of adjacent bolts.

2.0 Cygna Interpretation

Cygna Observation PS-02-01 was written to evaluate an apparent discrepancy between drawing information and calculations, as related to anchor bolt embedment lengths. Was shear cone interaction also addressed?

3.0 Response

Observation PS-02-01 identifies a concern with the calculation of bolt embedment lengths and the direction provided to the field for the installation. Further investigation revealed that the embedment was provided to the constructor as a function of total bolt length which is specified on the drawing. In addition, the greater of the two embedments derived from either the construction specification or the drawing governs.

Although not related to this concern, Cygna did check both the analyses and construction to ensure that bolt spacing requirements were met. Minimum bolt spacing criteria are necessary to assure full development of bolt capacity as specified by the manufacturer. Maximum bolt capacity is realized when the concrete shear cone is fully developed without interferences. Interaction or overlapping between adjacent bolt shear cones will reduce bolt capacity as a function of bolt diameters. The applicant properly considered these effects.

1.0 CASE Question

Pipe stress checklist, note 3, item a:

1) What is the basis for considering that the effects were negligible?

2) What pipe stress run did Cygna look at, since the inclined load was used in the design of support RH-1-010-003-S22R?

2.0 Cygna Interpretation

Pipe stress checklist (PI-02), note 3, states the following:

3. The following supports were modeled along the coordinate axis rather than inclined. The impact is negligible.

a. FH-1-010-003-S22R @ data point 1253 (8.6 degrees)

b. SI-1-042-001-S22R at data point 793 (7.5 degrees)

What was the basis for concluding that support RH-1-010-003-S22R was adequate?

3.0 Response

Support RH-1-010-003-S22R is a simple restraint, inclined 8.6 degrees from a line drawn perpendicular to the pipe. Cygna judged that this small inclined angle would not significantly affect the support design or the piping analysis. This judgement was based on the following considerations:

- the fabrication tolerance is 5 degrees, therefore the misalignment is only 3.6 degrees beyond tolerance.

- the axial restraint load will increase by 1/cosine 8.6 degrees = 1.011 or 1%.

In order to verify the adequacy of this judgement, Cygna requested that Gibbs & Hill reanalyze piping segment AB-1-70. For this reanalyis, the piping model was revised to include the following:

- Supports RH-1-010-003-S22R and SI-1-042-001-S22R were modeled with skew angles of 8.6 and 7.5 degrees, respectively.
- Support RH-1-010-003-S22R was modeled as two trunnions with snubbers located 7 inches from the pipe centerline.
- Support RH-1-064-010-S22R was modeled 1'-4" west of the elbow.

The results of this reanalysis are summarized below:

Maximum System Stress (psi)

ASME Equation

	Old	New
8	9039	9039
9 (upset)	21094	21103
9 (emergency)	24451	24463
10	22883	22883
11	27881	27881

Support Loads (lbs)

	Normal		Upset		Emergency		Allow.
	Old	New	Old	New	Old	New	
RH-1-010-003-S22R	1705	1459	3534	4519	3967	5189	15700
*	105	164	-1724	-2894	-2756	-3565	-15700

Nozzle Loads (lbs)

	Old	New
Load	3084	2541
Allowat	3120	3120
Ratio	0.98	0.81

Therefore, the correctness of the original engineering judgement is verified. Enclosure W11-1 contains the computer output for this reanalysis.

Revision	Original Issue	Date	Rev. *	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #			1								
Preparer			AKP	3-1-84							
Checker			CSV	3.1.84							
DR			ADH	3/2/84							

* REANALYSIS OF STRESS PROB. AB-1-70, ISSUE 0 HAS BEEN PERFORMED STRICTLY TO INCORPORATE THE FOLLOWING COMMENTS MADE BY CYGNA INC. DURING THEIR AUDIT OF ISSUE 0 OF THE ANALYSIS.

(1) SUPPORT NO. RH-1-010-003-S22R AT NODE POINT 1253 IS SKEWED AT 8.6° AND SUPPORT NO. SI-1-042-001-S22R AT NODE POINT 793 IS SKEWED AT 7.5° PER THE RESPECTIVE BRH SKETCHES.

(2) SUPPORT NO. RH-1-010-004-S22K AT NODE POINT 252 IS A PAIR OF SNUBBERS. THESE HAVE BEEN REMODELED AT THE TWO STUNCHIONS AT DATA POINT 8252 AND 6252 PER THE BRH SKETCH.

(3) SUPPORT NO. RH-1-064-010-S22R AT DATA POINT 2245 WAS EARLIER CALLED SUPPORT NO. RH-1-062-001-S22R AND HAS BEEN MODELED AT 1'-4" WEST OF THE ELBOW INSTEAD OF 2'-6" WEST OF THE ELBOW AS MODELED EARLIER.

(4) THE INPUT AND OUTPUT OF THIS REANALYSIS IS STORED AS SHOWN BELOW.

INPUT: FILE NAME : TUSI.AB$1$70.CYGNA
TAPE # T 02630, LABEL # 023

OUTPUT: FILE NAME : TUSI.AB$1$70.CYGNA
TAPE # T13039 LABEL 001

THE NOZZLE LOADS FOR THE INLET NOZZLE OF THE RHR HEAT EXCHANGER TBX-RHAHRS-02 AT N.P. 1255 ARE TABULATED AND COMPARED WITH THE ALLOWABLE NOZZLE LOADS OF THE SAME AND ARE FOUND TO BE ACCEPTABLE.

Gibbs & Hill, Inc. Job No. 11 2323-030 Client TUSI P...

Subject ...

Calculation Number: TITLE ITEM: AB-1-70 Sheet No. 2 of 2

	Rev	Date	Rev*	Date	Rev	Date	Rev	Date	Rev	Date
Originator			AKP	3-1-84						
Preparer			WW	3.1.84						
Checker			[illegible]	3/2/84						
Design Reviewer										

RHR HT. EXCHANGER (INLET)

BRP/~~OTHER~~ RH-1-SB-003 NODE: 1255 IDENT: TBX-RHAHRS-02

	NORMAL		UPSET		EMERGENCY		FAULTED	
	AS-BU.	ALL	AS-BU.	ALLO.	AS-BU	ALLO.	AS-BU.	ALLO.
F_x	+84 -81	1560	+1075 -1072	3120	+1445 -1442	6240		
F_y	+441 -118		+2363 -2040		+3000 -2678		BOUNDED	
F_z	+164 -119		+935 -890		+1105 -1060		BY	
~~FR~~/ Shear	471 168	1560	2541 2226	3120	3197 2880	6240	EMERGENCY	
M_x	+187 -468	7811	+1596 -1877	15622	+1969 -2250	31244	CONDITION.	
M_y	+298 -475		+2021 -2197		+2359 -2535			
M_z	+772 +165		+2503 -1565		+2906 -1969			
~~MR~~/ Bend	+828 503	3905	3217 2697	7811	3743 3210	15622		

BRP/OTHER: NODE: IDENT:

	NORMAL		UPSET		EMERGENCY		FAULTED	
	AS-BU.	ALL	AS-BU	ALLO.	AS-BU	ALLO.	AS-BU.	ALLO.
F_x								
F_y								
F_z								
FR/ Shear								
M_x								
M_y								
M_z								
MR/ Bend								

Notes: 1) Forces are in lbs, moments in Ft-lbs
2) For allowable loads see ** (3) For anchors, compliementary problem results must be tabulated

** CALCULATION BOOK OF AB-1-70

Checking Method #

F-165, 4-81

DESIGN REVIEW

RECORD FORM

Texas Utilities Services, Inc. (CLIENT) Comanche Peak S.E.S. (PROJECT) 2323 (G&H JOB NO.)

Title: AB-1-70 ISSUE #

☐ Drawing ☒ Calculation ☐ Specification

AB-1-70 (DOCUMENT NO.) * (REVISION NO.) 3/1/84 (DATE)

COMMENTS ARE AS NOTED ON DOCUMENT SHEETS LISTED BELOW EXCEPT AS STATED HEREIN: NOTE: * Q.A Design Review has been performed only on the incorporation of the items defined on sheet 1 of the attached calculation of Prob. AB-1-70. All other input data are as per issue 0 of the analyses AB-1-70

REQUIRED ACTION NONE

Warren K Rogers (DESIGN REVIEW ENGINEER) 3/2/84 (REVIEW DATE)

REQUIRED ACTION SATISFACTORILY COMPLETED YES ☐ NO ☐

COMMENTS

DESIGN REVIEW ENGINEER REVIEW DATE