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

(8)

August 29, 1984
84042.028

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

Subject: Communications Report Transmittal #11
Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3
Texas Utilities Generating Company
Job. No. 84042

Dear Mrs. Ellis:

Enclosed please find telecons associated with the Phase 3 Independent Assessment Program.

If you have any questions or desire to discuss any of these documents, please do not hesitate to call either me or Donna Oldag.

Very truly yours,

N. H. Williams

N. H. Williams
Project Manager

Attachments

cc: Mr. D. Wade (TUGCO) w/attachments
Mr. S. Treby (USNRC) w/attachments
Ms. J. Van Amerongen (TUGCO/EBASCO) w/attachments
Mr. D. Pigott (Orrick, Herrington & Sutcliffe) w/o
Mr. S. Burwell (USNRC) w/attachments

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Communications Report

Company: Texas Utilities ☐ Telecon ☒ ☐ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 6/14/84

Subject: Oversize Bolt Holes (Pipe Supports)
(Item 25 in 5/24 Telecon)

Time: 9:20

Place: Site

Participants:

	of
R. Sievers	B&R
J. Minichiello	Cygna

Item	Comments	Required Action By
	Cygna called the CPSES N-STAMP holder to understand their position on the oversize bolt holes. Mr. Sievers, who is responsible for site ASME QC and a member of the Code Committee, stated that both his and the ANI's interpretation of NF-4721 is that no code violation exists. Their basis is that paragraph NF-4721(b) does not prohibit the use of oversize holes in bearing connections. Since the code has no prohibition, no violation exists. If engineering needs a smaller tolerance hole to meet their design criteria, that is up to engineering. For fabrication up to 1/4" oversize would be acceptable.	

Signed: N.H. Williams /ss

Distribution: N. Williams, D. Wade, G. Grace, J. Minichiello, C. Wong, G. Bjorkman, S. T
J. Ellis, Project File, S. BURWELL

1020.01a

sc as to avoid harmful thermal gradients. This procedure may also be used for postweld heat treatment after repairs.

NF-4624.4 **Heating Components Internally.** The component support or item may be heated internally by any appropriate means and with adequate indicating and recording temperature devices to aid in the control and maintenance of a uniform distribution of temperature in the component support or item. Previous to this operation, the component support or item should be fully enclosed with insulating material.

NF-4660 HEAT TREATMENT OF ELECTROSLAG WELDS

Electroslag welds in ferritic material over 1½ in. (38 mm) in thickness at the joints shall be given a grain refining heat treatment.

NF-4700 REQUIREMENTS FOR BOLTED CONSTRUCTION

NF-4710 BOLTING AND THREADING

NF-4711 Thread Engagement

The threads of all bolts or studs shall be engaged for the full length of thread in the nut.

NF-4712 Thread Lubricants

Any lubricant or compound used in threaded joints shall be suitable for the service conditions and shall not react unfavorably with any support element material. Contact surfaces within friction type joints shall be free of oil, paint, lacquer, or galvanizing.

NF-4713 Removal of Thread Lubricants

All threading lubricants or compounds shall be removed from surfaces which are to be welded.

NF-4720 BOLTING

NF-4721 Bolt Holes

W80

For the purpose of this Article, high strength bolts shall be considered those with yield strength greater than 80.0 ksi (552 MPa). Bolt holes shall meet the requirements of (a) through (e) below.

(a) Holes for nonfitted bolts shall meet the requirements of Table NF-4721(a)-1. For anchor bolts or concrete expansion anchors having a specified minimum tensile strength of 80.0 ksi (552 MPa) or less, the hole sizes indicated in this Subsection may be increased by $\frac{1}{16}$ in. (1.6 mm). When the bolt hole size is $\frac{1}{8}$ in. (3.2 mm) larger than the bolt, and the bolt is $\frac{1}{2}$ in. (13 mm) or smaller, standard washers shall be used.

(b) Oversized or slotted bolt holes may be used with high strength bolts $\frac{1}{2}$ in. (13 mm) in diameter and larger, except as restricted in (1), (2), and (3) below.

(1) Oversized holes shall not exceed the requirements of Table NF-4721(b)-1. They may be used in any or all plies of friction-type connections. Hardened washers shall be installed over exposed oversized holes.

(2) Short-slotted holes shall not be wider than permitted by (a) above and shall not have a length exceeding the oversize diameter allowed in (1) above by more than $\frac{1}{16}$ in. (1.6 mm). They may be used in any or all plies of friction-type or bearing-type connections. The slots may be used without regard to direction of loading in friction-type connections but shall be normal to the direction of the load in bearing-type connections. Hardened washers shall be installed over exposed short-slotted holes.

(3) Long-slotted holes shall not be wider than permitted by (a) above and shall not have a length which exceeds 2½ times the bolt diameter. In friction-type connections, the long-slotted holes may be used without regard to direction of loading, provided the stress on the bolts does not exceed 75% of the allowable working stress given in NF-3000. In bearing-type connections, the long diameter of the slot shall be normal to the direction of loading. Long-slotted holes may be used in only one of the connected parts of either a friction-type or bearing-type connection at an individual faying surface. Structural plate washers or a continuous bar not less than $\frac{5}{16}$ in. (8 mm) in thickness shall be used to cover long slots that are in the outer plies of joints. These washers or bars shall have a size sufficient to cover the slot completely after installation and shall meet the requirements of NF-3000.

(c) Except as specified in (d) below, holes may be

W80

TABLE NF-4721(a)-1
BOLT HOLE SIZES

Bolt Size	Hole Size
≤ 1 in.	Bolt diameter plus 1/16 in.
1 1/8 in. to 2 in.	Bolt diameter plus 1/8 in.
> 2 in.	Bolt diameter plus 3/16 in.

TABLE NF-4721(b)-1
TOLERANCES ON OVERSIZED HOLES

Bolt Size	Max. Hole Size
≤ 7/8 in.	Bolt diameter plus 3/16 in.
1 in.	Bolt diameter plus 1/4 in.
> 1 in.	Bolt diameter plus 5/16 in.

punched, provided the thickness of the material is not greater than the nominal diameter of the bolt plus 1/8 in. (3.2 mm). When the thickness of the material is greater than the nominal diameter of the bolt plus 1/8 in. (3.2 mm), holes shall be drilled, subpunched and reamed, or thermally cut. Thermal cutting shall not be used unless the load bearing surfaces are machined or ground smooth. For subpunched holes, the die shall be at least 1/16 in. (1.6 mm) smaller than the nominal diameter of the bolt.

(c) Bolt holes in material over 1/2 in. (13 mm) thick having a specified minimum yield strength greater than 80.0 ksi (552 MPa) shall be drilled.

(d) For bolts not subjected to shear, the limits for oversized and slotted holes in (d) above may be increased if structural plate washers or continuous bars which meet the requirements of NF-3000 are provided.

NF-4722 Bolted Connections

(a) Surfaces of bolted parts in contact with the bolt head and nut shall not have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the surface of high strength bolted part has a slope of more than 1:20, a beveled washer shall be used to compensate for the lack of parallelism.

(b) Bolts loaded in pure shear shall not have threads located in the load bearing part of the shank unless permitted by the Design Specifications.

NF-4723 Precautions Before Bolting

All parts assembled for bolting shall have contact surfaces free from scale, chips, or other deleterious material. Surfaces and edges to be joined shall be smooth, uniform, and free from fins, tears, cracks, and other defects which would degrade the strength of the joint.

NF-4724 Bolt Tension

W80

All high strength structural bolts shall be preloaded to a value not less than that given in the Design Specifications. Preloading shall be monitored by the turn of nut method by properly calibrated wrenches, or by direct extension indicators. Bolts preloaded by means of a calibrated wrench shall be installed with a hardened washer under the nut or bolt head, whichever is the element turned in preloading. Hardened washers are not required when bolts are preloaded by the turn of nut method, except that hardened washers are required under the nut and bolt head when the bolts are used to connect material having a specified yield point less than 40.0 ksi (276 MPa).

NF-4725 Locking Devices

W80

All threaded fasteners shall be provided with locking devices to prevent loosening during service. Elastic stop nuts (when compatible with service temperature), lock nuts, jam nuts, and drilled and wired nuts are all acceptable locking devices. Upset threads (by peening, tack welding, or other means) may serve as locking devices. Torquing and other preloading methods may be used as locking devices on threaded parts made of material with a yield strength of 80 ksi (552 MPa) and greater, loaded in tension, provided the resulting preload is at least 20% above the maximum load on the fastener for the specified loading conditions, but is limited to 70% of the specified minimum tensile strength of the fastener. The threaded assembly shall be tested for the dynamic loading conditions specified in the Design Specification, and the established preload shall be verified on the assembly by properly calibrated wrenches, direct extension indicators, or the turn of the nut method. The results of the test, required preload, and specified thread lubrication shall be provided in the Design Report. Disk and helical spring lock washers shall not be used as locking devices.

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Communications Report

Company:	Texas Utilities	☐ Telecon	☒ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	4/2/84
Subject:	Mechanical Review Document Request	Time:	12:45 pm
		Place:	CPSES Site
Participants:	B. Wood	of	TUGCO
	J. Russ		Cygna

Item	Comments	Required Action By
	Reference: Conference Report dated 2 April 1984, "Mechanical Review Document Request," B. Wood and J. Russ participating Cygna received the following from Mr. Wood: 1. All documents requested on the referenced conference report. 2. Calculation Package CC-1-028-004-A33K.	

Signed: /pm Page 1 of 1

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Communications Report

Company: Texas Utilities ☒ Telecon ☐ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 5/31/84

Subject: Action Items

Time: 10:15 a.m.

Place: Boston

Participants: G. Grace of TUSI

S. Bibo Cygna

Item	Comments	Required Action By
	I received a call from George Grace inquiring whether there were any QA action items that I was waiting for. Specifically, he was referring to some information that I requested from Tony Vega. I told George that I was currently discussing these issues with Susan Spencer and Debra Anderson of TUGCO (Dallas) and that he didn't have to get involved at this time. In addition, I requested George to send me a copy of DCP-3, latest revision. I asked George to make sure that the list of Cygna personnel on the gate log for May, 1984 was maintained. He told me that it was taken care of.	

Signed: N H Williams

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Communications Report

Company:	Texas Utilities	☒ Telecon	☐ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	3/27/84
Subject:	Response Time for the Pipe Stress Questions	Time:	11:15 am
		Place:	SF
Participants:	S. Lim	of	Gibbs & Hill
	L. Weingart		Cygna

Item	Comments	Required Action By
	I contacted Steve to discuss his expected response time for the pipe stress questions. Steve is handling the main steam inside containment and feels that he will have his answers ready for discussion in about a week. He is going to discuss the other problems (MSOC and CCW) with Henry Mentel and call me back later today. I told Steve to consider the possibility of my going to the Gibbs & Hill offices in New York in order to expedite the process.	

Signed: /pm Page 1 of 1

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1020.01a

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Communications Report

Company: Texas Utilities	☐ Telecon	☒ Conference Report	
Project: Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3		Job No.	84042
		Date:	3/21/84
Subject: Cygna Questions on Main Steam		Time:	10:00 am
		Place:	Fort Worth
Participants: S. Lim		of	Gibbs & Hill
L. Weingart			Cygna

Item	Comments	Required Action By
	Steve and I discussed all of the questions which have arisen from the review of the stress analyses of the main steam inside and outside containment and the component cooling water system. The main purpose of this discussion was to assure that Gibbs & Hill understood both the nature and intent of the questions such that excessive iterations of response could be avoided. Only one direct action item resulted from this conversation. Steve will send a plot of the time history response of some of the axial restraints on the main steam inside containment. A comparison of these with the plots of the input forcing function along those runs will provide further assurance that the proper forcing functions were indeed applied for each system.	

Signed: /pm Page 1 of 1

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Communications Report

Company: Texas Utilities	☐ Telecon	☒ Conference Report	
Project: Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3		Job No.	84042
		Date:	3/23/84
Subject: Data Request		Time:	8:30 am
		Place:	Comanche Peak
Participants: D. Rencher		of	Texas Utilities
J. Minichiello			Cygna

Item	Comments	Required Action By
	Cygna requested the following: Add. Load Case 4 in STRUDL run - get output Change sign of X coordinate in Node 24 -- get output We need 2 runs to determine what was used in design (i.e., node 24 with: Run 1. → Y = -.5, x = .374; Run 2. → Y = -.5, x = -.374)	

Signed: J. C. Minichiello /pm Page 1 of 2

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Communications Report

Company: Texas Utilities ☒ Telecon ☐ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 6/22/84

Subject: Lateral Displacement, MS-1-004-003-S72R

Time: 3:30 p.m,

Place: Boston/Washington

Participants: Dr. Robert Iotti of Ebasco

Dr. Gordon Bjorkman Cygna

Item	Comments	Required Action By

Dr. Iotti confirmed that the lateral displacements of support MS-1-004-003-S72R were small.

	Lateral	Axial	Vertical
DL	0	0	0
DL+TH1	0	1.223	0
DL+TH2	0	1.324	0
1/2 SSE	0.0017	0.0064	0
SAM	0.002	0.207	0
SSE	0.003	0.0108	0
SAM	0.003	0.346	0

Dr. Iotti had made a very preliminary calculation of the dynamic load factor for the stability bumpers and determined that it was less than 1.0. The calculation was based on the minimum frequency of the stability bumpers and assured the application of a triangular pulse at peak static bumper load.

Dr. Bjorkman commented that based on the uncertainties in the frequency calculation (support stiffuser and mass distribution), pulse shape and duration one should use the maximum dynamic load factor.

Dr. Iotti agreed that this might be true. He mentioned that the impulse force is displacement dependent and that the problem was nonlinear. He recognized that the Cygna static calculation showed that the stability bumpers are not adequate. However, he believes that the bumpers can be qualified dynamically.

Signed: N. H. Williams /ms

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Item	Comments	Required Action By
	Dr. Bjorkman commented that this would probably be a first (i.e., qualify a support dynamically which a calculation shows is not adequate statically). This would require an extensive nonlinear time history analysis. Dr. Iotti mentioned that dynamic qualification of the support was a possibility. Dr. Bjorkman noted that dynamic qualification would be discussed internally at Cygna.	

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Communications Report

Company:	Texas Utilities	☒ Telecon	☐ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	7/11/84
Subject:	Pipe Support Questions	Time:	3:15 p.m.
		Place:	S.F.
Participants:	J. Finneran	of	TUGCO
	J. Minichiello		Cygna

Item	Comments	Required Action By
•	In response to Cygna's question on composite section weld calculations (earlier telcon 7/11/84), TUGCO reviewed the 7 calculations with Cygna and agreed that the weld calculations were incomplete (did not include tensile effect) or inappropriate (wrong method used). Cygna's recalculations did show all these welds acceptable, so there is no design impact. TUGCO has reviewed the 18" feedwater line supports for composite sections and found one section. TUGCO is checking the weld for that section. In addition, TUGCO will check supports on the 30" service water lines for composite sections. Since these systems represent the largest, most highly loaded systems in the plant, this check by TUGCO will ensure that there is no design impact plant-wide on this topic. N. Williams will telephone D. Wade to determine the appropriate documentation required for this commitment.	

Signed: N.H. Williams /ms Page 1 of 1

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1020.01a

Communications Report

Company:	Texas Utilities	☐ Telecon	☒ Conference Report
Project:	Comanche Peak Steam Election Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	June 27, 1984
Subject:	Specification Report	Time:	8:05 am
		Place:	CPSES
Participants:	J. Kimble	of	B&R - P&R Room
	J. Russ		CES

Item	Comments	Required Action By
	Cygna requested and received one copy of the following specification: Specification No.: G-952124, Rev. 4 WPT No.: 4514, dated February 17, 1982 Shop Order No.: TBX-120	

Signed: /ss Page 1 of 1

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Communications Report

Company: Texas Utilities	☐ Telecon	☒ Conference Report	
Project: Comanche Peak Steam Electric Station Independent Assessment Program, Phase 3		Job No. 84042	
		Date: March 16, 1984	
Subject: Fire Protection and Hardware Weights for Cable Trays		Time: 3:30 pm	
		Place: CPSES (site)	
Participants: Doug Hunt		of Gibbs & Hill	
D. Nandi		Gibbs & Hill	
John Russ		Cygna	

Item	Comments	Required Action By
	Reference: Conference Report of 15 March 1984 "Fire Protection and Hardware Weights for Cable Trays," D. Hunt, D. Nandi and J. Russ participating	

In response to the questions in the referenced conference report, Mr. Nandi gave me the attached sheets, marked A1 to A10. The information on sheets A1 to A9 is a summary of data from Binder 2323-E1-1700, Issue 322, as noted on each sheet. The information on Sheet A10 is taken from manufacturer's catalogs or as noted. Mr. Nandi told me that the weights of the splice plates and bolts used in the tray connections are included in the tray weight. He also stated that "Z" clips and friction clips are normal connections of the tray to the supports. Heavy duty clamps are used at a support, if a tray joint occurs there.

Doug told me that cover plates are not used at Comanche Peak because the insulating material used is rigid. The cable tray is not used to support the weight of the insulation.

Signed: /pm

Distribution: D. Wade, N. Williams, R. Hess, Project File, G. Grace

1020.01a

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical 2323-E1-718-11 Rev 3

(3) Structural _____

* (4) Other 2323-E1-1700 Issue 322 Pg. 30-19.2

3. LOCATION: (1) Building: SAFEGUARDS

(2) Elevation: 852'-6"

(3) Room No: 103

(4) Tray No: T11GEAB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY * Ht (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES (E1-1700)	TOTAL WT.	DESIGN LOAD (TABLE 1)	REMARKS
27	36" x 4"	12 #/Ht		16.8 #/Ht	28.8 #/Ht	105.0 #/Ht	
26	36" x 4"	12 #/ft		16.8 #/Ht	28.8 #/Ht	105.0 #/Ht	
29	36" x 4"	12 #/Ht		12.6 #/Ht	24.6 #/Ht	105.0 #/Ht	
30	36" x 4"	12 #/ft		4.2 #/ft	16.2 #/Ht	105.0 #/ft	
22	30" x 4"	10.5 #/Ht		16.8 #/ft	27.3 #/Ht	87.5 #/ft	
23	30" x 4"	10.5 #/Ht		16.8 #/Ht	27.3 #/Ht	87.5 #/ft	
24	30" x 4"	10.5 "		16.8 "	27.3 "	87.5 "	
25	30" x 4"	10.5 "		16.8 "	27.3 "	87.5 "	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A1

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

* LENGTH OF TRAY FROM T11GPAB 25 TO T11GPAB 26 = 6 ft
LENGTH OF TRAY " T11GPAB 26 TO T11GPAB 27 = 4 ft
" " " " T11GPAB 27 TO T11GPAB 29 = 1 ft
" " " " T11GPAB 29 TO T11GPAB 28 = 4 ft
" " " " T11GPAB 29 TO T11GPAB 30 = 10 ft.
" " " " T11GPAB 22 TO T11GPAB 23 = 26 ft
" " " " T11GPAB 23 TO T11GPAB 24 = 8 ft
" " " " T11GPAB 24 TO T11GPAB 25 = 9 ft

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical 2323-E1-0602-14 Rev 2

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg. 30-16.1

3. LOCATION: (1) Building: SAFEGUARDS 1

(2) Elevation: 831'-6"

(3) Room No: 88 NORTH

(4) Tray No: T11G5AB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES (E1-1700)	TOTAL WT.	DESIGN LOAD (TABLE 1)	REMARKS
44	24"x4"	9.5 #/ft	29.5 #/ft	16.8	55.8 #/ft	70 #/ft	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A2

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

LENGTH OF TRAY FROM T11G5AB44 TO T11G5AB45 = 24 ft.

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical 2323-E1-603-11 Rev 3

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg. 30-19.2

3. LOCATION: (1) Building: SAFEGUARDS

(2) Elevation: 852'-6"

(3) Room No: 100

(4) Tray No: T11GSAB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY #/ft (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES #/ft (E1-1700)	TOTAL WT. #/ft	DESIGN LOAD #/ft (TABLE 1)	REMARKS
45	24"x4"	9.5		16.8	26.3	70	
46	24"x4"	9.5		16.8	"	"	
47	24"x4"	9.5		16.8	"	"	
48	30"x4"	10.5		16.8	27.3	87.5	
49	30"x4"	10.5		16.8	"	"	
50	30"x4"	10.5		8.4	18.9	"	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A3

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

LENGTH OF TRAY FROM T11GSAB-45 TO T11GSAB-46 = 8.0 ft

" " " " " -46 " " -47 = 12.0 ft

" " " " " -47 " " -48 = 16.0 ft

" " " " " -48 " " -49 = 4.0 ft

" " " " " -49 " " -50 = 9.0 ft

" " " " " -50 " " -51 = 5.0 ft

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical E1-0602-11 Rev 1

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg 30-19.1

3. LOCATION: (1) Building: SAFEGUARDS-1

(2) Elevation: 810'-6"

(3) Room No: 77 NORTH

(4) Tray No: T11GSAB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES (E1-1700)	TOTAL WT.	DESIGN LOAD (TABLE 1)	REMARKS
07	24" x 4"	9.5#/ft		16.8#/ft	26.3#/ft	70	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A4

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

LENGTH OF TRAY FROM T11GSAB 07 TO T11GSAB 44 = 15 ft

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. 2323-E1-0600-11 Rev 3

(2) Electrical 2323-E1-0600-12 Rev 2

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg. 30-14.1

3. LOCATION: (1) Building: SAFEGUARDS

(2) Elevation: 773'-6"

(3) Room No: _____

(4) Tray No: T11GSAB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES (E1-1700)	TOTAL WT.	DESIGN LOAD (TABLE 1)	REMARKS
03	24"x4"	9.5#/ft		16.8	26.3#/ft	70#/ft	2323-E1-0600-12 Rev. 2
04	24"x4"	9.5#/ft		16.8	26.3#/ft	70#/ft	"
05	24"x4"	9.5#/ft		12.6	22.1#/ft	70#/ft	2323-E1-0600-11 Rev 3

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A5

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

TRAY LENGTH FROM T11GSAB 03 TO T11GSAB 04 = 5 ft.

" " " T11GSAB 05 TO T11GSAB 06 = 10 ft.

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical 2323-E1-0601-11 Rev 3

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg. 30-1G.1

3. LOCATION: (1) Building: SAFEGUARDS-1

(2) Elevation: 790'-6"

(3) Room No: _____

(4) Tray No: T11GSAB

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY # Ft (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1) # Ft	WT. OF CABLES # Ft (E1-1700)	TOTAL WT. # Ft	DESIGN LOAD # Ft (TABLE 1)	REMARKS
01	24" x 4"	9.5		16.8		70	
02	"	9.5		16.8		70	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES:

SHEET A6

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

LENGTH OF TRAY FROM T11GSAB01 TO T11GSAB02 = 24 ft

LENGTH OF TRAY " T11GSAB01 " T11GSAB07 = 27 ft.

" " " " T11GSAB02 " T11GSAB03 = 19 ft.

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical E1-0600-11 Rev 3

(3) Structural _____

(4) Other 2323-E1-1700 Issue 322 Pg 30-1G.1

3. LOCATION: (1) Building: SAFEGUARDS-1

(2) Elevation: 773'-6"

(3) Room No: _____

(4) Tray No: T11GSF

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES (E1-1700)	TOTAL WT.	DESIGN LOAD (TABLE 1)	REMARKS
007	12" x 4"	6 #/ft		4.2 #/ft	10.2 #/ft	35 #/ft	
008	12" x 4"	6 #/ft		4.2 #/ft	10.2 #/ft	35 #/ft	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

5. APPROVAL SIGNATURES: SHEET A7

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

TRAY LENGTH FROM T11GSF007 TO T11GSF008 = 4ft

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE: 0

2. REFERENCE DRAWINGS: (1) SK. TFHA. E1-0600-11 Rev. 3
(2) Electrical E1-0600-12 Rev. 2
(3) Structural
(4) Other 2323-E1-1700 Issue 322 Pg. 30-10.1

3. LOCATION: (1) Building: SAFEGUARDS-1
(2) Elevation: 773'-6"
(3) Room No:
(4) Tray No: T11ΦSAA

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY # Ft (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1)	WT. OF CABLES # Ft (E1-1700)	TOTAL WT. # Ft	DESIGN LOAD # Ft (TABLE 1)	REMARKS
28	24" x 4"	9.5		16.8	26.3	70	
29	24" x 4"	9.5		16.8	26.3	70	
30	24" x 4"	9.5		12.6	22.1	70	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

SHEET A8

5. APPROVAL SIGNATURES:

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

TRAY LENGTH FROM T11ΦSAA-28 TO T11ΦSAA-29 = 5 ft
" " " " -30 " " -31 = 7 ft.

ATTACHMENT 2

CABLE TRAY THERMOLAG EVALUATION FORM

1. DATE:

2. REFERENCE DRAWINGS: (1) SK. TFHA. _____

(2) Electrical 2323-E1-601-11 Rev 3

(3) Structural _____

(4) Other 2323-E1. 1700 ISSUE 322 Pg. 30-1Φ.1

3. LOCATION: (1) Building: SAFEGUARDS-1

(2) Elevation: 790'-6"

(3) Room No: _____

(4) Tray No: T11ΦSAA

4. (a) EVALUATION AS PER SECTION 3-2-2-1:

SEGMENT NO.	TRAY SIZE	SELF WT. OF TRAY #/ft (TABLE 1)	WT. OF FIRE BARRIER (TABLE 1) #/ft	WT. OF CABLES #/ft (E1-1700)	TOTAL WT. #/ft	DESIGN LOAD #/ft (TABLE 1)	REMARKS
23	24"×4"	9.5		16.8	26.3	70	
24	24"×4"	9.5		16.8	26.3	70	
25	24"×4"	9.5		16.8	26.3	70	
26	24"×4"	9.5		16.8	26.3	70	
27	24"×4"	9.5		16.8	26.3	70	

4. (b) Evaluation as per section 3-2-2.2 or 3-2-2.3. Attach calculations and reference CMC and/or DCA No. in Remarks column.

SHEET A9

5. APPROVAL SIGNATURES:

Electrical Engineering:

Civil/Structural Engineering:

Civil/Structural Check:

Civil/Structural Review:

TRAY LENGTH FROM T11ΦSAA-23 TO T11ΦSAA-24 = 29 ft

" " " " -24 " " -25 = 7 ft

" " " " -26 " " -27 = 5 ft

" " " " -27 " " -28 = 22 ft

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date _____ Filing Code _____
Calc By _____ Sheet No _____ Of _____
Chk'd/Apprd By _____ G & H Job No _____
Subject _____ Ref. Dwg /Spec No _____

(1) WT. OF '2' CLIP

a) For 4" High Tray = .47# Each

b) For 6" High Tray = .60# Each

(2) WT. OF FRICTION TYPE CLIP

a) For 4" High Tray = .92# Each

b) For 6" High Tray = 1.20# Each

(3) WT OF HEAVY DUTY CLAMP

a) ℄ CLAMP ½"x4"x6" = 3.5# Each (For 4" High Tray)

b) ℄ CLAMP ½"x6"x6" = 5.10# Each (" 6" High Tray)

(4) STANDARD SPLICE ℄

SPLICE ℄ USED IN EVERY 12'-0" IN STRAIGHT RUN. (MAX)

a) For 4" High Tray 3" WIDE = .85# EACH

b) For 6" High Tray 3" WIDE = 1.06# EACH

c) For 6" High Tray 6" WIDE = 1.70# EACH

(5) WT OF ⅝ϕ A 307 BOLT (2" Lgth.) = .47# /EACH

6) WT. OF BEVEL WASHER USED IN ⅝ϕ BOLT = .22# /EACH

(7) WT. OF ROUND WASHER USED IN CASE OF MULTI SUPPORT ONLY = .036# /EACH

(8) For

SHEET A10

CYGNA

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comanche Peak Steam Electric Station Independent Assessment Program, Phase 3

Job No. 84042

Date: March 15, 1984

Subject: CPAA's for Fire Protected Cable Trays

Time: 2:15 pm

Place: CPSES (site)

Participants: Sarah Donald of Brown & Root

John Russ Cygna

Item	Comments	Required Action By
	I requested copies of the CPPA's listed on the attached sheet from Sarah of Site Document Control Center.	Brown & Root

Signed: /pm Page 1 of 2

Distribution: D. Wade, N. Williams, R. Hess, Project File, G. Grace

1020.01a

JEFF SPEIGHMAN
15 MARCH '84

TFHA FIRE BARRIER PENV LOG *

BUILD. / ELEV.	FIRE ZONE	PENV DRAWING #	CPPA #
SG - 873	17B 17C	1 2	30,117 , 21,082
AB - 852	21F	4	25,883 , 25,432 , 23,716 , 22,096 33,137 35,616
SG - 852	18 17A	5 6	30,182 , 30,118 , 26,005 33,136 34,961 36,628
AB - 831	21D	10	24,362 , 22,345 35,620
SG - 831	15 16 144	7 8 9	26,763 , 26,731 , 26,014 35,147
AB - 790	21A	12	26,588 35,394
SG - 790	4C 1C & 2C	13 14	26,706 * 35,359
AB - 810	21B, C, & 31	15	29,835 35,832
SG - 810	8 9 142 & 143	20 21 22	30,104 35,171
EC - 778	153 43, 47, & 57	17 18	31,636 , 30,510 35,547

* = (Original) / (Update)

CYGNA

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program, Phase 3

Job No. 84042

Date: March 15, 1984

Subject: Fire Protection for Cable Trays

Time: 2:30 pm

Place: CPSES (site)

Participants: Ed Bezkor of Gibbs & Hill

John Russ Cygna

Item	Comments	Required Action By
	I spoke to Ed about the cable trays of the RHR system which may have fire protection applied to them. Ed told me that that information was available only on site. He suggested that I speak to the Site Civil Group regarding fire protection.	

Signed: /pm Page 1 of 1

Distribution: D. Wade, N. Williams, R. Hess, Project File, G. Grace

1020.01a

CYGNA

Communications Report

Company:	Texas Utilities	☐ Telecon	☒ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program, Phase 3	Job No.	84042
		Date:	March 15, 1984
Subject:	Fire Protection and Hardware Weights for Cable Trays	Time:	1:30 pm
		Place:	CPSES (site)
Participants:	Doug Hunt	of	Gibbs & Hill
	D. Nandi		Gibbs & Hill
	John Russ		Cygna

Item	Comments	Required Action By
	I spoke to Doug and Mr. Nandi (both of Gibbs & Hill's Site Civil Group) about Mr. Walsh's request for weights of fire protection insulation and cover plates, splice plates and tray-support attachment hardware. Doug told me that the Site Hazards Group is responsible for determining which cable trays will require fire protection. This information is prepared by Mr. Jeff Spiegleman of TUGCO and sent by CPPA to the Civil Group for evaluation of effects due to any additional weight. This evaluation is performed by adding the additional weight into the existing cable tray weight and comparing the total value to the design weight of 35 psf.	
	I gave Doug a copy of the RHR tray segments. To expedite our response to Mr. Walsh's question, I asked Doug to provide the following information:	
	1. Tray segment unit weight for the size of each tray segement.	Gibbs & Hill
	2. Cable fill weight per tray segment.	Gibbs & Hill
	3. Weight of insulation per tray segment.	Gibbs & Hill
	4. If any tray cover, and if so, its unit weight.	Gibbs & Hill
	5. The combined weight of Items 1 through 4.	Gibbs & Hill
	6. Weight of splice ("doubler") plates for the size of each tray segment.	Gibbs & Hill
	7. Weight of the tray attachment clips and bolts for each attachment.	Gibbs & Hill

Signed: /pm Page 1 of 1

Distribution: D. Wade, N. Williams, R. Hess, Project File, G. Grace

1020.01a

Communications Report

Company: Texas Utilities	☐ Telecon	☒ Conference Report	
Project: Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3		Job No.	84042
		Date:	3/21/84
Subject: Data Request		Time:	10:30 am
		Place:	Comanche Peak
Participants: D. Rencher		of	TUSI
J. Minichiello			Cygna

Item	Comments	Required Action By
	Cygna requested the following items: Baseplate output re-run dated 10:58:11.12...02/23/84 for calc CC-1-087-004-A33 Revision 3 of CC-1-077-013-S435 Documents SA-4124 and SA-4125 (Calc. MS-1-004-004-S72) STRUDL frame output for support CC-1-028-023-S33R STRUDL frame output for support MS-1-004-004-C72K	

Signed: JC Minichiello /pm Page 1 of 1

Distribution: D. Wade, N. Williams, J. Minichiello, G. Grace, Project File

1020.01a

CYGNA

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 3/20/84

Subject: Cygna Comment on MS

Time: 8:00

Place: Comanche Peak

Participants: G. Krishnan of Gibbs & Hill

J. Minichiello Cygna

Item	Comments	Required Action By
	Cygna requested response to the following comment:	
1.	For the MS lines, Cygna has not found any hydrotest analysis. Where is the documentation showing hydrotest stresses acceptable?	

Signed: J. C. Minichiello /pm Page 1 of 1

Distribution: D. Wade, N. Williams, J. Minichiello, G. Grace, Project File

1020.01a

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No: 84042

Date: 3/20/84

Subject: PUS U-Bolt Allowables

Time: 4:00 pm

Place: Comanche Peak

Participants:		of
	D. Rencher	TUSI
	J. Minichiello	Cygna

Item	Comments	Required Action By
	Cygna had requested allowables for PUH U-bolts above PUH-160. According the Mr. Rencher, allowables do not exist. Instead, the designers are directed to use appropriate calculations to qualify the U-bolts, based on the cross-section. The same is true for PUS allowables not shown.	

Signed: J C Minichiello /pm Page 1 of 1

Distribution: D. Wade, N. Williams, J. Minichiello, G. Grace, Project File

1020.01a

CYGNA

Communications Report

Company:	Texas Utilities	☐ Telecon	☒ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	3/14/84 - 3/17/84
Subject:	Tube Steel Allowable	Time:	1:00 p.m./ 8:00 p.m.
		Place:	Site
Participants:	D. Rencher	of	TUSI
	J. Minichiello		Cygna
	J. Finneran		TUSI/PSE

Item	Comments	Required Action By
	Cygna has noted that the allowables used for tube steel do not reflect Revision 10 of the N-71 Code Case, but only Revision 9. Mr. Rencher explained that TUSI was aware of the differences and suggested Cygna contact Mr. Finneran concerning TUSI's position. On 3/17, Cygna discussed the allowable with Mr. Finneran. Mr. Finneran stated that TUSI had documentation from the ASME Code permitting the use of the earlier revision. Cygna requested a copy of the documentation for review.	JF/TUSI

Signed: J. C. Minichiello /eam Page 1 of 1

Distribution: D. Wade, N. Williams, J. Minichiello, G. Grace, Project File

1020.01a

CYGNA

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 3/22/84

Subject: Mechanical Review Comments

Time:

Place: Comanche Peak

Participants: D. Rencher of Texas Utilities

J. Minichiello Cygna

Item	Comments	Required Action By
	Cygna requested response to the following two questions.	
1.	In CC-1-031-008-S33R, Cygna has noted another instance of a "fixed" joint at an embed plate, rather than a "pin" joint (see comments on MS-1-004-001-C72S, dated 3/21). In this case, a "fixed" assumption is needed, since self-weight was considered. The Civil Spec (SS-30) requires stiffeners be provided (see attached). a. Is piece 7 considered to be the stiffener? b. Has the Civil Group provided guidelines for stiffeners? c. What direction has TUSI given the support designers in using embed plates as "fixed" connections? d. The designer appears to use conservative calcs in determining plate loads. Then, he uses the highest plate allowables. What is TUSI's direction for determining embed plate allowables?	

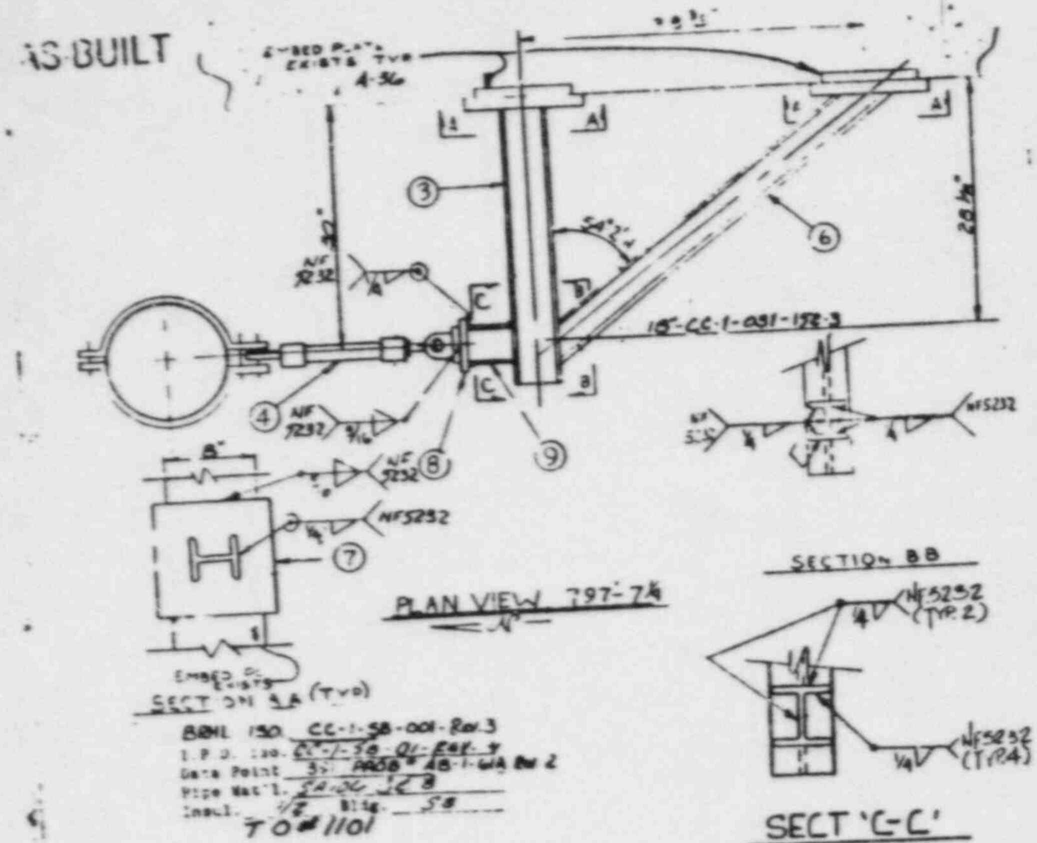
Signed: J. C. Minichiello /pm Page 1 of 13

Distribution: D. Wade, N. Williams, J. Minichiello, G. Grace, Project File

1020.01a

FOR OFFICE AND ENGINEERING USE ONLY

AS-BUILT



NOTES:
4.) Locking devices for high strength bolts are not required per DCA 7607

VENDOR CERTIFIED
DRAWING REV. NO. 6
BY JH DATE

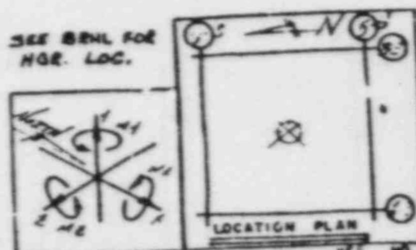
ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	CSS	PHIW	SEC.	AI
	SEISMIC SWAY STRUT ASSEMBLY CONSISTING OF:	ONE								
~~1~~	~~Hilti Kwik Concrete Anchors, TW=~~	~~3~~					X			
~~2~~	~~Carbon Steel (SA-515 GR 65 or SA-36) Plate (Section A-A), TW=~~	~~2~~			X			X		
3	M4x13 (SA-36) 2'-7 1/4" Long, TW=34#	1				X		X		
4	Fig. 211 #1 Sway Strut Assembly, 18" O.D Pipe, Carbon Steel, W=3'-11", Load= 3055# /PR-74	1					X			
~~5~~	~~M4x13 (SA-36) 3'-0 7/8" Long, TW=40#, As Shown, Shop Center and Weld to (1) One of Item #2~~	1				X		X		
6	M4x13 (FIELD CUT AS SHOWN) SA 36	1				✓		✓		
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING BUNDLE AND TAG MARK # CC-1-031-008-S33R	1 1								
7	C.S. PLATE SA 515 GR 65/...	2			X			X		
	All material to be painted with Carbo-Zinc #11 except threads which shall be treated with a rust preventative.									
8	C.S. PLATE 1"X6"X6" ...	1				X		X		
9	M4X13 ... SA36	1				✓		X		

REV	DATE	DWN	CHK	APP	DESCRIPTION
Comp	~	~	~	~	AS-BUILT, VENDOR CERTIFICATION REF: GTN# 60435 & 6111
4					REV'D VENDOR CERTIFICATION REF: GTN # 62995
5					REV'D VENDOR CERTIFICATION REF NCR-M-70055
6				Q	REV'D VENDOR CERTIFICATION PER CPPA 35013

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

Brown & Root, Inc.

SEE BRHL FOR HGR. LOC.



THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III-3

REF. DRAWING NUMBERS
PIPE: M1-0645 Rev A ELECT:
STEEL: HVAC:

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
DESIGN						
NORMAL UPSET	+2208 -927					
EMERGENCY						
FAULTED						

REV	DATE	DWN	CHK	APP	DESCRIPTION
1					ISSUED FOR CONST.
2	5-5 80				REV'D PER IN REV 2.
3					[illegible]
			Q		[illegible] (CONT ABOVE)

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-031-001-S33R
SKETCH NO.
SHEET 1 OF 1 REV 6

a concrete free edge (i.e., openings, face of beam, etc.) in any direction.

3.4 "Pin Connections" shall be assumed for load transfer to the embedded plates. Only forces normal to the embedment (P) and forces in the plane of the embedment (S) may be transferred to the embedment. Moments due to cantilever action or from any other source may be transferred to the embedment only when the embedment is stiffened for the calculated moment.

3.5 The loading pattern on sheet A4-1 and A4-3 assumes that the embedment is loaded at the midpoint of every span between pairs of studs for A4-1 and at every pair of studs for A4-3. In cases in which the load is distributed on more than one pair of studs, the full normal load (P) and only half of the plane load (S) should be considered when using the figures on sheet A4-2 and A4-4.

3.6 For capacity of embedded plate strips for loads acting on stud line see Cases 3 and 4 (A4-5 through A4-9) | REV. 1

4.0 CAPACITY OF EMBEDDED PLATE STRIPS FOR LARGE ECCENTRIC LOADING |

4.1 Tension and shear forces generated on the stud anchors by loads applied eccentric to the supporting stud group should be calculated to insure no failure of the stud anchors.

4.2 Ultimate tension and shear capacities of the stud anchors shall be taken from reference 2 of this Appendix.

4.3 The number of participating stud anchors may be increased by welding stiffeners to the embedded plate strips and to the support structure to ensure that the loading is spread to all the selected stud anchors. The embedded plate strip shall be checked for bending and shear. | REV. 1

4.4 Steel plate material is A-36 Nuclear Safety Related as defined on Drawing 2323-S-0786 for embedded plate details.

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Filing Code

Sheet No. 9 Of 12

G & H Job. No.

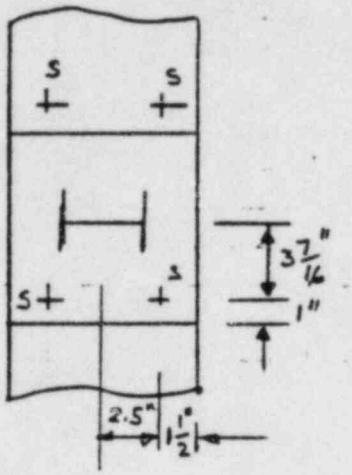
Chk'd/Apprd. By [illegible] 11/3/82

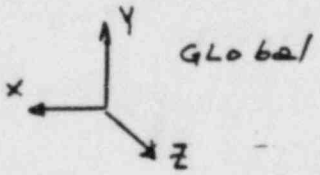
Subject # CC-1-031-008-533R Rel. Dwg./Spec. No.

REF	PG

Mach plate at embeded pl.

Joint 3 support STRUCT





$F_x = 131^{\#}$
$F_y = 51^{\#}$
$F_z = 2236^{\#}$
$M_x = 1020^{\#}$
$M_y = 2968^{\#}$
$M_z = 2 \sim$ NIL

$F_{shear} = [131^2 + 51^2]^{1/2} = 141^{\#}$/bolt

$F_{tension} = 2236 + \frac{1020}{3.94} + \frac{2968}{4} = 3237^{\#}$

per SS-30 Appendix 4 page 4 of 6 Allow:

$F_S = 21000^{\#} > 141^{\#}$ ∴ ok
$F_T = 6640^{\#} > 3237^{\#}$ ∴ ok

Conservative assumption in both cases
11/3 GD

Kicker plate at embeded pl

$F_x = 2903$ $M_x = 391$
$F_y = 39$ $M_y = 300$
$F_z = 2236$ $M_z = 502$

$F_S = [2903^2 + 39^2]^{1/2} + 502 = 3405^{\#}$

$F_t = 2236 + \frac{391}{3.94} + \frac{300}{4} = 2410^{\#}$

$3405^{\#} < 21000^{\#}$ ∴ ok ; $2410^{\#} < 6640^{\#}$ ∴ ok

Item	Comments	Required Action By
2.	In reviewing CC-1-028-022-S33K, Cygna has not found any checks of the hardware, other than references to previous design calcs. Cygna has checked piece 3 (24" special riser clamp) against the Grinnell load sheets (attached). Using the "max operating temp" of <200°F from the line list, the emergency allowable for the clamp is (@4' c-c): $E = 1.25\ (16800)$ $= 21000$ lb Since E_{act} = 21964 lb, this support may fail, assuming the above calc is OK. a. Since the calc states the original design loads were higher, what is the correct procedure for calculating clamp allowables? b. Has TUSI considered that one snubber may be more highly loaded than the other, due to pipe rotation?	

ITT GRINNELL
PIPE HANGER DIVISION
QUALIFIED PRODUCT
LOAD RATINGS
FIG. 40N

Size	C to C IN.	Maximum Load Rating (Lbs.) at 650°F		
		Design Loading & Level A & B	Level C	Level D
18" PIPE	34	13300	17730	25000
	36	11700	15870	22370
	42	9200	12270	17300
	48	7900	10530	14850
20" PIPE	37	14600	19467	27448
	42	11650	15530	21900
	48	9400	12530	17670
	54	7900	10530	14850
24" PIPE	43	15750	21000	29610
	48	12600	16800	17770
	54	10400	13870	19550
	60	8800	11730	16540
28" PIPE	51	15300	20350	28765
	54	13780	18325	25905
	60	11500	15295	21620
	66	9865	13120	18545

LOAD RATINGS NOTES

1. AT REDUCED SERVICE TEMPERATURES, THE LOAD RATINGS MAY BE INCREASED BY THE FOLLOWING FACTORS:

CLAMP TEMP. °F	LOAD FACTOR
100	1.37
200	1.25
300	1.22
400	1.18
500	1.11
600	1.01
650	1.00

2. IF THE REQUIRED C TO C IS BETWEEN LISTED C TO C, USE THE LOAD RATING FOR THE GREATER C TO C. NO INTERPOLATION IS ALLOWED. C TO C'S OUTSIDE THE RANGES SHOWN ARE NOT ALLOWED.

3. IF UNEQUAL E DIMENSIONS ARE REQUIRED, USE THE LOAD VALUE LISTED FOR THE EQUIVALENT C TO C CALCULATED BY DOUBLING THE LONGER E DIMENSION. E DIMENSIONS OUTSIDE THE RANGES SHOWN ARE NOT ALLOWED. SEE NOTE 2. UNEQUAL E DIMENSIONS ARE ALLOWED ON VERTICAL PIPING ONLY.

4. THE LOAD RATINGS ARE FOR RIGID HANGERS; FOR SPRING HANGERS THE LOAD RATINGS MAY BE DOUBLED.

ITT GRINNELL CORPORATION
VENDOR CERTIFICATION
COMANCHE PEAK STEAM ELECTRIC STATION

Sheet 1 of 5

REV	ENGR	DATE	CHK'D	DATE
0				
1	BG	4/19/83	BT	4/20/83
2				
3				

MK#: CC-1-028-022-S33K
SUBJECT: VENDOR CERTIFICATION
CUSTOMER: T U S I
PROJECT: C P S E S

BRH REV: 7 ITT REV: 2
DATA PT: 772
GTN NO: 62995
PROB NO: AB-1-61A R 2
BRHL #: CC-1-SB-05 R 4
CPPA #: ——

CONDITION	Fx	Fy	Fz	Mx	My	Mz
DESIGN						
NORMAL/ UPSET	±17635					
EMERGENCY	±21944					
FAULTED						

SUPPORT DESIGN CODE

☒ ASME III THROUGH WINTER 1974 ADDENDA

☐ B31.1 THROUGH —— ADDENDA

PIPING CLASS 1 2 (3) 5

MK# CC-1-028-022-S33K REV 7 is certified for the above specified loads.

DESIGN TEMP 200 °F AMBIENT TEMP 104 °F

1. CODS REV	
2. EPL FILE # 1 REV	
3. ASME III - NF	
4. ASME III - APPENDICES	
5. ASME III - APPENDIX XVII	
6. PROJECT DESIGN SPEC	
7. AISC - STEEL MANUAL	
8. AWS - STRUCT. WELDING - D1.1	
9. DESIGN OF WELDED STRUCTURES - BLODGETT	
10. DESIGN OF RIGID FRAMES - KLEINLOGAL	
11. NCR 399/CGL STRESS REPORT	

12. OTHER
13. ENGR. STD# REV.
14. ENGR. STD# REV.
15. ENGR. STD# REV.
16. ENGR. STD# REV.
17. STD. PROC# REV.
18. STD. PROC# REV.
19. STD. PROC# REV.
20. S.A.# REV.
21. S.A.# REV.

ADDITIONAL INFORMATION	REV.
RE: STRUDL	
RE: A-LUG	
RE: SUB IX	2
RE: S.A.#	
RE:	
RE:	
RE: CALCS	

CALCS ALSO APPLY TO	REV.

CSC NO. REV. Ts CK

ENGR. BY: BG DATE 4/19/83 SK# — MK# CC-1-028-022-553K

CHECK BY: AT DATE 4/20/83 SK# — MK# —

PROJECT: CPSES SK# — MK# —

PROB#/ISO#: AB-1-61A R2 SK# — MK# —

OTHER I.D.: D.A 772 SK# — MK# —

*These items only to be checked when loads and movements decrease.

ENGINEERING CHECK LIST	INITIAL CHECK YES	INITIAL CHECK NO	INITIAL CHECK N/A	FINAL CHECK YES	FINAL CHECK NO	FINAL CHECK N/A
* [illegible]	✓			✓		
PIPE SIZE ELEVATION						
STEEL SIZE ELEVATION						
DIMENSIONS						
INTERFERENCES						
OTHER PIPES						
ELECT TRAY						
DUCTS						
OTHER HANGERS						
INSULATION THICKNESS						
TRACEABILITY REQUIREMENTS						
WELD SIZES & TYPES						
* HANGER COMPONENT SIZES	✓			✓		
NUCLEAR CODE CLASS						
TYPE OF SUPPORT						
TYPE OF MEMBER						
CO-ORDINATE SYSTEM						
* LOADINGS & CONDITIONS	✓			✓		
* MOVEMENTS AND ROTATIONS	✓			✓		
NDE REQUIREMENTS						
MATERIAL IDENTIFICATION						
IMPACT TEST REQUIREMENTS						
ENGINEERING PARTS LIST						
DIMENSIONAL TOLERANCES						
FABRICATION PROCEDURES						
PAINTING REQUIREMENTS						
P.E. SIGN-OFF						
* GENERAL NOTES		✓				✓
LITERATURE SEARCHES DOCUMENTED						
REFERENCE MATERIAL IS SPECIFIED						
ASSUMPTIONS DOCUMENTED						
ANALYSIS DOCUMENTATION IS LEGIBLE						
CALCULATIONS IDENTIFIED BY SUBJECT						
ACCEPTANCE CRITERIA IDENTIFIED						
DESIGN INPUT CRITERIA IS CORRECT						
ASSUMPTIONS ARE REASONABLE						
THE APPROPRIATE DESIGN METHOD WAS EMPLOYED						
SPECIFIED EQUIPMENT IS SUITABLE FOR THE REQUIRED APPLICATION						
DESIGN ANALYSIS RESULTS ARE REASONABLE COMPARED TO THE DESIGN INPUT						

SUPPORT LOAD TABLE 10/22/19 4 of 5

REV.	CALC./DATE	CHK'D./DATE	DESCRIPTION
0	GARY COVELL 8-12-82	MIKE SMITH 8-17-82	AS-BUILT LOADS PER ORIGINAL ISSUE OF PROBLEM
1	GARY COVELL 9-23-82	RC WOOD 9-25-82	TRANSFERRED SIGNATURES AND DATES. AS-BUILT LOADS PER REV.1 OF AB-1-61A
2	J.McDONALD 1-10-83	[illegible]/1-11-83	TRANSFERRED SIGNATURES AND DATES. AS-BUILT LOADS PER REV.2 OF AB-1-61A

PROBLEM NUMBER/REVISION AB-1-61A / REV.2 ; GTN # 62995

BRHL/REVISION CC-1-AB-007/REV.4 CC-1-SB-001/REV.3
CC-1-AB-013/REV.7 CC-1-SB-002/REV.2
CC-1-AB-049/REV.5 CC-1-SB-003/REV.4

CC-1-028-026-S33R NORMAL (A)

NODE PT. 842 UPSET (B)

EMERGENCY (C) / ~~FAULTED (D)~~

~~"NORMAL OPERATING MODE" DISPLACEMENTS~~

Fx	Fy	Fz	ΔX	ΔY	ΔZ
—	-4307 -2690	-106 +49	+0.204 -0.401	—	—
—	-7482 +485	-4063 +4007	Fx	Fy	Fz
—	-8537 +1540	-5503 +5447	—	—	—

ΔX= — ΔY= — ΔZ= —

CC-1-028-024-S33R NORMAL (A)

NODE PT. 83 UPSET (B)

EMERGENCY (C) / ~~FAULTED (D)~~

~~"NORMAL OPERATING MODE" DISPLACEMENTS~~

Fx	Fy	Fz	ΔX	ΔY	ΔZ
—	-4956 -964	-497 +1035	+0.222 -0.437	—	—
—	-11144 +5224	-3752 +4291	Fx	Fy	Fz
—	-12503 +6583	-4444 +4982	—	—	—

ΔX= — ΔY= — ΔZ= —

CC-1-028-023-S33R NORMAL (A)

NODE PT. 773 UPSET (B)

EMERGENCY (C) / ~~FAULTED (D)~~

~~"NORMAL OPERATING MODE" DISPLACEMENTS~~

Fx	Fy	Fz	ΔX	ΔY	ΔZ
—	-7273 -4255	-1453 +695	+0.257 -0.508	—	—
—	-11880 +352	-6006 +5248	Fx	Fy	Fz
—	-13081 +1552	-7240 +6482	—	—	—

ΔX= — ΔY= — ΔZ= —

C-1-028-022-S33K NORMAL (A)

NODE PT. 772 ~~UPSET (B)~~

EMERGENCY (C) / ~~FAULTED (D)~~

"NORMAL OPERATING MODE" DISPLACEMENTS

Fx	Fy	Fz	ΔX	ΔY	ΔZ
—	—	—	+0.255 -0.521	+0.003 -0.001	+0.001 -0.001
-17535 +17535	—	—	Fx	Fy	Fz
-21964 +21964	—	—	—	—	—

ΔX= -0.402 ΔY= +0.002 ΔZ= +0.001

REF: TSBR #109

V C S DRAFTING INSTRUCTIONS

ENG: BG DATE: 4/19/83 CHECK: AT DATE: 4/20/83

MARK NUMBER: CC-1-028-022-S33K

- [x] Revise sketch revision level 7.
- [x] Revise problem number AB-1-61A R2
- [x] Revise loads.
- [ ] Include BRHL number _____.
- [x] Include GTN number 62995.
- [ ] Include CPPA number _____.
- [ ] Revise data point to _____.
- [x] Revise movements X +.566/-.581 Y +.003/-.001 Z +.001/-.061.
- [ ] Add/remove one jam nut on item number _____.
- [ ] Change weld inspection to MF _____.
- [ ] Revise snubber setting on sketch AC_____, AH(1)_____, AH(2)_____.
- [ ] Remove C-C from sketch.
- [ ] Remove items _____ from B.O.M.
- [ ] Revise load in B.O.M. for item(s) #____ to ____#, #____ to ____#.
- [x] Include normal operating movements, DX -.002", DY +.002, DZ +.001".
- [ ] Incorporate survey comments per CPP number _____.
- [ ] Revise base plate dimension as per TSDR number _____.
- [ ] Revise welds to meet min-weld requirement _____

- [x] Erase signature and date from vendor certified stamp _____

_____

- [ ] Revise B.O.M. as shown below.

ITEM NO.	MATERIALS & OPERATIONS	QUAN.	SHIP.		PAS	L	CSS	PRIM.	SEC.	AISC.

- [ ] OBTUSE AND/OR ACUTE ANGLE WELD NOT USED FOR ENGINEERING EVALUATION

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 4/19/83
Calc By BG
Chk'd/Appvd. By AT 4/20/83
Subject CC-1-028-022-533K

Filing Code
Sheet No 5 of 5
G & H Job No.
Ref. Dwg./Spec. No.

V.C. R.1

New load sheet as pu. GTN 62995. However, loads are less than those used in the design review, and snubber settings are ok as per V.C.R.0 calcs. Therefore no further calcs read.

(NEW LOAD SHEET MOVEMENTS ARE SIMILAR TO OLD ONE A.T.)

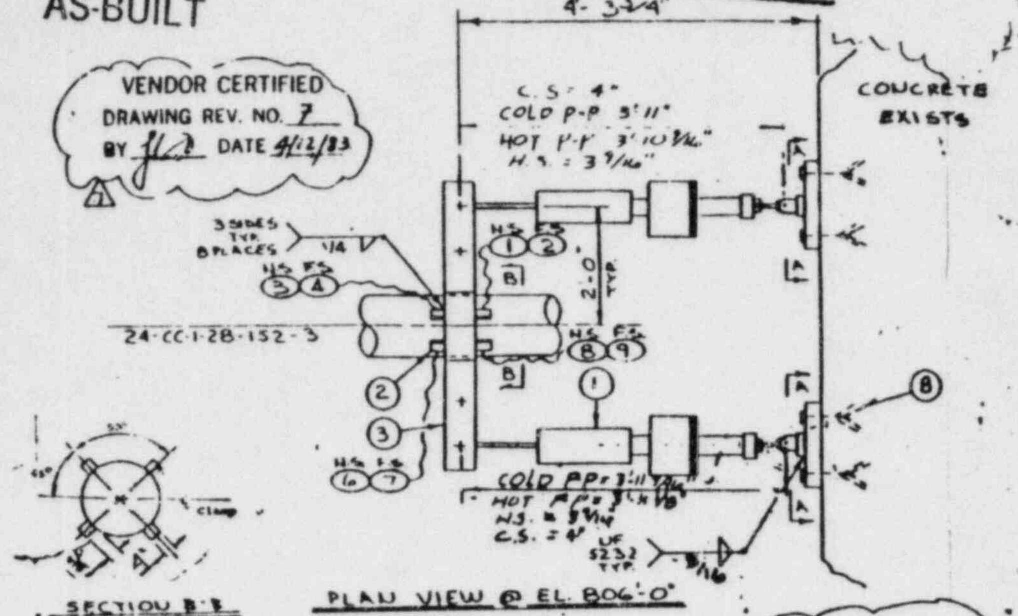
INFORMATION COPY

THIS DOCUMENT IS FOR INFORMATION ONLY. CONTACT DOCUMENT CONTROL FOR CURRENT STATUS AND REVISION.

FOR OFFICE AND ENGINEERING USE ONLY

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 7
BY [illegible] DATE 4/12/83



MOVEMENTS

X	+.255 / -.521
Y	+.003 / -.001
Z	+.001 / -.001

NORM. OPER. DISPL.

DX	-.402
DY	+0.002
DZ	+0.001

NOTE:
4) LOCKING DEVICES FOR HIGH STRENGTH BOLTS ARE NOT REQUIRED PER DCS [illegible]

	MATERIALS & OPERATIONS	QUAN	SHIP
	SEISMIC MECHANICAL SHOCK SUPPRESSOR ASSEMBLY CONSISTING OF:	ONE	
	MATERIAL EXISTS		
1	No. 35, 6" Stroke, Fig. 307N Mechanical Shock Suppressor, W=0'-8 3/4",	1	
	Load=10630# "Ordered in Pairs"		
2	1 3/4"x4" Carbon Steel (SA515 Gr.65) Lugs 0'-5" Long. TW-79#	8	
~~4~~	~~1"x12" Hilti Kwik concrete Anchors (1144)~~	~~8~~	
~~5~~	~~1 1/4"x1'-3" Carbon Steel (SA 515 Gr.65 or SA-36) Plate. 1'-3" Long. TW-160#~~	~~2~~	
	NEW MATERIAL REQUIRED		
3	Special 24" Fig. 40N Riser Clamp. C-C=4'-0" S=2", Load Stud=1.497/1.499 x 11 1/2" W/Thread Both Ends W/3" Unthreaded Section W/ (2) Hex Nuts & (2) Jam Nuts W/Washers For Use with #35, 6" Stroke, Fig. 307N	1	
6	1¼" C.S. PL / PER SECT. A-A SA-36	1	
7	1¼" C.S. PL / PER SECT. A-A SA-36	1	
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING BUNDLE AND TAG MARK # CC-1-028-022-S33K	1 1	
8	1"x12" SUPER HILTI'S CONCRETE ANCHORS	8	

Apply one coat of Carbo Zinc #11.

REV	DWN	CHK	APP	DESCRIPTION
6	[illegible]	Q	[illegible]	REV. VENDOR CERTIFICATION.
7	[illegible]	[illegible]	Q	REV. VENDOR CERTIFICATION. REF: GTN# 62995

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

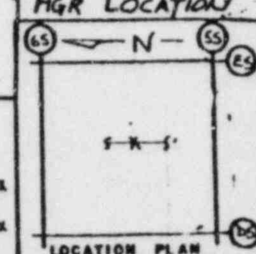
T.D. 1101

BRHL Iso. CC-1-SB-03 R.4
I.P.D. Iso. CC-1-SB-03
Data Point 772/Prob AB-1-61AR
Pipe Mat'l. SA 106 GRB
Insul. 1/2" Bldg. SB

REV	DATE	DWN	CHK	APP	DESCRIPTION
3	2-4-81	LW	[illegible]	[illegible]	REV'D AS NOTED: REF CMC 37330 ICN 1298 & DELETED F.W.'S 1-10
[illegible]	~	~	~		& DELETED NOTES 1-3 & ADDED SHT. 2 OF 2
4	11-3-81	JEB	[illegible]	[illegible]	REV'D AS NT'D. REF CMC 52813 DCA 7607 SEE NT. 4 AS BUILT
5	12-21-82	[illegible]	[illegible]	[illegible]	REV. AS BUILT, REF CMC 7727 [illegible] VENDOR CERTIFICATION [illegible]

THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III - 3

SEE BRHL FOR HGR LOCATION



Brown & Root, Inc.

REF. DRAWING NUMBERS
PIPE: M1-0604 REV. [illegible] ELECT: E1-0601-[illegible]
STEEL: S1-0602 REV. 12 H.V.A.C.: M1-06 [illegible]

CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN					
NORMAL & UPSET	11535				
EMERGENCY	[illegible]				
FAULTED					

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]	[illegible]	RW	[illegible]	ISSUED FOR CONST FW 1-10
1	[illegible]	[illegible]	BI	[illegible]	REVISED PER ITT REV. 1
2	4-2-79	JW	[illegible]	[illegible]	REV'D PER ITT REV. 2

CONT

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-028-022-S33S
SKETCH NO.
SHEET 1 OF 2 REV 7

CYGNA

Communications Report

Company:	Texas Utilities	☐ Telecon	☒ Conference Report
Project:	Comanche Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	6/12/84
Subject:	Pipe Stress Review - Welded Attachments	Time:	12:45 p.m.
		Place:	Site
Participants:	C. Ray	of	G&H
	J. Minichiello		Cygna

Item	Comments	Required Action By
	In the original review of AB-1-61A, Cygna did not find a welded attachment calculation for CC-1-028-713-A33K. G&H stated that the calculation was referenced in the back of the QA books, under CC-1-028-113-A33K (by mistake). Cygna requested a copy of the G&H memo AM-WA-82 dated 5/12/82, (To: B. Roy/F. Colucci, From: P. Bogart/V. Chirila) and verified that support -713 is similar to support -004, as stated in the memo (713 has a slightly larger trunnion diameter of 16" vs. 14").	

Signed: N A Williams /ms Page 1 of 1

Distribution: N. Williams, D. Wade, G. Grace, J. Minichiello, S. Treby, J. Ellis, S. Burwell, Project File

1020.01a

Communications Report

Company: Texas Utilities ☐ Telecon ☒ Conference Report

Project: Comache Peak Steam Electric Station
Independent Assessment Program - Phase 3

Job No. 84042

Date: 6/20/84

Subject: Pipe Support Review

Time: 3:30 p.m.

Place: Site

Participants:

	of
D. Rencher	TUEC
J. Minichiello	Cygna

Item	Comments	Required Action By
	In response to Cygna's question on MS-1-004-006-C72K (see conf. report 6/15/84), Texas Utilities ran a finite element model of the connection. Their response is attached.	

Signed: N A Williams /ms

Distribution: N. Williams, D. Wade, G. Grace, J. Minichiello, S. Treby, J. Ellis, S. Burwell, Project File

1020.01a

Rec'd 6/20

CYGNA RESPONSE

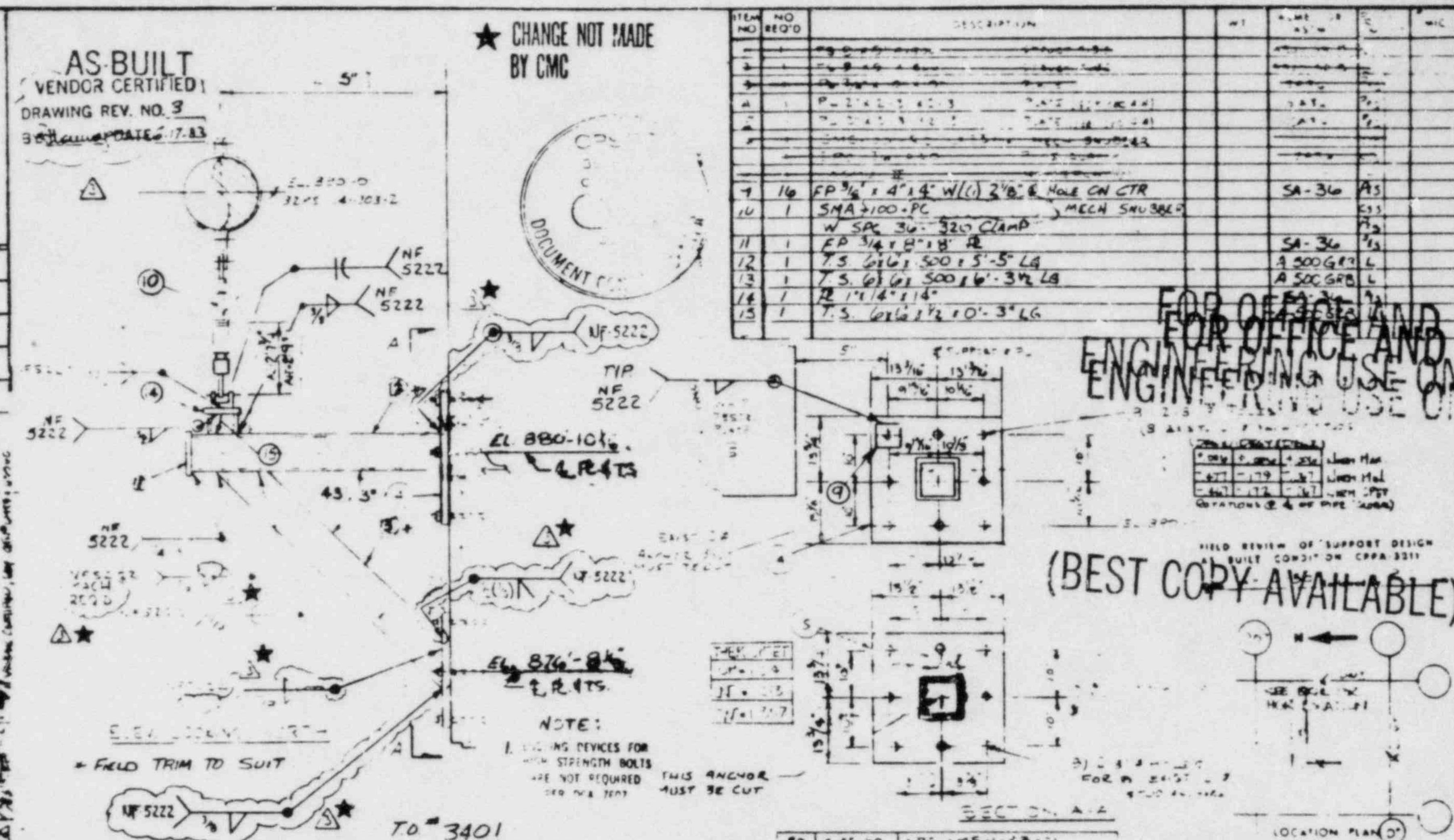
DATE OF QUESTION: 6/15/84

MS-1004-006-C72K

Calculation of 1"x14"x14" plate attached. Finite element analysis shows stress to be 22,540 psi in the upset condition (see p. 100 of output).

$22{,}540 \text{ psi} \leq 0.75(32{,}040) = 24{,}030 \text{ psi}$.) ok ✓

12½ x 12½ x 2
TO1 = 8
G = 3



ITEM NO	NO REQ'D	DESCRIPTION	WT	NAME OF ASTM	SC	MC
4	1	P – 2' x 2' – 3 [illegible]		[illegible]		
9	16	FP 3/4" x 4" x 4" W/(1) 2 1/8" Ø HOLE ON CTR		SA-36	A3	
10	1	SMA + 100-PC MECH SNUBBER W SPC 36-320 CLAMP				
11	1	FP 3/4 x 18" x 18"		SA-36		
12	1	T.S. 6x6 x .500 x 5'-5" LG		A 500 GR B	L	
13	1	T.S. 6x6 x .500 x 6'-3½ LG		A 500 GR B	L	
14	1	PL 1"x 14" x 14"				
15	1	T.S. 6x6 x ½ x 0'-3" LG				

REV	DESCRIPTION
△	ISSUED FOR CONST.
3	AS BUILT; REF CMC [illegible]

REV'D VENDOR CERTIFICATION

REFERENCE DRAWINGS	ISOMETRIC	REV	PIPING	REV	ELECTRICAL	REV
	MS-1-156-001	2	2323-M1-[illegible]	H	2323-El-[illegible]	
	ISOMETRIC	REV	STRUCTURAL	REV	H V A C	REV
	MS-1-23-[illegible]	6	2323-S-[illegible]	2	2323-M1-[illegible]	

OWNER: TEXAS UTILITIES SERVICES INC.
PROJECT: COMANCHE PEAK UNITS NO. 1 & 2
ENGINEER: GIBBS & HILL INC.

Brown & Root, Inc.
HOUSTON, TEXAS

CODE/CLASS: 3/2
ZONE
DRAWN | DATE | CHK'D | DATE | APPV'D | DATE
P.O. NO. CP-0040 A1
PRODUCTION ORDER | SERIAL NUMBER | SHEET
REV. 3

CYGNA

Communications Report

Company:	Texas Utilities	☒ Telecon	☐ Conference Report
Project:	Comache Peak Steam Electric Station Independent Assessment Program - Phase 3	Job No.	84042
		Date:	7/11/84
Subject:	Pipe Support Questions	Time:	11:00 a.m.
		Place:	SF
Participants:	J. Finneran	of	TUGCO
	J. Minichiello, N. Williams		Cygna

Item	Comments	Required Action By
	Cygna requested response or clarification on the following issues:	
1)	For checking the welds for composite sections (i.e., a plate welded top and bottom to tube steel or a wide flange), Cygna noted errors in the following calculations. a) MS-1-003-005-S72R, Rev. 1 b) MS-1-002-007-C72K, Rev. 2 c) MS-1-004-004-S72R, Rev. 0 d) MS-1-001-003-S72R, Rev. 2 e) MS-1-002-004-S72R, Rev. 1 f) MS-1-003-006-S72R, Rev. 3 g) MS-1-004-003-S72R, Rev. 4 Mr. Finneran will review these calculations and call Cygna back later today to discuss them.	
2)	For double trunnions, riser clamps, or trapeze arrangements with cinched U-bolts, TUGCO has answered that they use a 50/50 load split on the two sides, rather than, say, 66/33. For justification in terms of piping rotation, Mr. Finneran referenced his Affidavit on axial restraints and torsional loads due to piping rotation. Cygna will review this document as soon as we receive it. Cygna also refereneced NUREG/CR-2175, which discusses the effect of clearance mismatch on load split for dual snubber arrangements. Mr. Finneran will obtain a copy for review. Mr. Finneran did state that the imbalance due to rotation was a self-limiting load, since one calculated it from the full piping rotation. Mr. Finneran also referenced his Affidavit on seismic safety factors. Cygna will also review this document.	

Signed: N. Williams /ms Page 1 of 1

Distribution: N. Williams, D. Wade, G. Grace, J. Minichiello, S. Treby, J. Ellis, S. Burwell, ~~Project File~~

1020.01a