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(CITIZENS ASSN. FOR SOUND ENERGY)

EXPRESS MAIL

'84 MAR 13 A11:27

March 10, 1984

Ms. Nancy H. Williams
Project Manager
Cygna Energy Services
101 California Street, Suite 1000
San Francisco, California 94111-5894

Dear Ms. Williams:

Subject: In the Matter of
Texas Utilities Generating Company, et al.
(Comanche Peak Steam Electric Station
Units 1 and 2)
Docket Nos. 50-445 and 50-446

After receiving your responses of March 2 and March 7, 1984, it appears that there are still many items discussed in the Brief Summaries of Generic Problems and Cross-Examination Questions from CASE Witnesses Jack Doyle and Mark Walsh to which Cygna has not yet responded.

With the March 19-23, 1984, hearing date approached so swiftly, Mr. Doyle thought it would be helpful to Cygna to give you an idea of his thinking regarding some of the matters under discussion. We are attaching Mr. Doyle's notes in this regard. This will be discussed during the next hearings, during cross-examination of Cygna (and perhaps as part of CASE's rebuttal).

We are also attaching the following additional CASE Exhibits, which will be used during cross-examination (and perhaps as part of CASE's rebuttal):

CASE Exhibit 920 - Standard Practice SP-69, 1976 Edition, MSS, Pipe Hangers and Supports - Selection and Application, Developed and Approved by the Manufacturers Standardization Society

CASE Exhibit 921, Formulas for Stress and Strain, Fifth Edition, by Raymond J. Roark and Warren C. Young, pages 220, 221, 226, and 227

CASE Exhibit 922, STRUCTURAL STEEL DESIGN, Fritz Engineering Laboratory, Department of Civil Engineering, Lehigh University

CASE Exhibit 923, Manual of Steel Construction, Seventh Edition, American Institute of Steel Construction, Inc. (AISC)

CASE Exhibit 924 (formerly erroneously marked CASE Exhibit 906), drawing of 4 bolts and holes

CASE Exhibit 925, STEEL STRUCTURES Design and Behavior by Charles G. Salmon and John E. Johnson, University of Wisconsin

We believe that you have already received the following CASE Exhibits during the last hearings, but just to be certain, we are attaching the following:

CASE Exhibits 891 through 901 - various support drawings

CASE Exhibit 906 - Seismic Acceleration Study, by Applicants

If you have any questions, please let us know.

Sincerely,

CASE (Citizens Association for Sound Energy)

Juanita Ellis

(Mrs.) Juanita Ellis
President

Attachments

cc: Service List - with Attachments: CASE Exhibits 920, 921, 922, 923 924, 925. (CASE Exhibits 891 through 901, and 906 already provided in February 1984 hearings.)

ANSWER TO 3/5/84 COMMENTS

DEAD LOAD IS THE ONLY REAL LOAD ACTING ON THE SUPPORT ALL OTHER LOADS ARE ONLY "BEST ESTIMATES". BEYOND THIS IN STRUCTURAL DESIGN DEAD LOAD IS THE ONLY LOAD NOT OFFERED RELIEF (ASIDE FROM CONSTRAINT OF FREE END DISPLACEMENT.) BY CODES. FOR EXAMPLE WIND LOAD AND EARTHQUAKE ARE ALLOWED A COEF. OF .75 (OR 1.33 INCREASE IN ALLOWABLE) LIVE LOAD (UNDER SPECIAL CIRCUMSTANCES) IS ALLOWED A REDUCTION (SEE AISC 3.5.1 PG 5-223 7TH ED) SEE ALSO 1.3.1 PG 5-13 DEF. DEAD LOAD.

THE ELIMINATION OF SELF WT EXCITATION AND DEAD LOAD FROM CALC. FOR BUILDING APPENDAGES. IS IN CONFLICT WITH THE PROVISIONS OF A.I.S.C 1.3.7 WHICH BY REFERENCE CITES A.N.S.I A58.1.

THE CONCEPT OF REDUCING THE REQUIREMENTS OF A WORLD RECOGNIZED CODE IS IN CONTRADICTION WITH 10 CFR50 APPENDIX A CRITERIA 1 WHICH MANDATES THAT CODES BE STIFFENED IF REQUIRED, IT DOES NOT STATE THAT CODES MAY BE RELAXED.

FOR CASE EXHIBIT 891 SI-1-325-002-532R

STARTING WITH THE KL/r PROBLEM (NO QUALIFICATION TO SATISFY ENG. JUDGEMENT) CONTROL LD $\frac{19134}{14504} = 1.319$ ∴ N/U CONTROLS.

KL/r STRUT ETC. (1) FOR STRUT TO REMAIN STABLE ALONG AXIS OF PIPE APPROX 1000 POUND LOAD MUST BE REACTED BY PIPE. TO REACT THIS FORCE THE AXIAL RESTRAINT FOR THE PIPE RECIEVES 1000 POUND FORCE NOT ACCOUNTED FOR IN STRESS RUN (PIPE). THIS LOAD MUST BE JUSTIFIED.

" (2) 1200 POUND COUPLE INCREASES THE SINE OF THE ANGLE. ADDING TO THIS PROBLEM IS THE BASE PLATE ROTATION DUE TO MOMENT (1200 x 25.5) THIS MAY BE WRITTEN OFF WITH SIMPLE JUSTIFICATION FOR JUDGEMENT. FOR EXAMPLE TS 8X8 IS TOO STIFF TO ALLOW MORE THAN MINUTE DISPLACEMENT AND 1¼ PLATE WITH 19 K VERTICAL LOAD IS UNAFFECTED BY PLATE MOMENT.

" (3) HARDWARE AND BOX FRAME ARE ADDITIVE TO THE 14504 POUND VERTICAL DOWN LOAD (WHICH HAS NO INCREASE IN ALLOWABLE) ∴ VERTICAL LOAD EQUALS 14504 PLUS 7'-3" OF TS 5 @ 27.68#(1.3 FOR MIN ACCEL) = 14504#+261#

∴ VERTICAL LOAD ON STRUT (NEGL. WT OF STRUT) IS 14765#

(4) SINCE PIPE THERMAL DISPL. ARE $\Delta X = .216$ & $\Delta Z = -.668$ MOVEMENT OPENS 3.5° ANGLE TO 3.74° AND HOROZ COMPONENTS ARE 14765 TAN 4 = 963.9 ~ 964# KICKS.

" (5) FOR AXIAL LOAD IN PIPE: WT. OF STRUT CONTRIBUTES TO LOAD ∴ STRUT WT IS (ASSUMING MIN PIPE SIZE - STD) 10.79# FOOT. THE RESULTANT G IS ($G = 1.12 \sin 3.74 + .12 \cos 3.74$) = .1925 FREQ = 33.2 ~ SO THE SEISMIC EFFECT OF THE STRUT (CLEVIS AND BRACKET) IS [5 (10.8) + 80 FOR C/B] · 19 = 25.46#

(6) SINCE MAX COMPRESSIVE ALLOWABLE FOR SRS-24 STRUT IS ~11.59 KSI (BASED ON KL/r OF $167.4/1.51$ EQUALS 111) AREA OF PIPE IS 3.17 INCHES ; COMP. ALLOW IS ABOUT 36.6 KIPS - HOWEVER SINCE BENDING DURING SEISMIC EVENT IS ALSO PRESENT SEE SPECTRA FOR G LOADING AND WTS THIS IS A BEAM COLUMN AND INTERACTION WAS NEGLECTED (A.I.S.C FORMULA 1.6-1a REQD) $604/3.21 = 188$ PSI BENDING STRESS (MIN.) (DISPL .0088")

ERRORS IN THIS AREA OF CALC

(a) DESIGNER HAS PIPE THAT IS SKEWED ON DWG (SEE KEY) VIEW HAS ELBOW TO THE + Z DIRECTION. DESIGNER SUBTRACTED - Z DISPLACEMENT TOTALLY WHEN HE SHOULD HAVE (FROM THE SKEWED APPEARANCE ANGLE UNKNOWN) ADDED THE COSINE OF THE - Z DISPLACEMENT. THEN THE DESIGNER ADDED THE +X DISPL. SRSS.

(b) DESIGNER DID NOT ADDRESS HINGED COLUMN

(c) DESIGNER DID NOT ADDRESS BENDING OF STRUT

(d) DESIGNER INTRODUCED DIRECT LOAD OF 1000# INTO PIPE.

(e) WT OF BOX FRAME, 'U' BOLT BRACKET AND ANGLES NOT ADDED TO PIPE (WHICH IS SIMILAR TO ADDING 300# VALVE)

PROBLEMS WITH 'U' BOLT

(1) ASIDE FROM THE FACT THAT APPLICANT STATES THAT THE NUTS ON 'U' BOLTS ARE TORQUED TO ABOUT 80 POUNDS. I SHALL USE MORE NON CONSERVATIVE ASSUMPTIONS. ASSUME THAT ALL THAT IS REQUIRED FOR TORQUING IS TO INSURE THE FRICTION PLANE REQUIRED TO RESIST ROTATION. 2ND THE FOUR ELEMENTS INVOLVED HAVE TO BE CONSIDERED TOGETHER (PIPE, FRAME, 'U' BOLTS AND ANGLES) THE LOAD ON THE BRACKET ATTACHED TO THE BOX FRAME FROM THE STRUT (BRACKET & CLEVIS) IS: 16.1 (AT .12 gs) THE SIDE FORCE FROM THE CALC. IS 24.75 THE TOTAL IS ∴ 40.85 THE FRICTION REQ'D IS (TAKING MOMENTS ABOUT ℄ PIPE) 40.85(8+5+5¼) DIVIDED BY 8 EQUALS 93.19# FRICTION FORCE. THE CLAMPING FORCE IS ∴ 93.19/.25 (COEF FRICTION STL ON STL) = 372.76# (NON CONS.) A SAFETY FACTOR OF 2 IS NOT USED BECAUSE OF 2 LOAD PATHS. THIS APPROACH IS NON CONSERVATIVE BECAUSE LATERAL CONSTRUCTION TOL. AND UNKNOWN SEISMIC & THERMAL DISPLACEMENT (WHICH OCCUR IN OPERATING PLANTS ALTHOUGH THEY DONT APPEAR AT DESIGN) WERE NOT INCLUDED

(2) THIS LOAD OF 372.76 POUNDS IS REACTED BY THE LEG OF THE 4x4x¼ ANGLE WHICH ACTS AS A CANTILEVER. THE SECTION MODULUS OF THE LEG IS EQUAL TO $4(1/4)^2/6$ EQUALS .0417. THE NORMAL GAGE WOULD BE 2½" ∴ L (FOR PL) IS ABOUT 2. THE STRESS EQUALS PL/S EQUALS 372.76(2)/.0417 EQUALS 17878 PSI.

(3) THE DIFFERENTIAL RADIAL EXPANSION OF THE PIPE WILL BE BASED ON DESIGN MINUS AMBIENT (THIS IS LESS CONSERVATIVE THAN ASSUMING RESTART OF THE PLANT WITH A LOWER AMBIENT). ΔT ∴ = 293 - 104 = 139° TOTAL EXPANSION EQUALS 139 X 6.5E-6 X 16 = .0145 INCHES. USING A NON CONSERVATIVE (THIS IS AN UNINSULATED PIPE WITH A MAX OF 120° LINE CONTACT) ASSUMPTION THAT DUE TO HEAT TRANSPORT ONLY 30 PERCENT OF THIS DIFF. IS TAKEN BY THE ASSEMBLIES. ∴ DESIGN DIFF. EXPANSION EQUALS .0043 INCHES. BECAUSE OF THE STIFFNESSES INVOLVED - BOX FRAME EXREMELY STIFF, 'U' BOLT AND PIPE MUCH STIFFER THAN THE CANTILEVERED ¼ PLATE ASSUME THAT (NON CONSERVATIVE) 80 PERCENT REACHES THE LEGS. EACH SEES A DEFLECTION OF .0035 WHICH RESULTS IN AN EQUIVILENT LOAD OF $F = \Delta BEI/L^3$ = .0052(.0035)(3) E/8 = 187.99 POUNDS AND THE STRESS IS 187.99 (2)/.0417 = 9016.0 PSI (FROM THE 188 POUND LOAD IT CAN BE SEEN THAT THE BOX FRAME, 'U' BOLT AND PIPE WOULD PROVIDE NO BENIFIT & OUR ORIGINAL ASSUMPTION OF 80 PERCENT LOAD TO THE ANGLE LEGS WAS NOT CONSERV.).

(4) THE COMBINED LOAD FROM THESE TWO SOURCES IS 17878 + 9016 = 26894 (WHICH IS JUST ABOUT THE ALLOWABLE)

(5) IN ADDITION TO THE ABOVE KNOWN QUATITIES THERE IS ALSO ADDITIONAL DISPLACEMENT DUE TO COMPRESSION ON THE TS 5 BY 19.5 KIP LOAD (OVER .001) AND THE DEFORMATION AT THE PIPE/TUBE INTERFACE. THE APPLICANT SPENT MUCH EFFORT TO PROOVE THAT DUE TO CONSTRUCTION. THERE IS NO SUCH THING AS ZERO GAP

THE GAP WOUND UP TO BE IN SOME CASES .032
∴ ASSUME .003 DISPLACEMENT FOR THE COMPRESSION IN THE TS 5, DEFORMATION OF PIPE/TUBE AND INITAL GAP(ASSUMING .001 VERY NON CONSERVATIVE) THIS WILL ADD ANOTHER $(.003)(.0052)3(E)/8$ FORCE WHICH EQUALS 161#. THE ADDITIONAL STRESS EQUALS 161(2)/.0417 = 7716 PSI AND THE TOTAL STRESS IN THE ANGLE IS 26894+7716=34610 PSI WELL BEYOND THE ALLOWABLE AND WITHIN 6000 PSI, OR AN ADDITIONAL 125# LOAD ON THE ANGLE LEG, OF COMPLETE FAILURE

(6) BEYOND THIS IF THE 'U' BOLT HOLE IS NOT AT THE 2½" GAGE AND WERE IN FACT 2" FROM HEEL THE FOLLOWING WOULD OCCUR:

(a) TOTAL DISPLACEMENTS = .0065 EQUIVALENT LOAD IS $(.0065)(.0052)(3)(E)/3.75$ = 743.6

(b) STRESS EQUALS 743.6(1.5)/.0417 EQUALS 26748 PSI

(c) STRESS DUE TO FRICTION LD = 372.76(1.5)/.0417 = 13409 PSI

(d) THE SUM OF THESE = 40157 PSI (ABOUT AT PLASTIC FAILURE) THIS LEG COULDNT SUPPORT AN ADDITIONAL 10 POUND SACK OF SUGAR WITHOUT FAILURE.

NOTE: THE ABOVE ARGUMENTS ARE ACADEMIC SINCE FRICTION CANNOT BE USED TO STABALIZE THE UNIT. BEYOND THIS IT IS COMMON INDUSTRY PRACTICE TO FURNISH RIGID SUPPORTS (NOT STRUTS) WHEN PIPES ARE SUPPORTED FROM BELOW. (HOWEVER NOT NEC. NUCLEAR INDUSTRY PRACTICE)

THE BOX BM PRESENTS SEVERAL PROBLEMS (1) IT ADDS TO THE WT FOR PIPE STRESS CALCS AND IT RESTRICTS THE THERMAL GROWTH OF THE PIPE (.0145 INCHES).

(1) ASSUME DISPLACEMENT IS ABSORBED EQUALLY BY BOX FRAME AND PIPE Δ/SIDE ∴ IS .0036 INCHES

(2) THE EQUIV. FORCE ON PIPE AND TS 5X5 EQUALS
$192EI\Delta/L^3 = 192E(25.7)(.0036)/16^3 = 119.246^K$
OBVIOUSLY TOO MUCH

(3) TRY .0125 IN PIPE WALLS AND .001 EACH TS 5
$1/3.6(119246) = 33.129^K$

(4) EVEN IF THE PIPE ABSORBS 95 PERCENT OF THE THERMAL CONSTRAINT THE TS 5 STILL WILL HAVE .00036/.0036 (119246) = 11 924 POUNDS.

(5) BUT NOW ONE MUST CONSIDER WHAT HAPPENS TO A PIPE 16" Ø COMPRESSED ~ 1/64 INCH ON BOTH AXIS IF IT TAKES THIS BY PLASTIC DEFORMATION OF THE WALLS THERE ARE NOW 4 FLATS OVER 1/2 INCH WIDE PLUS AN UNKNOWN MOMENT IN THE PIPE. (CODE VIOLATION)

(6) THE FORCES IN JOINT FROM 11.9 K EQUIV LOAD ARE $PL/8 = 11.9(21)/8 = 31.24"^K$ SHEAR = 5.95^K
(FOR ITEM 12) THE FORCES IN THE SAME JOINT ARE $PL/8 = 11.9(21)/8 = 31.24"^K$ AND 5.95^K TENSION.
USING THE SECTION PROPERTIES FROM THE CALC THE WELD REQ'D IS: BASED ON LEG = 9" $S_W = 10.2$
$f_s = 5.95/9 = 611\#$ $f_n = 5.95/9 = 611 + 31.24/10.2 = 3673\#$
$f_R = (611^2 + 3673^2)^{1/2} = 3723\#$ WELD REQ'D 3723/12726 EQUALS .293 INCH WELD WHICH IS NOT INCLUDING

THE LOADS FROM THE PIPE STRESS RUN. THE COMBINED LOADS WOULD BE 3723 (EXPANSION) PLUS 3170# (FROM CALC) 6893 AND THE WELD REQ'D FOR THIS LOAD IS 6893/12726 EQUALS .542 WHICH IS FAR GREATER THAN THE 5/16 INCH WELD USED BY THE DESIGNER.

AND IT MUST BE KEPT IN MIND THAT THIS ASSUMES THAT ONLY 5% OF THE EXPANSION EFFECT IS TAKEN BY THE BOX FRAME. SINCE THE WELD AS DESIGNED IS AT 3170/3977 = .80 OF ALLOWABLE IT WOULD TAKE FAR LESS THAN THE 5% USED TO PUT THE WELD OVER ALLOWABLE. SINCE THE PIPE IS ABOUT AS STIFF AS ASSUMED ABOVE ($P = \frac{165EI}{R^3}$ WHERE $I = 5(.5)^3/12 = .052^{in4}$ SEE PAGE 226 ROARK P = 500K/IN FOR RAD. TABLE 17 CASE 7 $\theta = 45^\circ$) THE 5% EST. IS CONS. BUT IS AN ACCEPTABLE JUDGEMENT.

(7) ALSO ASSUMING THE PIPE IS SO FLEXIBLE THAT IT CAN TAKE 1/64 OF AN INCH DISPLACEMENT WITH LITTLE OR NO EFFECT (THE REASON FOR USING ENGINEERING JUDGEMENT) THEN ASSUMING THAT A 20 KIP LOAD AS A REACTION FOR THE RUN PIPE IS OK BY A SECOND ENG. JUDGEMENT IS IN ABSOLUTE CONTRADICTION WITH THE FIRST PREMISE.

(8) SINCE THIS CATCH 22 CANNOT BE RESOLVED BY ENGINEERING JUDGEMENT IT MUST BE REDUCED TO STANDARD DOCUMENTED PROCEEDURES.

PLATE STRESS (SHEET 9 OF 9)

(1) FUB II GIVES PLATE STRESS AS 29281.4 PSI BUT CALC SHOWS 18741 < 21750 HOW WAS THIS CONFLICT RESOLVED,

(2) BOLTS SHOW EQUAL SHEAR IN PLATE WITH OVERSIZE

BOLT HOLES WHEN ONLY (2) BOLTS ARE ACTIVE. ALTHOUGH THIS IS NOT SERIOUS FOR THIS CASE IT SHOULD HAVE BEEN ADDRESSED.

(3) BASE PLATE WAS ANALYZED FOR TENSION BUT NOT FOR COMPRESSION.

NOTE: SUPPORT IN VIOLATION OF MSS-SP 69
NO RIGID (SUPPORT FROM BELOW) NOR SLIDE PL.
(STD INDUSTRIAL PRACTICE)

CASE EXHIBIT 892

ANCHOR SI-1-038-013-S22A

(1) WITH 4 (NON STD.) OVERSIZED HOLES IN A BEARING CONNECTION ONLY 2 BOLTS ARE ACTIVE. THEREFORE THE INTERACTION IS NOT AS SHOWN ON THE CALC BUT IS RATHER EQUAL TO $4399/8540 + 3343/8295 = .92$ OR 92% OF THE ALLOWABLE NOT THE .73 SHOWN. (VIOLATION OF AISC PAGE 5-191 (c) SEISMIC JOINT - PAGE 5-193 3-a-1 HARDENED WASHER & 5-195 TORQUE)

(2) ON PAGE 4C OF 6 THE WELD CALC AT THE BOTTOM OF THE PAGE SHOWS THE WELD ALLOWABLE TO BE $18000(.375)/(2 \sin \frac{135}{2}) = 3653$ WHEREAS THE ACTUAL CALC SHOULD BE BASED ON THE TAN TO THE PIPE AT THE INTERSECTION PLUS 90° DIVIDED BY 2. TAN TO PIPE 3.3125 (½ STANCHION & PIPE DIA) DIVIDED BY 3.8125 = SIN = .86885 ANGLE = 60.326 ∴ ALLOWABLE = $18000(.375)/(2 \sin \frac{150.33}{2}) = 3491$ (ASIDE FROM THE FACT THAT $150.33 > 135°$). THIS IS A 5% ERROR (NON CONSERVATIVE).

(3) THE STAINLESS STEEL TUBE ON SA-36 BASE PLATE PRESENTS A THERMAL CONSTRAINT PROBLEM WITH THE WELD. SINCE THERE IS A DIFFERENCE IN THE COEFF. OF THERMAL EXPANSION ANY TEMP. DIFFERENTIAL PUTS A CIRCUMFERENTIAL STRESS ON THE WELD WHICH IS NOT INCLUDED IN THE CALCULATION.

CASE EXHIBIT 893 SI-1-079-001-S42R

(1) ON PAGE 3 OF 3 THE STATEMENT IS MADE "WELD AT REAR BRACKET WAS CHANGED FROM FILLET WELD TO FLAIR BEVEL WELD.
'SINCE ALLOWABLE FOR FLAIR BEVEL WELD IS HIGHER THAN 1/4 INCH FILLET WELD, IS NO NEED FOR COMPARATION.' (THE LAST WORD IS CONFUSING) THERE IS NO BASIS FOR THIS STATEMENT AND NO JUSTIFICATION BY CYGNA.

(2) WITH THE WELDS NOW PARALLEL TO THE WEB FLANGE BENDING OCCURS INDUCING STRESSES AT THE BEAM FILLETS. THESE ARE NOT INCLUDED IN THE CALC NOR MENTIONED BY CYGNA.
$\sigma \simeq 6(.51P)/t^2 = 6(.51 \times 1279)/.345^2 = 33$ KSI
(MONORAIL BEAM FORMULA) (CONSERV DUE TO SHORT BM)

(3) IN ADDITION TO TENSILE LOAD INDUCED SHEARS MUST BE INCLUDED IN FLAIR WELD CALC SINCE BI AXIAL BENDING HAS BEEN INDUCED IN BM. FLG. DUE TO ROTATING WELD 90°. THE LOCAL PROBLEMS FOR THIS SUPPORT ARE MORE SEVERE THAN THE OVERALL BM. PROBLEMS

CASE EXHIBIT 894 RH-1-064-010-522R.

(1) WEB BENDING IN THE W6X15 WAS NEVER CONSIDERED. MINIMUM STRESS WEB BENDING = 3078 (.700/45.81) X 8¼ DIVIDED BY WEB S"^{3} = 3527. THIS WAS NOT CONSIDERED IN CALC. DEPENDING ON SEISMIC MOVEMENT THIS MAY BE NEGL.

(2) HOWEVER THE 4 INCH OFFSET IS A DIFFERENT STORY. THE ANGLE = 4/45.81 = .0873 = 5.01° AND THE LOAD F_X = 272#. FRICTION FORCE REQD = 272(13.31) DIVIDED BY 4.31 = 841# CLAMPING FORCE = 841(4) X S.F.(2) = 6720# DIVIDED BY 2 'U' BOLTS = 3360# + 160# COUPLE DUE TO 45# LOAD (THERMAL MVT) ≃ 3500# THIS IS NOT INCLUDING THE LOADS CAUSED BY EXPANSION OF THE RUN PIPE, NOR THE SEISMIC OF THE ELEMENTS OF THE STRUCTURE. EVEN SO THE INDUCED LOAD ON THE PIPE IS TWO POINT 3500# THE MOMENT IN THE PIPE IS ∴ = (ASSUME 8"STD) 3500(4)(.318) = 4452/2 2226 AND STRESS = $6M/t^2$ = 2226(6)/.322^2 = 128.8 KSI OBVIOUSLY THE CLAMPING FORCE WOULD DISTRIBUTE SUCH POINT LOAD TO A DISCRETE AREA AROUND THE PIPE AND ∴ THE COEF(.318) WILL CHANGE SIGNIFICANTLY BUT THIS PROBLEM CANNOT BE DISSMISSED BY ENG. JUDGEMENT. A CLAMP(STD 295 H) FOR EXAMPLE WHICH DISTRIBUTES THE CLAMPING FORCE RADIAL 360° AND IS ½ X 2½ MTL. IS LIMITED TO A LOAD OF 4800# BUT 2 'U' BOLTS WITH OVER 3500 POUNDS CLAMPING FORCE ON A 'U' BOLT WITH 3620# ALLOWABLE IS

CLASSED OK WITH NO JUSTIFICATION. THIS 3500 POUND FORCE (EXCEPT FOR RELAXATION) IS CONSTANT FOR THE LIFE OF THE SYSTEM. ALTHOUGH THE LOAD DONT ADD MUCH TO THIS (UNTIL SEPERATION) THE THERMAL EXPANSION DOES AND THIS WILL PUT THE SUPPORT OVER THE 3620 ALLOWABLE AND THEREFORE IT FAILS.

AGAIN THE ABOVE IS ACADEMIC SINCE FRICTION IS NOT ACCEPTABLE.

(3) ON SHEET 4 OF 8 IN THE CALCS THE ANGLE FOR THE STRUT IS CALCULATED TO BE $(4/45.8125)^{-1}$ = 4.99 WHICH IS LESS THAN 5 AND ∴ OK. BUT IN REALITY THE CALC S/B $4/45.8125 = .087312$ WHICH EQUALS 5.009. THIS IS GREATER THAN 5° AND ∴ N.G (WITHOUT ENG. EXPLANATION)

THE C-C DISTANCE FOR THE STRUT IS STATED TO BE 45.8125 ON SHEET 4 OF 4, 6 OF 8 AND THE B/M. THE 4" OFFSET IS SHOWN ON SHEET 6 OF 8, 8 OF 8 AND THE DRAWING. SINCE THE SIDE OPPOSITE DIVIDED BY THE HYPOT. EQUALS THE SIN OF THE ANGLE THE ANGLE IS 5.01° NOT 4.99°.

THE DESIGNER EITHER USED THE TAN^{-1} OF THE RATIO OR BY INTENTION ALTERED THE VALUE OBTAINED. THIS ERROR SHOULD HAVE BEEN ADDRESSED BY CYGNA. BEYOND THIS CYGNA SHOULD HAVE ADDRESSED THE POTENTIAL GENERIC POSIBILITY OF PENCIL WHIPING.

CASE EXHIBIT 895 SI-1-075-001-S22R

(1) WITH HOLES THAT ARE OVERSIZE & NOT, STD. ONLY 2 BOLTS OF THE PATTERN ARE ACTIVE. PAGE 11 OF 18 WHICH HAS THE INTERACTION CALCS SHOWS A STRESS RATIO OF .92 ACTUALLY WHEN CORRECTLY DONE HAS A RATIO: $5766/4688 + 1363/6898 = 1.001$ (NON CONSERV BECAUSE SHEAR DISTRIB EQUAL RATHER THAN BY LOAD PATH STIFF) BOLTS FAIL.

(2) 2ND BASE PLATE STR. RATIO EQUALS $3873/4688 + 768/6898 = .94$ NOT .89 AS SHOWN BY CALC.

(1) VIOLATION AISC PG 5-191 (c) SEISMIC JOINT-STRESS REVERSAL PG 5-193 3-8-1 HARDENED WASHER REQ'D (THERE IS A CODE CASE THAT STATES THAT UNDER CERTAIN CONDITIONS OF WHICH I DONT RECALL BUT BELIEVE RELATE TO THE F_y OF THE PLATE UNHARDENED WASHERS MAY BE USED) PAGE 5-195 TORQUE REQUIREMENTS).

I WONT REPEAT THIS VIOLATION BUT ITS GENERIC BEARING CONNECTION AISC PG 5-51 1.23.4 (GENERIC)

CASE EXHIBIT 896 RH-1-010-004-S22K

(1) THE MAJOR AND POSSIBLE FATAL ERROR IN THIS CALC IS THE FAILURE TO INCLUDE THE PIPE (SEISMIC) ROTATION ABOUT THE GLOBAL Z AXIS AT THE NODE POINT. THE RESTRAINT OF THIS ROTATION DUE TO THE LOCKING OF THE PIPE AGAINST Z GLOBAL MOVEMENT CAN BE FAR IN EXCESS OF THE (Y) VERTICAL DESIGN LOAD.

(2) APPLICANT STATED SOME TIME AGO THAT THEY RECOGNIZED THIS PROBLEM AND THAT IT WAS BEING ADDRESSED IN THE FUTURE. THIS SUPPORT INDICATES A BREAKDOWN IN THIS PROGRAM.

(3) *With variable rates of acceleration, what ensures that both snubber locks simultaneously?*

CASE EXHIBIT 89 RH-1-064-011-522R

(1) ON PAGE 4 OF 15 A NOTE APPEARS "SUPPORT LOCATION MOVED 2'-7¾" EAST "OUT OF TOLLERENCE (AS SPELLED SHOWN)" SPEED LETTER STDR # 2059 APPROVED CMC # 69033 APPROVED.

(2) THIS MOVEMENT MEANS THAT THIS SYSTEM IS NOT IN COMPLIANCE WITH 1-E79-14. IF A REVIEW IS TO HAVE MEANING SUCH POINTS MUST BE ADDRESSED TO ANSWER THE QUESTION "WHY IS THE SYSTEM ACCEPTABLE EVEN IF THE CRITERIA IS VIOLATED",

(3) THERE IS NO NEED TO GO INTO THE U BOLT PROBLEMS SINCE REDUNDANCY WOULD SERVE NO USEFULL PURPOSE. THE SUBJECT IS COVERED IN PREVIOUS SUPPORTS.

(4) ON SHEET 3 OF 4 THE WELD CALCULATION FAILS TO CONSIDER THE INDUCED TORSION IN THE WELD WHICH COUPLES OUT AND RESULTS IN A FORCE NOT CONSIDERED IN THE INTERACTION.

THE 5000# FORCE IS DELIVERED AT THE CENTER OF THE 6 INCH TUBE ∴ THE FORCE IS ECCENTRIC TO THE WELD GROUP BY 3 INCHES, THE WIDTH OF THE TUBE IS 4 INCHES THE FORCE ON THE WELD IS $3(5000)/4 = 3750$ AND THE UNIT LOAD IS $3750/3 = 1250\ ^{\#}/_{IN}$. THE RESULTANT FORCE IS ∴ $(1250^2 + 1697^2)^{\frac{1}{2}} = 2108\ ^{\#}/_{IN}$ (THE DESIGNER SHOWS THE ALLOWABLE AS $1810\ ^{\#}/_{IN}$ SEE $1697 < 1810$)

SINCE 2108 IS LARGER THAN 1810 WELD IS N.G.
(WITHOUT FURTHER DETAILED ANALYSIS THIS SUPPORT FAILS).

(5) ON THE SAME PAGE THE BOLT INTERACTION ALSO DOES NOT INCLUDE THE COUPLING OF THE ECC. LOAD AND ASSUMES THE 4 BOLT PATTERN IS TOTALLY ACTIVE INCLUDING THESE (2) FEATURES THE INTERACTION EQUATION BECOMES $(13873/2)/6898$ + TENSION EQUALS 1.005 + TENSILE EFFECTS (BOLTS FAIL).

(6) THE EFFECTS OF THE .5 RATIO (4/3) ON THE 1/2 IN. TUBE WALL HAS NOT BEEN CONSIDERED IN THE CALC.

NOTE: THIS SUPPORT IS IN VIOLATION OF MSS-SP69 (STANDARD INDUSTRIAL PRACTICE) PAGE 9 COLUMN A ROW 1 (COVERED CLASS A-1)

CASE EXHIBIT 898 SI-1-037-005-S32A

(1) THIS CALC (ITEM 4) DOES NOT HAVE A FULL SET OF CALCS BUT ONLY HAS CALC FOR REDUCED SIZE PAD.

(2) I WOULD STILL REQUEST THAT CYGNA INDICATE WHETHER THE CONSTRAINT OF THERMAL GROWTH OF THE RUN PIPE HAS BEEN CONSIDERED & HOW?

(3) I ALSO WOULD REQUEST CYGNA TO ANSWER THE QUESTION OF HOW MANY BOLTS ARE CONSIDERED AS ACTIVE.

CASE EXHIBIT 899 RH-1-024-011-SZZA

(1) ON PAGE 3 OF 15 NOTE 1 STATES "DISREGARD GUSSET PLATES" THE PROBLEM WITH THIS APPROACH IS THAT ONE OF THE PLATES IS ≈ 5 INCHES FROM BOLTS 2 AND 5 AND ABOUT 9 INCHES FROM BOLTS 1 AND 4. SINCE THE FORCES WILL FOLLOW THE STIFFER LOAD PATH. BOLTS 2 AND 5 WILL NOT INDICATE THE ACTUAL LOADS WHICH THEY RECIEVE, AS A RESULT OF THE STIFFENERS, IF THE STIFFENERS ARE EXCLUDED FROM THE CALC.

(2) IF THE STIFFENERS AND THE TS 8 (CUT OFF ABOUT 1" ABOVE THE STIFFENERS) STUB IS NOT INCLUDED IN THE MODEL THE WELDS AND THE STIFFENERS ARE NOT QUALIFIED FOR USE BUT ARE ONLY GUESSED AT AS FAR AS REQUIRED PROPERTIES.

(3) SINCE ONLY 2 BOLTS OF THE PATTERN ARE ACTIVE THE FOLLOWING ERRORS IN THE CALCS PROOVE FATAL ON PAGE 8 OF 15 THE INTERACTION FOR BOLT 5 IS SHOWN AS .80 IN REALITY IT IS $5969/12984 + (20918/2)/8295$ EQUALS $1.72 > 1.00$ FROM SHEAR ALONE BOLT 4 ALSO FAILS AS DO THE REST. (HOLES ARE NOT STD.)

(4) ON PAGE 12 OF 15 THE CALC INDICATES THAT BOLT 5 HAS A STRESS RATIO OF .75. THE RATIO (BASED ON 2 BOLTS ACTIVE IN SHEAR) IS $5659/12984 + (21546/2)/8295$ $= 1.735$ WHICH IS LARGER THAN 1.00. THESE VALUES USE THE SHEAR FROM THE OUTPUT THE SHEARS RESULTING FROM TORQUE ON THE 2 BOLT PATTERN WOULD BE POSSIBLY HIGHER THAN INDICATED IN THE OUTPUT WHICH IS

BASED ON 6 BOLTS ACTIVE THEREFORE THE FAILURE ANALYSIS IS NON CONSERVATIVE.

(5) THERE IS A NOTE ON THE DRAWING SHEET 1 OF 2 WHICH STATES " BOTTOM PORTION OF TUBE STEEL TO BE BEVELED FOR FULL PENETRATION WELD". STATING THAT A FULL PENETRATION WELD IS DESIRED DOES NOT MAKE IT SO, WITHOUT A BACKUP ALL THIS AMOUNTS TO IS A BEVEL WELD EQUAL TO $1/2 - 1/8 = 3/8$. SINCE THE BEVEL WELD CROSS SECTION (WHICH IS EQUAL TO THE 1/4 INCH FILLET WELD) LIES WITHIN THE FOOTPRINT OF THE 1/4 INCH FILLET WELD ITS REAL PROPERTIES ARE LESS THAN THE 1/4 INCH WELD. THE NOTE IS THEREFORE CONTRADICTORY OF ITS INTENT.

CASE EXHIBIT 900 SI-1-030-003-S32A

(1) THE CONSTRAINT OF THERMAL GROWTH OF THE RUN PIPE IS NOT INCLUDED IN THE CALCS. IS IMPOSSIBLE TO DETERMINE SINCE THE DESIGN TEMP IS LOWER THAN AMBIENT WHICH APPEARS TO BE A CONTRA. IN TERMS OF THE WORDS AS USED IN THE CALCS.

(2) ON SHEET 13 OF 25 THE BOLT INTERACTION IS SHOWN AS .91. WITH 2 BOLTS ACTIVE (ASSUMING SUM OF SHEARS FROM OUTPUT AS A SUMMATION WOULD BE THE SAME FOR 2 BOLTS AND 4 BOLTS) THE INTERACTION WOULD BE $15465/32463 + (17775/2)/12199$ EQUALS 1.20 WHICH IS GREATER THAN 1.00. THE BOLTS ON THIS PLATE FAIL.

(3) SHEET 21 SHOWS INTERACTION OF .45. REALITY (LESS THERMAL EXPANSION) EQUALS $6681/32463 + (10752/2)/12199 = .65 < 1.00$ BUT DEPENDENT ON THERMAL EFFECTS.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

CERTIFICATE OF SERVICE

By my signature below, I hereby certify that true and correct copies of

CASE's 3/10/84 letter to Cygna Energy Services with Attachments*

have been sent to the names listed below this 10th day of March, 1984, by: Express Mail where indicated by * and First Class Mail elsewhere.

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