



101 California Street, Suite 1000, San Francisco, CA 94111-5894

415/397-5600

October 3, 1984
84042.030

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

Subject: Responses to Cygna Design Control, Pipe Support, and Pipe Stress
Questions
Comanche Peak Steam Electric Station
Independent Assessment Program - Phase 3
Texas Utilities Generating Company
Job No. 84042

Dear Mrs. Ellis:

Enclosed please find copies of additional responses to Cygna design control,
pipe support and pipe stress questions.

This should complete the transmittal of responses received to date for the Phase
3 Independent Assessment Program. We shall be transmitting responses associated
with the Phase 4 Independent Assessment Program in the near future. Feel free
to call me if you have any questions or wish to discuss the enclosed documents.

Very truly yours,

N. H. Williams
Project Manager

dmm
Attachments

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

8411060436 841003
PDR ADOCK 05000445
A PDR

*2222 - Per S. Burwell
1/1 See Attached*

Attachments

1. L. M. Popplewell (TUGCO) letter to N. Williams (Cygn), "CPSES Cygna Review Questions (Pipe Supports)," June 28, 1984.
2. L. M. Popplewell (TUGCO) letter to N. Williams (Cygn), "CPSES Cygna Review Questions (Pipe Supports)," July 2, 1984.
3. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69245, "Additional Response to Cygna letter 84042.007 dtd. 6/23/84," July 12, 1984.
4. L. M. Popplewell (TUGCO) letter to N. Williams (Cygn), "CPSES Cygna Review (Pipe Supports)," July 12, 1984.
5. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69250, "Followup Information from G&H," July 13, 1984.
6. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69249, "Pipe Stress Review - Mass Participation," July 13, 1984.
7. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69296, "Cygna IAP Phase 3 Report," July 27, 1984.
8. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69303, "Tapered Transition Joint SIF," July 31, 1984.
9. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69316, "Revised Mass Participation Fraction Sensitivity Study," August 3, 1984.
10. J. T. Merritt (TUGCO) memorandum to J. B. George (TUGCO), "CPSES Document Control Center," September 6, 1984.
11. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69369, "Transition Joint SIF at Equipment Nozzle Connections," August 23, 1984.
12. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69368, "Mass Participation," August 23, 1984.
13. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69373, "Mass Participation," August 24, 1984.
14. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69339, "Mass Participation," August 10, 1984.
15. L. M. Popplewell (TUGCO) letter to N. Williams (Cygn), "Comanche Peak Steam Electric Station, Phase III Action Items," August 29, 1984.

16. J. B. George (TUGCO) letter to N. Williams (Cygn), CPPA #40439, "Comanche Peak Steam Electric Station, Cygn Phase III, Independent Assessment Program," August 16, 1984.
17. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69454, "Mass Participation," September 14, 1984.
18. R. C. Iotti (EBASCO) letter to N. William (Cygn), 3-Z-17 (6.2), ETCY-1, "U-Bolt Cinching Testing/Analyses Program - Phase 3 Open Items, Additional Information as follow-up to Meeting of 9/13/84," September 18, 1984.
19. R. E. Ballard (G&H) letter to J. B. George (TUGCO), GTN-69359, "Transition Joint SIF at Equipment Nozzle Connections," August 17, 1984.

PROJECT FILE

TEXAS UTILITIES SERVICES INC.

P. O. BOX 1002 - GLEN ROSE, TEXAS 76043

June 28, 1984

CYGNA Energy Services
101 California Street
San Francisco, CA 94111

Attention: Ms. Nancy Williams, Project Manager

CYGNA	
JOB NO :	8/042
DATE LOGGED:	8/6/84
	#63
FILE:	2-1-1 Inc. CR
CROSS REF. FILE	2-1 Inc. CR Log

COMANCHE PEAK STEAM ELECTRIC STATION
CPSES CYGNA REVIEW QUESTIONS
(PIPE SUPPORTS)

Reference: 1) June 26; Telecon between D. Rencher (TUGCO) and
J. Minichiello (CYGNA),

Dear Ms. Williams:

Below is TUGCO's response to the above referenced telecon.

Telecon of June 26 Regarding Support MS-1-003-.04-C72S:

The question of structural acceptability of the 1"x7"x12" washer plate (item 17) is still open. In lieu of performing detailed calculations and finite element analyses to demonstrate acceptability, the problem will be simplified by making two (2) conservative assumptions:

- 1) Assume the washer is 1"x6"x6" and is centered over the insert.
The rear bracket to plate to tube steel connection is separate.
- 2) Assume there is no weld between the 1"x6"x6" washer and the tube steel.

With the above assumptions, Table 7 of Section 20 of the NPSI Structural Design Manual (attached) may be applied directly. This table states that a 1" thick plate may be used for insert tension loads less than or equal to 17.5 kips. Based on the detailed calculation performed by NPSI, tension in the insert is 18.2 kips. This apparent slight overload is acceptable, however, for the following reasons:

- 1) Because of installation tolerances, skew angles of less than 5° are generally not considered in support design. Consideration of the 2.3° skew on this support increased the tension load in the insert from 15.8K to 18.2K. 15.8K would have been perfectly acceptable to use for design.

June 28, 1984

Page 2

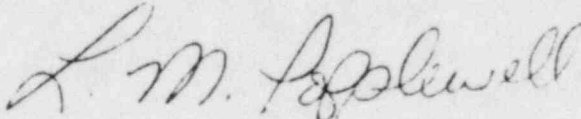
- 2) Conservative assumptions were made by NPSI in their sizing calculations for washer plates (e.g.: point load at center of plate and neglecting stiffening affect of tube steel). Actual stress in a 1" plate subjected to a 17.5K load is well below allowable limits.
- 3) Conservative assumptions were made on this support (see items (1) and (2) in first paragraph).

Based on the above reasoning, the 1"x7"x12" washer plate on MS-1-003-004-C72S is capable of performing its function as intended. This is further demonstrated by the fact that the support is installed and continuously subjected to its full design load and has not shown any signs of high stress.

If there are any further questions or comments, please contact Mr. George Grace at extension 500.

Very truly yours,

TEXAS UTILITIES GENERATING COMPANY



L. M. Popplewell
Engineering Manager

GG/and

TEXAS UTILITIES GENERATING COMPANY

July 2, 1984

CYGNA Energy Services
101 California Street
San Francisco, CA 94111

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	#64
FILE:	2-1-1 Inc. CR
CROSS REF. FILE	2-1-1 Inc. CR Log

ATTENTION: Ms. Nancy Williams, Project Manager

COMANCHE PEAK STEAM ELECTRIC STATION
CPSES CYGNA REVIEW QUESTIONS
(PIPE SUPPORTS)

Reference: 1) June 29; Telecon between D. Rencher (TUGCO) and J. Minichiello (CYGNA)

Dear Ms. Williams:

Below is TUGCO'S response to the above referenced telecon regarding Flare Bevel Welds.

CYGNA Questions:

- It is our interpretation of existing weld standards that the effective throat of a flare bevel weld (t_e) is $5/16R$. Assuming $R=2t$, then $t_e=5/8t$. What justification does TUGCO have for using $t_e=t$ in flare bevel weld design?
- Please provide documentation which instructs engineers how to calculate the effective throat of a flare bevel weld with a fillet cap.

TUGCO Response:

- Per AWS D1.1, 1979 edition, figure 10.13.1.3B, an effective throat of t is specified (see attached). Based on the geometry of the joint, $t_e=t$ is a reasonable value.*
- Calculation of weld effective throat (in any joint) is based on the shortest distance from the root of the weld to the face of the weld. For a flare bevel with a fillet cap, the engineer uses this approach in calculating t_e . The example supplied to CYGNA for MS-1-003-013-C72K, shows this calculation is done.

ps Distribution
N. Williams
J. Minichiello
E. Wang
G. Bjorkman
84042 PR

TEXAS UTILITIES GENERATING COMPANY

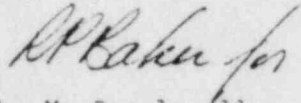
P. O. BOX 1002 GLEN ROSE, TEXAS 75043

* Please note that the ASME code does not address flare bevel weld design.

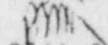
If there are any further questions or comments, please contact Mr. George Grace at extension 500.

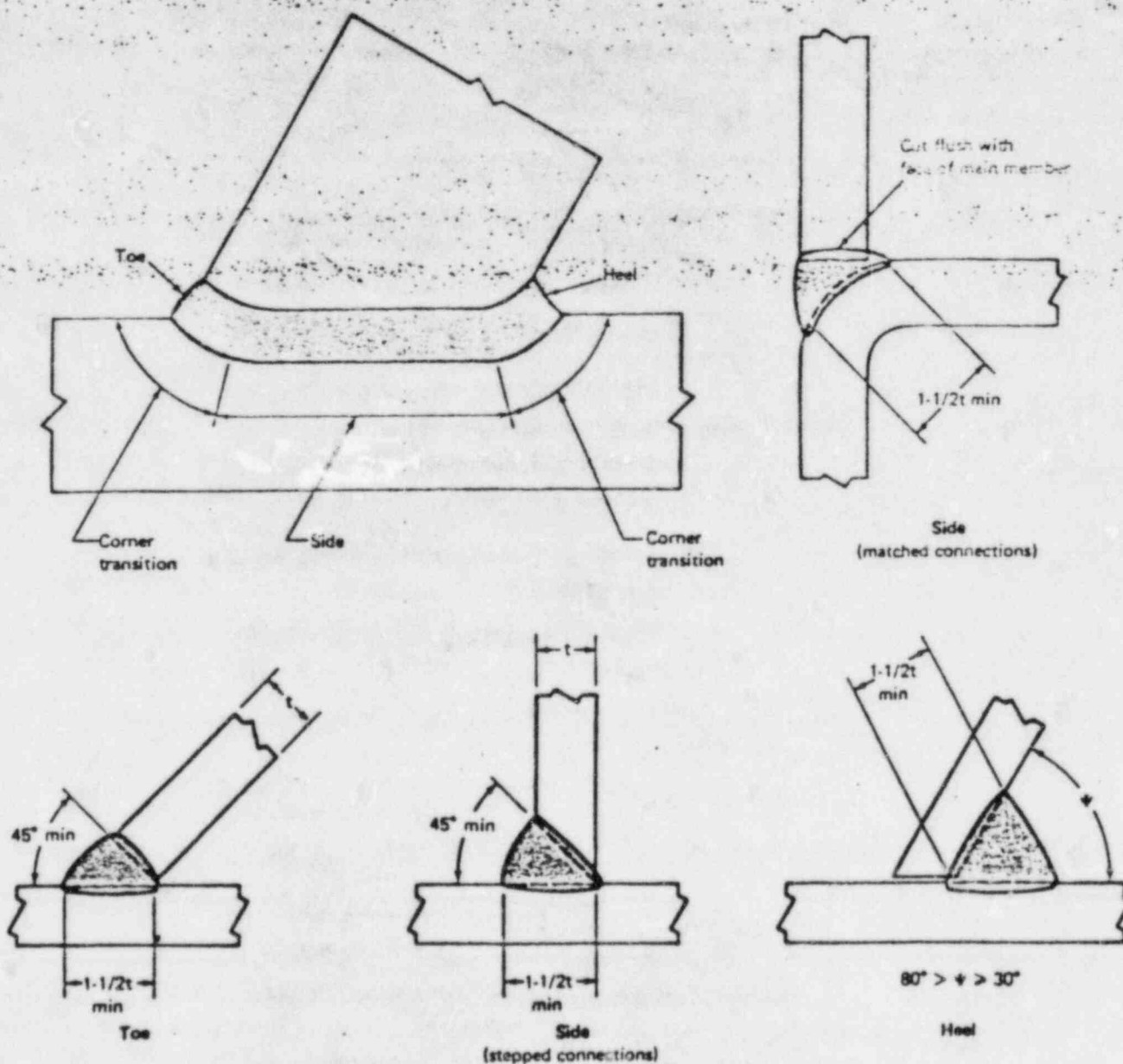
Very truly yours,

TEXAS UTILITIES GENERATING COMPANY



L. M. Popplewell
Engineering Manager


GG/jrf



Notes:

1. t = thickness of thinner section
2. Depth of bevel = t
3. Root opening 0 to 3/16 in. (4.8 mm)
4. Not prequalified for ψ under 30°
5. Effective throat = t
6. Joint preparation for corner welds shall provide a smooth transition from one detail to another. Welding shall be carried continuously around corners, with corners fully built up and all starts and stops within flat faces.

Fig. 10.13.1.3B—Partial joint penetration prequalified box connections made by shielded metal arc, gas metal arc, or flux cored arc welding

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760- 4438
Telex:
Domestic: 127636/968694
International: 428813/234475
A Dravo Company

PROJECT FILE

Distribution

W. Williams
S. Bibb
D. Smedley
84042 PF

July 12, 1984

GTN- 69245

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
ADDITIONAL RESPONSE TO CYGNA LTR 84042.007 DTD 6/23/84
REF: GTN-69190 DATED JUNE 29, 1984

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	65
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1 Inc. CR log

In Gibbs & Hill's response to CYGNA Energy Services letter of June 23, 1984, via the referenced letter, we indicated that we were continuing to search files for documentation supporting Concern No. 2b of their letter. We are providing the following additional response concerning Management Review Evaluation Reports.

CYGNA's Finding

- 2b. Management Review Evaluation Reports could not be found for the time period from 1974 through 1976.⁽¹⁾ This requirement has been established since September 1974 in G&H Procedure QA-4...it appears that these activities form an integral part of the G&H corrective action system.⁽²⁾

Please determine if documentation exists for... Management Review Evaluations from 1974 through 1977⁽¹⁾ as required by G&H Procedure QA-4. (Emphasis Added)

TRANSMITTED BY TELECOPIER

7-13-84

Dravo

July 12, 1984

Gibbs & Hill's Response - Statements (1) and (2) above are somewhat misleading, since they give the impression that:

1. No management review was performed during the period 1974 through 1977. There is also inconsistency between the dates mentioned under Statement (1), as reported by CYGNA.
2. The Management Review function forms an integral part of Gibbs & Hill's corrective action system. This implied that the corrective action system was not duly performed or completed.

In response to item (1), it is to be noted that the requirement to perform the management review function was included in G&H Procedure QA-4, Rev. 3 dated September 1974. Accordingly, the first round of management reviews was expected to take place in 1975 (i.e., within a year of issuing the procedure). This was done in August 1975. Although we have been unsuccessful, so far, in retrieving this 1975 Report, we can demonstrate that the 1975 management review was indeed performed. By examining the cover sheets and part of the check lists of the 1976 management review reports (see attached copies), it is stated: "Date of previous management review: August 1975." This demonstrates that the 1975 review was indeed performed.

Also, it is to be noted that the checklist used for the management review included a provision to check and verify corrective actions of previous reviews. This was done, as evidenced in the 1976 Report. In other words, any action which was recommended as a result of the 1975 review was verified in the 1976 review. This completes the action and demonstrates that this function was done as required by the G&H Program.

Further, management reviews of successive years (i.e., 1976 and later) were performed and the reports are on file and were presented to CYGNA's representative.

In response to item (2), the statement that "those activities form an integral part of G&H corrective action system", this statement misrepresents the intent of the management review function and discredits G&H's corrective action system. It further implies that G&H did not correct those activities. Since this is not the case, we would point out that correction of deficiencies identified by audits, surveillance or any other means, were dealt with, corrected and verified as part of G&H's audit/surveillance program which was already in place. The

July 12, 1984

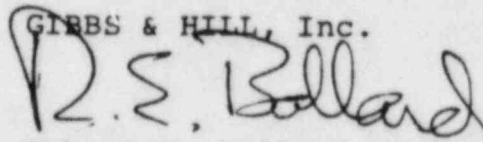
management review objective was to assess part performance to improve future operation, under the QA program, and strengthen the preventive action measures.

With this response we believe that we have addressed to our satisfaction all concerns raised by CYNGA's letter 84042.007.

If we can provide additional information in this regard, please advise.

Very truly yours,

GIBBS & HILL, Inc.



Robert E. Ballard, Jr.
Director of Projects

REBa-MSM:lc

1 Letter + 1 Attachment

CC: ARMS (B&R Site) OL + 1A

→ N. Williams (CYGNA, Calif.) 1L+1A (telecopied)

S. Bibb (CYGNA, MA) 1L+1A

D. Wade (TUSI Site) 1L+1A

DEPARTMENTAL MANAGEMENT AUDIT

DATE OF PREVIOUS AUDIT: AUGUST 27, 1975NEXT AUDIT SCHEDULED FOR: MAY 1977PERSONNEL AUDITED AND TITLE: E. HOROVITZ - SUPV. MECH. ENGINEERM. FITTER - SR. IFC ENGINEERA. SCARIMBOLD - LEAD MECH DESIGNERREFERENCE AUTHORITY: GIBBS & HILL QUALITY ASSURANCE MANUAL PROCEDURE
QAI-G

OCT. 29, 1976C. NEW ITEMS OR SUGGESTED IMPROVEMENTS (SEE PAGE 2A FOR ADDITIONAL ITEMS)

1. QAI-E should include specific instructions to file the original of the Tech. Description sign-off record form 2 with the Tech. Description (audit check list item 3.2 c)
2. Exhibit 3 of QAI-B 3.1 (form F777, 3-75) should be revised to include space for inserting the issue date of the Tech. Description (audit check list item 3.2 d).

D. PREVIOUS AUDIT STATUS:YESNO

1. WERE DEFICIENCIES OF THE PREVIOUS AUDIT SATISFACTORILY RESOLVED?

✓ REMARKS: _____

2. WAS NECESSARY CORRECTIVE ACTION TAKEN TO PREVENT REPORTED DEFICIENCIES?

✓ REMARKS: _____

3. IS ADDITIONAL CORRECTIVE ACTION REQUIRED?

✓ REMARKS: See item F. Aug 4.

DEPARTMENT Electrical

AUDIT NO. 2 DATE 10/12/76

PAGE 1 OF 5

DEPARTMENTAL MANAGEMENT AUDIT

DATE OF PREVIOUS AUDIT: 1975

NEXT AUDIT SCHEDULED FOR: 1977

PERSONNEL AUDITED AND TITLE: L.E. O'Brien - Senior Electrical Engineer

J.A. Walsh - Lead Design Engineer

Engineers & Designers (Electrical)

OPPD - Fort Calhoun 2
Job No. 564

REFERENCE AUTHORITY: GIBBS & HILL QUALITY ASSURANCE MANUAL PROCEDURE
QAI-G

DEPARTMENT Electrical

AUDIT NO. 2 DATE 10/12/76

PAGE 3 OF 5

C. NEW ITEMS OR SUGGESTED IMPROVEMENTS:

1. (3.0B) Procedure QAI-B.7 should be amended to ensure that a copy of the SAR sign-off record is given to the job engineer.
2. (3.5D) QAI-B.6 para. 6.4(d) should be clarified to resolve the difference in interpretations between QA and engineering.
3. QAI-E provides for distribution of specs and addenda to all but the
(cont'd on back)

D. PREVIOUS AUDIT STATUS:

YES NO

1. WERE DEFICIENCIES OF THE PREVIOUS AUDIT SATISFACTORILY RESOLVED?

N/A

REMARKS: There were no deficiencies in Audit No. 1.

2. WAS NECESSARY CORRECTIVE ACTION TAKEN TO PREVENT REPORTED DEFICIENCIES?

N/A

REMARKS: There were no Corrective Action Requests in Audit No. 1.

3. IS ADDITIONAL CORRECTIVE ACTION REQUIRED?

X

REMARKS: Yes, as a result of new deficiencies found and noted here-
after.

DEPARTMENT Structural

AUDIT NO. 2 DATE June 1976

PAGE 1 OF 5

DEPARTMENTAL MANAGEMENT AUDIT

DATE OF PREVIOUS AUDIT: August 7, 1975

NEXT AUDIT SCHEDULED FOR: January 10, 1977

PERSONNEL AUDITED AND TITLE: I.K. Shah, Senior Engineer -Valdecaballeros Job Engineer

J.G. Ortiz, Senior Engineer - Ft. Calhoun 2 Job Engineer

C.S. Chen, Senior Engineer - Ft. Calhoun 2 Squad Leader

A. M. Kenkre, Senior Engineer -Comanche Peak Squad Leader

REFERENCE AUTHORITY: GIBBS & HILL QUALITY ASSURANCE MANUAL PROCEDURE
QAI-G

MANAGEMENT AUDIT REPORT

A. SUMMARY OF THE AUDIT ANALYSIS:

Valdecaballeros and Ft. Calhoun were fully audited. Comanche Peak was audited as a review of the previous management audit of August 7, 1975. A. M. Kenkre for Comanche Peak, I. K. Shah for Valdecaballeros and J. G. Ortiz and C. S. Chen for Ft. Calhoun 2 were interviewed. Conformance within the Department to the QA Manual was found satisfactory as regards procedures and understanding. Valdecaballeros and Ft. Calhoun 2 are in a stage where all procedures are not yet auditable.

B. QA PROGRAM REVIEW:

IN VIEW OF THIS AUDIT AND REVIEW OF THE QA PROGRAM AND CORPORATE PROCEDURES:

A. IS THE QA PROGRAM ADEQUATE TO MEET THE G&H'S MANAGEMENT POLICIES, GOALS AND OBJECTIVES?	<u>YES</u>	<u>NO</u>
	<u>X</u>	<u> </u>

REMARKS: _____

B. ARE THE EXISTING PROCEDURES ADEQUATE AND IN SUFFICIENT DETAIL TO MEET THE REQUIREMENTS OF APPLICABLE REGULATORY GUIDES, CODES AND STANDARDS FOR NUCLEAR SAFETY-RELATED SYSTEMS STRUCTURES AND COMPONENTS

X

REMARKS: _____

TEXAS UTILITIES GENERATING COMPANY

P. O. BOX 1002 · GLEN ROSE, TEXAS 76043

NOJUL61 FILE

July 12, 1984

CYGNA Energy Services
101 California Street
San Francisco, California 94111

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	466
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1.2 Inc. CR. Log

for Distribution
G. Bjorkman
J. Minichiello
N. Williams
84042

Attention: Ms. Nancy Williams
Project Manager

COMANCHE PEAK STEAM ELECTRIC STATION CPSES CYGNA REVIEW (PIPE SUPPORTS)

- REF: 1) April 19, 1984 letter to N. Williams (CYGNA)
from L. Popplewell (TUGCO)
2) July 11, 1984 Telecon between J. Minichiello
(CYGNA) and J. C. Finneran (TUGCO)

Dear Ms. Williams:

This letter responds to CYGNA's concerns regarding "bumpers" on supports on the main steam line and on weld calculations for composite sections.

As previously discussed in Reference 1 above (Page 8, Question 3), TUGCO believes that these support configurations are acceptable and we do not agree with CYGNA's assessment of these supports. However, in order to satisfy CYGNA's concerns, we have re-analyzed the stress problems for the pipes with these supports completely removed from the analysis. This evaluation results in no over-stressed piping or supports. Therefore, in the event these supports would behave in an unstable manner (which TUGCO does not believe will happen) and in the event that the bumpers would not perform their intended function, there would be no detrimental effects on these piping systems.

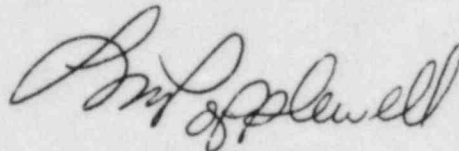
Per Reference 2 regarding the main steam supports with composite sections, the calculation packages for these supports did not consistently include a calculation of the appropriate stresses in the welds between structural members and cover plates for composite sections. However, all the subject welds were acceptable for all stresses. In order to satisfy CYGNA's concerns in this regard, we have reviewed all supports on the 18" feedwater lines and 30" service water lines to determine if composite sections were utilized. We only found one other support on a feedwater line where a composite section was used. The weld stresses in this support were acceptable.

If there are any further questions regarding the above issues, please contact Mr. J. C. Finneran at the site at Extension 521.

CYGNA Energy Services
Page 2.
July 12, 1984

Very truly yours,

TEXAS UTILITIES GENERATING COMPANY
ENGINEERING DIVISION

A handwritten signature in cursive script, appearing to read "L. M. Popplewell".

L. M. Popplewell
Project Engineering Manager

LMP/JCF/GG/cp

cc: D. H. Wade
J. C. Finneran

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127636/968694
International: 428813/234475
A Dravo Company

PROJECT FILE

Distultra
J. Minichello
N. Williams
84042 PF

July 13, 1984

GTN-69250

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/8/84
LOG NO.:	#67
FILE:	21.1 MC - CR
CROSS REF. FILE	2.1 MC - CR log

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
FOLLOWUP INFORMATION FROM G&H
REF 1: CYGNA COMMUNICATIONS REPORT DTD 7/2/84
REF 2: GTN-69233 DTD 7/10/84

By copy of this letter to Nancy Williams of CYGNA, attached please find a response (to supplement that given in ref. 2) to question 1 of the referenced CYGNA Communications Report.

Should you have any questions, please contact either Steve Lim or Henry Mentel.

Very truly yours,

GIBBS & HILL, Inc.

R. E. Ballard
Robert E. Ballard, Jr.
Director of Projects

g/h
REBa-HWMe:lc

1 Letter + 1 Attachment

CC: ARMS (B&R Site) OL + 1A

N. Williams (CYGNA, Calif.) 1L 1A (telecopied)

G. Grace (TUSI Site) 1L 1A

D. Wade (TUSI Site) 1L

L. Weingart (CYGNA, Calif.) 1L 1A

Dravo

SUPPLEMENTARY RESPONSE TO ITEM 1 OF CYGNA TELECOPIED QUESTIONS
ON JULY 2, 1984

In reference to the minor differences in snubber loads reported in the computer printouts and the calculation book, the analyst in his or her judgment deemed the load changes to be small and as such would have no impact on the support designs. As a consequence, the calculation book was not updated to reflect these new loads and these minor load changes were not reported in the pipe support vendor certification.

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760- 4438
Telex:
Domestic: 127636/968694
International: 428813/234475
A Dravo Company

84042 PF

PROJECT FILE

July 13, 1984

CYGNA

JOB NO :

DATE LOGGED:

LOG NO.:

FILE:

CROSS REF FILE

GTN-69249

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
PIPE STRESS REVIEW - MASS PARTICIPATION
REF 1: CYGNA LETTER 84042.008 DTD 6/24/84
REF 2: GTN-69176 DTD 6/29/84 -
MASS PARTICIPATION FRACTION SENSITIVITY STUDY

By copy of this letter to Mr. Leo Colborne of CYGNA Energy Services, attached is one (1) magnetic tape of the input files for those problems selected per reference 2. The tape has been prepared according to the format specified in reference 1.

CYGNA will verify that this tape is readable and will contact Gibbs & Hill regarding G&H personnel traveling to their Boston office. It is presently anticipated that Henry W. Mentel and Steve Lim will be making that trip. Henry Mentel should be contacted regarding travel plans and if there are any questions.

Very truly yours,

GIBBS & HILL, Inc.

Robert E. Ballard, Jr.
Director of Projects

REBa-HWMe:lc
1 Letter

CC: ARMS (B&R Site) OL
L. Colborne (CYGNA Boston) 1L + Tape T12779
G. Bjorkman (CYGNA Boston) 1L
N. Williams (CYGNA Calif.) 1L
D. Wade (TUSI Site) 1L
G. Grace (TUSI Site) 1L

Dravo

11 Penn Plaza
New York, New York 10001
212 760- 4438

Telex:
Domestic: 127635 GIBBS
International: 28815 GIBBS

A Dravo Company

CYGNA		727
JOB NO :	84042	
DATE LOGGED:	8/6/84	
LOG NO.:	H69	July 27, 1984
FILE:	2.1.1 Inc. CR	
CROSS REF. FILE	2.1 Inc. CR log	

GTN-69296

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
CYGNA IAP PHASE 3 REPORT

Gibbs & Hill has performed an overall review of the Phase 3 Report with particular focus on the Results and Conclusions Section and with an eye towards established action plans for problem resolution. In view of this we offer the following comments:

1. Section 5 - Results & Conclusions -
Page 5-10, Last Paragraph

Regarding NCR's - Gibbs & Hill does not review NCR's on a routine basis; only when presented for our review via formal correspondence or as part of a DCA/CMC request.

2. Section 3.3 - Develop Checklists -
Pages 3-2, 3-3

Establishes the checklist identifiers, i.e., PI-mm where mm = 05 to correspond to Stress Problem 1-023A. In Appendix 1, the identifiers have been used as the stress problem numbers in several cases.

NOTED AUG 06 1984 N. WILLIAMS

Distribution

N. Williams
D. Smedley
S. Bibb
J. Minichillo
M. Shulman
84042 PF

July 27, 1984

Example: Checklist No. PI-05
Problem No. AB-1-005; Rev. 1

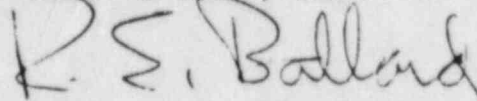
AB-1-005 - Should be AB-1-023A.

The problem numbers referred to on the pipe stress
checklists should be reviewed and corrected accordingly.

Please advise of any questions.

Very truly yours,

GIBBS & HILL, Inc.



Robert E. Ballard, Jr.
Director of Projects

REBa-SMMa:lc

1 Letter

CC: ARMS (B&R Site) OL

N. Williams (CYGNA CA) 1L

D. Wade/G. Grace (TUGCo Site) 1L (telecopied)

11 Penn Plaza
New York, New York 10001
212 760-
Telex:
Domestic: 127636/958634
International: 428819/234475
A Dravo Company

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	#70
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1.2 Inc. CR log

NOTED AUG 06 1984

Distribution
L.D. Wingard
J. Marchallo

GTN- 69303

CROSS REF. FILE

July 31, 1984

G. Bjorkman
N. Williams
84042 PF

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
TAPERED TRANSITION JOINT SIF
REF: GTT-10424, DATED 7/11/84

Subsequent to the G&H intentions outlined in referenced GTT, G&H has completed Part A of the plan of action pertaining to the Stress Intensification Factor (SIF) for tapered transition joints at equipment nozzle connections. The results are as follows:

1. Problem AB-1-61C, Rev. 0 - CYGNA's sample considered node points 378, 420 and 439. The G&H node points where stress intensification factors (SIF's) were input are 377, 419 and 438. Node 377 represents the end of a flange and contains an SIF of 1.9. Nodes 419 and 438 represent the end of an elbow to flange connection and contain SIF's of 3.5 and 4.271 respectively. Therefore, the analysis contains the appropriate stress intensification factors at the equipment nozzle connections.
2. Problem AB-1-151B, Rev. 0 - CYGNA's sample considered node point 1 which represents an embedded portion of pipe and not the piping to equipment nozzle connection for the spent fuel pool cooling water pump. Node point 1 does not require an SIF. The node point at the equipment nozzle connection is

node point 83 which represents the end of a flange and contains an SIF of 1.9. Node 1 is the node point of the discharge nozzle connection for adjacent problem AB-1-151A. Therefore, the analysis contains the appropriate stress intensification factor at the equipment nozzle connection.

3. Problem AB-1-57, Rev. 0 - CYGNA's sample considered node points 76 and 116 which are at the equipment nozzle connections to the reactor coolant drain tank heat exchanger and the excess letdown heat exchanger respectively. Due to the weld configuration, a stress intensification factor at these locations is not required. Westinghouse equipment drawings 501B572 and 501B574 indicate that these 4-inch nozzle connections utilize a butt weld end prep configuration. G&H Specification, 2323-MS-43B, requires that "all sharp changes in sections of any weld shall be eliminated" which results in a flush weld between the equipment nozzle and the adjoining pipe. Figure NC-3673.2(b)-1 of Subsection NC to Section III of the ASME Code states that for a butt-weld that has been reworked flush, the SIF is equal to 1.0. Thus, the stresses are not intensified at these equipment nozzle connections; justification for not considering an SIF at the said locations is therefore provided.
4. Problem AB-1-167-B, Rev. . - CYGNA's sample considered node point 204 which is the piping connection to a flexible connector. This connector is made out of neoprene and utilizes stainless steel clamp assemblies to connect the adjacent piping. An SIF at this connection is therefore not required.
5. Problem AB-1-40, Rev. 0 - CYGNA's sample considered node point 34 which is the equipment nozzle connection to the regenerative heat exchanger. Due to the nozzle weld end configuration shown on Atlas Industrial Manufacturing equipment drawing D-4313-7, a stress intensification factor at this location should have been considered. However, the nozzle weld end configuration can be considered as a tapered transition and when the associated SIF of 1.9 maximum (per Figure NC-3673.2(b)-1 of Subsection NC to Section III of the ASME Code) is applied at this location, the stress results are still within the Code allowables and are as follows:

July 31, 1984

Eq. 8	=	7184 psi	≤	17,200 psi
Eq. 9 (upset)	=	8141 psi	≤	20,640 psi
Eq. 9 (emergency)	=	8786 psi	≤	30,960 psi
Eq. 10	=	5185 psi	≤	27,800 psi
Eq. 11	=	12369 psi	≤	45,000 psi

Omission of the SIF at the equipment nozzle connection does not adversely affect the analysis.

6. Problem AB-1-150G, Rev. 0 - CYGNA's sample considered node points 1 and 17. Node point 1 is at the connection to the thermal regeneration demineralizer and node point 17 is in the vicinity of the resin fill opening. Due to the nozzle weld end configuration shown on Westinghouse drawing 271C900 and the flange arrangement shown on drawing FSM00143, a stress intensification factor at these locations should have been considered. However, when an SIF of 1.9 maximum is applied at these locations, the stress results are still within the Code allowables and are as follows:

Node Point 1

Eq. 8	=	2047 psi	≤	17,200 psi
Eq. 9 (upset)	=	3035 psi	≤	20,640 psi
Eq. 9 (emergency)	=	3387 psi	≤	30,960 psi
Eq. 10	=	2369 psi	≤	27,800 psi
Eq. 11	=	4416 psi	≤	45,000 psi

Node Point 17

Eq. 8	=	1215 psi	≤	17,200 psi
Eq. 9 (upset)	=	1215 psi	≤	20,640 psi
Eq. 9 (emergency)	=	1215 psi	≤	30,960 psi
Eq. 10	=	0 psi	≤	27,800 psi
Eq. 11	=	1215 psi	≤	45,000 psi

Omission of the SIF's at the said connections does not adversely affect the analysis.

In conclusion, G&H agrees that three (3) of the ten connections do not contain a stress intensification factor. The analyses involved are AB-1-40, Rev. 0 (node point 34) and AB-1-150G, Rev. 0 (node points 1 and 17). Based upon our findings, G&H will

July 31, 1984

perform Part B of the plan of action outlined in the reference GTT. In order to complete this review in a timely manner and since it involves considering a formidable amount of analyses (approximately 272) the following methodology will be followed:

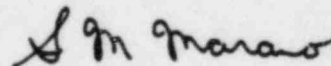
1. Determine which analyses contain equipment nozzle connections.
2. Determine if a stress intensification factor was or was not considered at the connection.
3. If the analysis contains equipment but no SIF was considered, the stress results at the applicable node point will be multiplied by the appropriate maximum SIF.
4. If the resulting intensified stresses remain within the allowable limits, the analysis will remain acceptable.
5. If the resulting intensified stresses exceed the allowable limits, the piping to nozzle mismatch will be considered to arrive at a decreased SIF.
6. If the stresses still exceed the allowable limits, equipment and weld end prep detail drawings will be reviewed to obtain possible relief.

Results of the above plan of action should be available by August 17, 1984.

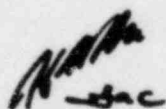
If you have any questions, please contact H. W. Mentel (x6302) or F. A. Colucci (x5203).

Very truly yours,

GIBBS & HILL, Inc.



R. E. Ballard, Jr.
Director of Projects



REBa-HWM/FAC:lc
1 Letter

CC: ARMS (B&R Site) OL
D. H. Wade (TUSI Site) 1L
N. Williams (CYGNA CA) 1L
G. Grace (TUSI Site) 1L

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
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Domestic: 127636/968694
International: 428813/234475
A Dravo Company

PROJECT FILE
8/14/84

CYGNA	
JOB NO :	84002
DATE LOGGED:	8/14/84
LOG NO.:	# 74
FILE:	2.11 Enc. etc
CROSS REF. FILE	2.1 Enc. etc log

August 3, 1984

GTN-69316

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
REVISED MASS PARTICIPATION
FRACTION SENSITIVITY STUDY
REF 1: GTN-69162 DTD 6/26/84
REF 2: GTN-69279 DTD 7/20/84
REF 3: GTN-69176 DTD 6/29/84

Attached please find the revised plan of action regarding Mass Participation along with a listing relating functional schedule milestone dates. Should you have any questions, call this office.

Very truly yours,

GIBBS & HILL, Inc.

Robert E. Ballard, Jr.

Robert E. Ballard, Jr.
Director of Projects

Approved: *M.A. Vivirito*

M.A. Vivirito

Vice President Power Engineering

REBa-HWMe:lc
1 Letter

CC: ARMS (B&R Site) OL

D. Wade (TUSI Dallas) 1L 1A (telecopy)

Dravo

Westbrook (TUSI Site) 1L 1A (telecopy) ~~TRANSMITTED BY TELETYPE~~

G. Bjorkman (CYGNA MA) 1L 1A

N. Williams (CYGNA CA) 1L 1A

D. Westbrook (TUSI Site) 1L 1A

REVISED MASS PARTICIPATION FRACTION SENSITIVITY STUDY

GTN-69162 dated June 26, 1984 established the Gibbs & Hill plan of action for the Mass Participation Fraction Sensitivity Study. Item 3 in that GTN stated that upon completion of the re-analysis of the five (5) selected problems a preliminary report would be issued and an assessment made with regard to additional required work. The status report issued under GTN-69279 dated July 20, 1984 generalized as to the type of additional work or followup actions required. Those followup actions were:

- a. Need for an expanded review (more problems)
- b. Further re-analysis of the five (5) selected problems (with refinements to reduce loads)
- c. Submittal of revised loads to PSE to check support adequacy.

Based upon the preliminary information gathered to date, Gibbs & Hill has deemed it appropriate to expand the review of the piping analyses. In essence the original plan of action is now revised with changes being made in review criteria and in the scope (number of problems) of the Study. The revised plan of action for the Study is as follows:

1. The scope of the Study will be expanded beyond the originally selected five (5) problems. A representative sampling will be made of those problems which are considered to contain the extreme parameters in regards to high frequency response. In GTN-69176 dated June 29, 1984, Gibbs & Hill presented Charts 1, 2 & 3 highlighting the mass participation percentages calculated for the 'x', 'y' and 'z' directions for the 200 stress problems in its initial survey. A review of these Charts show that 18 problems exhibited an 'x' mass fraction under 10 percent, 28 problems a 'y' mass fraction under 10 percent; four (4) problems a 'z' mass fraction under 10 percent. An initial representative sample will be drawn from these worst case percentages with the following additional parameters being considered:
 - a. The first natural frequency and number of modes considered in the original as-built analysis
 - b. The pipe size, schedule and weight
 - c. The number of anchors and pipe supports
 - d. Concentrated weights in the analysis, i.e., valves
 - e. The building(s) to which the piping is supported
 - f. The Response Spectra utilized (refined versus unrefined)

g. Seismic anchor movements.

A selection of the actual problems to be analyzed considering the above parameters is being prepared and will be submitted on August 8, 1984.

2. The problems in the representative sample will be re-analyzed utilizing the ADLPIPE computer program version C (consistent with the version used in the original as-built analysis). Introduced into this re-analysis will be a static seismic analysis based upon the respective 'x', 'y' and 'z' Zero Period Acceleration (ZPA) associated with the stress problem. The loads obtained in this manner will be compared with those originally derived in the dynamic analysis performed during the as-built program (which utilized a frequency cutoff of 33 Hertz). The two (2) sets of loads (original dynamic/ZPA) will be compared and the higher values used to check the support designs.

The above method outlined is currently an acceptable industry method of checking the adequacy of the piping system and its support designs in regard to high frequency responses. In addition in a telephone conversation with Nancy Williams of CYGNA Energy Services placed on Tuesday, July 31, 1984, Ms. Williams concurred that this type of check of the effect of ZPA was the method used by CYGNA's reviewer during the independent audits, and is acceptable to CYGNA.

3. With the results of the re-analysis Gibbs & Hill will follow a 10 percent acceptance criteria. If the new total support load is within 10 percent of the original no further work will be performed. For those cases above a 10 percent increase in load Gibbs & Hill will make refinements to the analysis. Such refinements will consist of:

- a. Use of refined response spectra, if not originally utilized
- b. Use of a more specific ZPA (for the factoring of resultant loads). Presently the acceleration associated with the cutoff frequency of 33 Hertz is being conservatively utilized as the ZPA. There can be a reduction in ZPA at higher frequencies. Besides a more accurate ZPA, credit will be taken of the relative location of the piping system supports being analyzed with respect to the supporting building(s) to lower any undue conservatism inherent in the enveloped Response Spectra curve.
- c. Use of refined seismic anchor movements.

4. With the refined re-analysis a check will be made of the support design load margin for those supports still having a greater than 10 percent total load increase.

Gibbs & Hill is optimistic that utilizing the above step by step evaluation of the ZPA effect on the worst case representative sample will dispense with the mass participation issue. Following is a simplified summary of the recommended actions.

For each of the problems contained in the worst case representative sample (mass fractions less than 10 percent):

Step 1 - Analyze the ZPA effect

Step 2 - Compare the resulting loads with those of the original dynamic analysis (as-built)

- a. If the original support design loads are higher, no further evaluation is required
- b. If the ZPA associated loads result in a total design load increase of less than 10 percent, no further evaluation is required
- c. If the ZPA associated loads constitute a greater than 10 percent increase in total loads proceed to Step 3.

Step 3 - Perform a refined analysis of the ZPA effect (more specific ZPA and S&M)

Step 4 - Same as Step 2, a & b -- no further analysis;
if c -- proceed to Step 5

Step 5 - Evaluation of the design load margin in the supports.

Depending on the outcome of the results of the above analyses, additional sampling analysis may be required.

MASS PARTICIPATION SENSITIVITY STUDY - FUNCTIONAL SCHEDULE MILESTONES

1. Problem Selection/Data for Refinement
(note 30 problems) August 3, 1984 - August 8, 1984
2. Reanalysis Incorporating ZPA Effect for comparison
(first 15 problems) August 8, 1984 - August 15, 1984
3. Reanalysis Incorporating ZPA Effect for Comparison
(second 15 problems) August 15, 1984 - August 22, 1984
4. Refined Reanalysis as Required
August 22, 1984 - August 30, 1984
5. Report to PSE - Supports with Load Increase to
Check Margin
August 17, 1984 - August 31, 1984

2 Pgs - Nancy Williams

TEXAS UTILITIES SERVICES INC.

OFFICE MEMORANDUM

PROJECT FILE

To J. B. George

Subject

COMANCHE PEAK STEAM ELECTRIC STATION
CPSES DOCUMENT CONTROL CENTER

Cygnus
Date Recd. Texas Sept. 8, 1983

DATE LOGGED:

LOG NO.:

FILE:

8/7/84

72

2.1.1 Inc. CR

2.1.2 Inc. CR. Log

The following is submitted in response to your request regarding the historical path and current status of the project document control program.

In May of 1982, project management directed the re-evaluation of the CPSES document control system in an effort to strengthen the system and improve its overall efficiency. The first step in this process was a realignment of supervision with an initial charge to evaluate DCC in terms of efficiency with respect to the total control and distribution process.

The immediate results of this evaluation were to increase efficiency by the proper organization of DCC manpower. These included establishing priorities, specific task sequences, and job descriptions. In parallel, equipment inventories were re-evaluated considering capability, cost effectiveness, operator training, and maintenance (including history and contract commitments). The results, when implemented in conjunction with new equipment purchases, enabled DCC to recover some document control functions previously managed outside DCC, and effect current file retrievability, reproduction, and distribution.

The second phase of the evaluation consisted of an integrated review of the total distribution process. It was clearly recognized that centralizing drawing and design change control would strengthen the system and provide a more positive means of control. In late 1982, the concept of managing these controls by a limited number of DCC-managed satellites was originally proposed.

The "satellite concept" -- although in preliminary outline form -- was observed during the CAT investigation by NRC personnel. Although the DCC effort was not found by CAT to be deficient, the team commented the satellite approach would minimize the "general risk" inherent to the existing program and simultaneously enhance positive control.

The first satellite was implemented in May of 1983 to support the Startup and Startup Support Groups. Full implementation of the satellite program was accomplished August 1, 1983, with the operation of five (5) total satellites supporting CPSES.

J. B. George
Sept. 6, 1983
Page 2

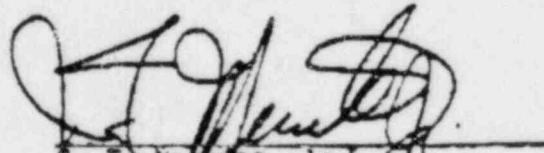
During the implementation phase of the satellite system, CYGNA began their Independent Assessment Program at Comanche Peak. Several observations were noted indicating inconsistencies in DCC's design change records. The inconsistencies resulted, in part, from start-up difficulties of the satellite system and from human error. Additional confusion was created because of the lack of understanding initially, by CYGNA, of the function of the Design Change Tracking Group (DCTG).

The DCTG is the engineering group charged with maintenance of the CMC/DCA Master Index used for tracking/statusing the engineering/design review of design changes. This group is also the primary Engineering-to-DCC interface.

The original CMC/DCA Master Index was maintained by Gibbs & Hill to track their internal design review effort. Because of the manner in which this index had been maintained, a comparison of applicable design changes in that document would appear, at face value, to be discrepant with DCC's manual design change logs. The DCTG is currently reviewing each design change for completeness and accuracy with regards to the status of design changes and the proper drawing references. When this purging effort is completed, a computer data base will exist such that DCC's manual design change tracking system may be eliminated. The merging of the two systems is scheduled to occur on October 15, 1983, and will eliminate all discrepancies from the past.

Until such time as the merger is made, DCC's manual design change tracking system remains as the controlling mechanism for design changes. In order to assure that identified discrepancies are corrected and that positive controls are in place, an independent monitoring team which reports directly to DCC Management, has been established. This team constantly rotates within the DCC system assessing and "auditing" distribution control. The team's scope includes each drawing, specification, procedure, and associated changes entered in the control system. These personnel have been delegated no production responsibility except auditing.

The above actions, all combined, will ultimately result in a strengthened DCC system and will provide the positive controls that are necessary.



J. T. Mellett, Jr.
Asst. Project General Manager

JTH:pew

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760- 4438
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Domestic: 127636/968694
International: 428813/234475
A Dravo Company

Rec. 8/27/84

Distribution

N. Williams w/o/a
L. Weingart w/o/a
J. Minichiello w/o/a
84042 PF

August 23, 1984

GTN-69369

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J.B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
TRANSITION JOINT SIF AT
EQUIPMENT NOZZLE CONNECTIONS
REF: GTN-69359 DTD 8/17/84

CYGNA	
JOB NO.	84042
DATE LOGGED	8/27/84
LOG NO.:	# 78
FILE:	2.1.1 Drc. CR
GROSS REF. FILE	2.1 Drc. CR LOG
11-1-1 Tech. Ed. # 213	

By copy of this letter to Nancy Williams of CYGNA, attached is a copy of the Gibbs & Hill Calculation 2323-EQ-SIF referred to in the above reference. As can be seen all nozzles are acceptable. In those instances where a calculation check was performed it should be noted that the taper transition SIF of 1.9 was applied across the board without account made for the pressure term or for the .75 factor in equations 8, 9 and 11. This across the board application was done for expediency and due to the low magnitude of stresses found in the majority of cases. In several instances this approach was not applicable hence the pressure and .75 factor was accounted for.

Gibbs & Hill, Inc.

GTN- 69369

-2-

August 23, 1984

Gibbs & Hill feels that this calculation more than adequately completes the plan of action on this item. Note that not included with this transmittal is the calculation attachments to 2323-EQ-SIF which are copies of the related ADLPIPE analyses microfilm. These can be made available upon request.

Very truly yours,

GIBBS & HILL, Inc.

R E Ballard

Robert E. Ballard, Jr.
Director of Projects

REBa
REBa-HWMe:lc
1 Letter

CC: ARMS (B&R Site) OL
~~N. Williams (CYGNA, CA) 1L 1A~~
D. Wade (TUSI Site) 1L
G. Grace (TUSI Site) 1L

Calculation Cover Sheet

G&H Job No. 2323-046 Client TUSI

Calculation Number 2323-EQ-SIF

Number of Sheets in Original Issue 82

Subject Tapered Transition Joint S.I.F. At Equipment

- ☒ Nuclear Safety Related
☐ Non-Nuclear Safety Related—QA Program Applicable
☐ Non-Nuclear Safety Related

	Sheets Deleted	Sheets Added	Sheets Revised	Job Engineer	
				Signature	Date
Original				<i>A. M. M. L.</i>	8/27/81
				FOR C. J. CORCAN	
Revision					

CYGNA

JOB NO : 84042

DATE LOGGED: 8/27/81

LOG NO.: # 213

FILE: 11.1' Tech. Files

CROSS REF. FILE 2.1.1.9.1. GR (# 78)

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. At Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 1

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	GAC	8/17/84								
Checker	WFA	8/21/84								

Purpose: The purpose of this calculation is to verify that the stresses at equipment nozzle connections satisfy the requirements of the ASME Code allowables (SEE REFERENCE 2)

Table of Contents

Sheet No.

- 1) References
- 2) Information Matrix
- 3) Analysis Results
- 4) Conclusion
- 5) Calculation Attachments

2

3

11

82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 2

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	S=C	8/17/84								
Checker	J.H.M.	8/21/84								

References:

- 1) ASME Code Section III 1974
- 2) GTT-10424 DATED 7/11/84 - "PLAN OF ACTION ADDRESSING EQUIPMENT NOZZLE CONNECTIONS AND THE CONSIDERATION OF A STRESS INTENSIFICATION FACTOR FOR A TAPERED TRANSITION JOINT."
- 3) GTN-69303 DATED 7/31/84 - PART "A" OF ALTERNATIVED PLAN ABOVE.
- 4) GTN-69338 DATED 8/10/84 - STATUS REPORT

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 3

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #										
Preparer	EAC	9/11/84								
Checker	W. H. A.	4/21/84								

Information Matrix

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
1	1-1	Yes	Yes	N/A	N/A
2	1-2	Yes	Yes	N/A	N/A
3	1-3	Yes	Yes	N/A	N/A
4	1-4	Yes	Yes	N/A	N/A
5	1-5	Yes	Yes	N/A	N/A
6	1-6	Yes	Yes	N/A	N/A
7	1-7	Yes	Yes	N/A	N/A
8	1-8	Yes	Yes	N/A	N/A
9	1-9A	No	N/A	N/A	N/A
10	1-9B	No	N/A	N/A	N/A
11	1-9C	No	N/A	N/A	N/A
12	1-9D	No	N/A	N/A	N/A
13	1-10A-1	Yes	Yes	N/A	N/A
14	1-10B	No	N/A	N/A	N/A
15	1-10C	No	N/A	N/A	N/A
16	1-10D-1	Yes	No	Yes	See Calc. Page 11
17	1-11A	Yes	No	Yes	See Calc. Page 12
18	1-11B	Yes	No	Yes	See Calc. Page 13
19	1-11C	Yes	Yes	N/A	N/A
20	1-12A-1	Yes	Yes	N/A	N/A
21	1-12B	No	N/A	N/A	N/A
22	1-12D	No	N/A	N/A	N/A
23	1-12E	No	N/A	N/A	N/A
24	1-19A	Yes	Yes	N/A	N/A
25	1-19B	Yes	Yes	N/A	N/A
26	1-19C	No	N/A	N/A	N/A
27	1-21-1	Yes	Yes	N/A	N/A
28	1-23A	No	N/A	N/A	N/A
29	1-23B	No	N/A	N/A	N/A
30	1-23C	No	N/A	N/A	N/A
31	1-23D	No	N/A	N/A	N/A
32	1-24	No	N/A	N/A	N/A
33	1-27-1	Yes	No	Yes	See Calc. Page 14
34	1-28-1	Yes	No	Yes	See Calc. Page 17
35	1-29K	No	N/A	N/A	N/A
36	1-29L	No	N/A	N/A	N/A
37	1-29M	No	N/A	N/A	N/A

Checking Method #

1 Line-by-line checking
2 Alternative Calculation Results compared
3 Identical Calculation Results compared
4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 4

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/11/84								
Checker	J/1/84	8/22/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
38	1-29N-1	NO	N/A	N/A	N/A
39	1-29O	NO	N/A	N/A	N/A
40	1-29P	NO	N/A	N/A	N/A
41	1-29S	NO	N/A	N/A	N/A
42	1-29T	NO	N/A	N/A	N/A
43	1-29U	NO	N/A	N/A	N/A
44	1-29V	NO	N/A	N/A	N/A
45	1-29W	NO	N/A	N/A	N/A
46	1-29X	NO	N/A	N/A	N/A
47	1-29Y	NO	N/A	N/A	N/A
48	1-29Z	NO	N/A	N/A	N/A
- 49	1-30-1	Yes	NO	Yes	See Calc. Page 20
- 50	1-31	Yes	NO	Yes	See Calc. Page 21
51	1-32	Yes	Yes	N/A	N/A
52	1-33	Yes	Yes	N/A	N/A
- 53	1-34A	Yes	NO	Yes	See Calc. Page 22
54	1-34B	Yes	Yes	N/A	N/A
- 55	1-34C	Yes	NO	Yes	See Calc. Page 23
56	1-35A	NO	N/A	N/A	N/A
57	1-35B-1	NO	N/A	N/A	N/A
58	1-35C	NO	N/A	N/A	N/A
59	1-35D	NO	N/A	N/A	N/A
60	1-35E	NO	N/A	N/A	N/A
61	1-35F	NO	N/A	N/A	N/A
62	1-36	NO	N/A	N/A	N/A
63	1-37B	NO	N/A	N/A	N/A
64	1-37B-1	NO	N/A	N/A	N/A
65	1-37X	NO	N/A	N/A	N/A
66	1-37Y	NO	N/A	N/A	N/A
67	1-37Z	NO	N/A	N/A	N/A
68	1-40	Yes	NO	Yes	See GT 69303, 7/31/84
- 69	1-42A	Yes	NO	Yes	See Calc. Page 24
70	1-42B	NO	N/A	N/A	N/A
- 71	1-45Q	Yes	Yes	N/A	N/A
72	1-45R	Yes	Yes	N/A	N/A
73	1-45S	Yes	Yes	N/A	N/A
74	1-45T	Yes	Yes	N/A	N/A

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 5

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	LOC	8/11/84								
Checker	N/M	8/27/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
75	1-4CA	Yes	Yes	N/A	N/A
-76	1-46B	Yes	No	Yes	See Calc. Page 25
-77	1-47B	Yes	No	Yes	See Calc. Page 26
78	1-51A	Yes	Yes	N/A	N/A
79	2-51A	Yes	Yes	N/A	N/A
80	1-51C-1	No	N/A	N/A	N/A
81	1-51D	Yes	Yes	N/A	N/A
82	2-51D-1	Yes	Yes	N/A	N/A
83	2-52E	Yes	Yes	N/A	N/A
-84	1-524	Yes	No	Yes	See Calc. Page 27
85	2-524	Yes	Yes	N/A	N/A
86	1-52V-1	Yes	Yes	N/A	N/A
87	1-52W	Yes	Yes	N/A	N/A
88	1-52X	Yes	Yes	N/A	N/A
89	1-52Y	No	N/A	N/A	N/A
90	1-52Z	No	N/A	N/A	N/A
91	1-55A	Yes	Yes	N/A	N/A
92	1-55B	Yes	Yes	N/A	N/A
93	1-55C	Yes	Yes	N/A	N/A
94	1-55D-1	Yes	Yes	N/A	N/A
95	1-57	Yes	N/A	N/A	See GTN 69303, 7/31/84
-96	1-58	Yes	No	Yes	See Calc. Page 28
97	1-59A	Yes	Yes	N/A	N/A
98	1-59B	Yes	Yes	N/A	N/A
99	1-59C	Yes	Yes	N/A	N/A
-100	1-59D	Yes	No	Yes	See Calc. Page 30
-101	1-60	Yes	No	Yes	See Calc. Page 32
102	1-61A-2	Yes	No	Yes	See Calc. Page 37
103	1-61B-1	Yes	Yes	N/A	N/A
104	2-61B	Yes	Yes	N/A	N/A
105	1-61C	Yes	Yes	N/A	See GTN 69303, 7/31/84
-106	1-61D	Yes	No	Yes	See Calc. Page 39
107	1-61E	Yes	Yes	N/A	N/A
108	2-61E-1	Yes	Yes	N/A	N/A
109	1-61F	No	N/A	N/A	N/A
110	1-62A	Yes	Yes	N/A	N/A
111	1-62B-1	Yes	Yes	N/A	N/A

Checking Method #

1 Line-by-line checking
2 Alternative Calculation Results compared
3 Identical Calculation Results compared
4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 6

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	JAC	8/11/84								
Checker	JHM	8/17/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
112	1-62C-1	Yes	Yes	N/A	N/A
113	1-62D-1	Yes	Yes	N/A	N/A
114	2-62D	Yes	No	Yes	See Calc. Page 40
115	1-62E	Yes	Yes	N/A	N/A
116	1-62F	Yes	No	Yes	See Calc. Page 41
117	1-62G	No	N/A	N/A	N/A
118	1-62X-1	Yes	Yes	N/A	N/A
119	1-62Y	No	N/A	N/A	N/A
120	1-62Z-1	Yes	Yes	N/A	N/A
121	1-63A	Yes	Yes	N/A	N/A
- 122	1-63B	Yes	No	Yes	See Calc. Page 42
123	2-63B	No	N/A	N/A	N/A
124	1-63C	No	N/A	N/A	combined with AB-1-63B
125	1-63D	Yes	Yes	N/A	N/A
126	1-64A	Yes	No	Yes	See Calc. Page 43
127	1-64B	No	N/A	N/A	N/A
128	1-64C	No	N/A	N/A	N/A
129	1-64D	No	N/A	N/A	N/A
- 130	1-64E	No	N/A	N/A	N/A
131	1-64F	Yes	No	Yes	See Calc. Page 44
132	1-65	Yes	Yes	N/A	N/A
133	1-66A-1	Yes	Yes	N/A	N/A
134	1-66B-1	Yes	Yes	N/A	N/A
135	1-66C	Yes	Yes	N/A	N/A
136	1-67T	No	N/A	N/A	N/A
137	2-67T	No	N/A	N/A	N/A
- 138	1-67U	No	N/A	N/A	N/A
139	1-67V	Yes	Yes	N/A	N/A
140	1-67X	No	N/A	N/A	N/A
141	2-67X	No	N/A	N/A	N/A
142	1-67Y	No	N/A	N/A	N/A
143	1-67Z	Yes	Yes	N/A	N/A
144	1-68T	No	N/A	N/A	N/A
- 145	2-68T	No	N/A	N/A	N/A
146	1-68U-1	No	N/A	N/A	N/A
147	1-68V-1	Yes	Yes	N/A	N/A
148	1-68X	No	N/A	N/A	N/A

Checking Method #

1 Line-by-line checking
2 Alternative Calculation Results compared
3 Identical Calculation Results compared
4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 7

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method 3	1									
Preparer	JAC	8/11/84								
Checker	J/10/11	4/25/84								

No.	Prob. AB -	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
149	2-68X	NO	N/A	N/A	N/A
150	1-68Y	NO	N/A	N/A	N/A
151	1-68Z	YES	YES	N/A	N/A
152	1-69	YES	YES	N/A	N/A
153	1-70	YES	YES	N/A	N/A
154	1-71A	YES	YES	N/A	N/A
155	1-71B	YES	YES	N/A	N/A
156	1-72	NO	N/A	N/A	N/A
157	1-73	NO	N/A	N/A	N/A
158	1-74	NO	N/A	N/A	N/A
159	1-75	YES	YES	N/A	N/A
- 160	1-76A	YES	NO	YES	See Calc. Page 46
161	1-76B	NO	N/A	N/A	N/A
162	1-77	YES	YES	N/A	N/A
163	1-78	YES	YES	N/A	N/A
164	1-79A	NO	N/A	N/A	N/A
165	1-79B	NO	N/A	N/A	N/A
166	1-79C	NO	N/A	N/A	N/A
167	1-79D	NO	N/A	N/A	N/A
168	1-79E	NO	N/A	N/A	N/A
169	1-79F	YES	YES	N/A	N/A
170	1-80A	NO	N/A	N/A	N/A
- 171	1-80B	YES	NO	YES	See Calc. Page 48
172	1-80C	NO	N/A	N/A	N/A
173	1-80D	NO	N/A	N/A	N/A
174	1-81	YES	YES	N/A	N/A
175	1-86A	YES	YES	N/A	N/A
176	1-86B	NO	N/A	N/A	N/A
177	1-86C	NO	N/A	N/A	N/A
- 178	1-87A	YES	YES	N/A	N/A
179	1-87B	NO	N/A	N/A	N/A
180	1-87C-1	NO	N/A	N/A	N/A
181	1-88C	YES	NO	YES	See Calc. Page 49
182	1-88D	YES	YES	N/A	N/A
183	1-88E	YES	NO	YES	See Calc. Page 50
184	1-88W	NO	N/A	N/A	N/A
185	1-88X	NO	N/A	N/A	N/A

Checking Method #

1 Line-by-line checking
2 Alternative Calculation Results compared
3 Identical Calculation Results compared
4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 8

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	afac	8/11/84								
Checker	giam	6/22/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
186	1-88Y	No	N/A	N/A	N/A
187	1-88Z	No	N/A	N/A	N/A
- 188	1-89	Yes	No	Yes	See Calc. Page 52
189	1-90	Yes	No	Yes	See Calc. Page 58
190	1-91	No	N/A	N/A	N/A
191	1-92A	Yes	No	Yes	See Calc. Page 60
192	1-92B	No	N/A	N/A	N/A
193	1-93A	Yes	No	Yes	See Calc. Page 61
194	1-93B	Yes	Yes	N/A	N/A
195	1-94	No	N/A	N/A	N/A
- 196	1-95	Yes	No	Yes	See Calc. Page 63
197	1-96A	No	N/A	N/A	N/A
198	1-96B	No	N/A	N/A	N/A
199	1-96C	No	N/A	N/A	N/A
200	1-96D	No	N/A	N/A	N/A
201	1-97A-1	Yes	Yes	N/A	N/A
202	1-97B	No	N/A	N/A	N/A
203	1-97C	No	N/A	N/A	N/A
204	1-97D	No	N/A	N/A	N/A
205	2-97D	Yes	Yes	N/A	N/A
206	2-99A	Yes	Yes	N/A	N/A
207	2-99B	Yes	Yes	N/A	N/A
208	1-135A-1	No	N/A	N/A	N/A
209	1-135B	No	N/A	N/A	N/A
210	1-135C	Yes	Yes	N/A	N/A
211	1-135D	Yes	Yes	N/A	N/A
212	1-135E-1	Yes	Yes	N/A	N/A
213	1-135F	Yes	Yes	N/A	N/A
- 214	1-150F	Yes	No	Yes	See Calc. Page 64
215	2-150F	Yes	No	Yes	See Calc. Page 66
216	1-150G	Yes	No	Yes	See GTN 69303, 7/31/84
- 217	2-150G	Yes	No	Yes	Correlated to AB-1-150G
218	1-150H	Yes	No	Yes	See Calc. Page 68
219	2-150H	Yes	No	Yes	Correlated to AB-1-150H
220	1-150I	Yes	No	Yes	See Calc. Page 70
221	2-150I	Yes	No	Yes	See Calc. Page 72
222	1-150J	Yes	No	Yes	See Calc. Page 74

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 9

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	GAC	8/11/84								
Checker	J/M/A	8/22/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
223	2-150J	Yes	No	Yes	See Calc. Page 76
224	1-151A	Yes	Yes	N/A	N/A
- 225	1-151B	Yes	Yes	N/A	See GTN 69303, 7/31/84
226	1-151C-1	Yes	Yes	N/A	N/A
227	1-151D-1	No	N/A	N/A	N/A
228	1-152	Yes	Yes	N/A	N/A
- 229	1-153	Yes	No	Yes	See Calc. Page 78
230	1-154	Yes	Yes	N/A	N/A
231	1-155	Yes	Yes	N/A	N/A
232	1-156	Yes	No	Yes	See Calc. Page 79
233	1-157A	No	N/A	N/A	N/A
234	1-157B	Yes	Yes	N/A	N/A
235	1-157C	No	N/A	N/A	N/A
236	1-158A	No	N/A	N/A	N/A
237	1-158B	Yes	Yes	N/A	N/A
238	1-158C	No	N/A	N/A	N/A
239	1-163-1	Yes	Yes	N/A	N/A
240	1-165A-1	Yes	Yes	N/A	N/A
241	1-165B-1	Yes	Yes	N/A	N/A
242	1-165C	Yes	Yes	N/A	N/A
- 243	1-165D	Yes	Yes	N/A	N/A
244	1-165E	Yes	Yes	N/A	N/A
245	1-165F	Yes	Yes	N/A	N/A
246	1-165G	Yes	Yes	N/A	N/A
247	1-165H	Yes	Yes	N/A	N/A
248	1-166A	No	N/A	N/A	N/A
249	1-166B	No	N/A	N/A	N/A
250	1-166C	No	N/A	N/A	N/A
251	1-166D	No	N/A	N/A	N/A
252	1-167A-1	Yes	N/A	N/A	Same as AB-1-167B-1
253	1-167B-1	Yes	N/A	N/A	See GTN-69303, 7/31/84
254	1-167C	Yes	N/A	N/A	Same as AB-1-167B-1
255	1-167D-1	Yes	N/A	N/A	Same as AB-1-167B-1
256	1-167E-1	Yes	N/A	N/A	Same as AB-1-167B-1
257	1-167F-1	Yes	N/A	N/A	Same as AB-1-167B-1
258	1-168	No	N/A	N/A	N/A
259	1-169	No	N/A	N/A	N/A

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 10

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/11/84								
Checker	WPA	8/23/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
260	1-170	NO	N/A	N/A	N/A
261	1-171	NO	N/A	N/A	N/A
262	1-172	NO	N/A	N/A	N/A
263	1-174	NO	N/A	N/A	N/A
264	1-175	NO	N/A	N/A	N/A
265	1-178A	Yes	Yes	N/A	N/A
266	1-178B	Yes	NO	Yes	See Calc. Page 80
267	1-179	NO	N/A	N/A	N/A
268	1-180	NO	N/A	N/A	N/A
269	2-181	Yes	Yes	N/A	N/A
270	1-186	NO	N/A	N/A	N/A
271	1-188	NO	N/A	N/A	N/A
272	1-189	NO	N/A	N/A	N/A

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 11

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #										
Prepared	JAC	8/15/84								
Checked	JAC	8/17/84								

Problem AB-1-10D-1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1119	687	1.9	
		15000	2126			
Normal and Upset	9	$1.2 S_h$	2013	687	1.9	
		18000	3825			
Emergency	9	$1.8 S_h$	2239	687	1.9	
		27000	4254			
Faulted	9	$2.4 S_h$	2239	687	1.9	
		36000	4254			
Normal and Upset	10	S_A	2851	687	1.9	
		22500	5417			
Normal and Upset	11	$S_A + S_h$	3969	687	1.9	
		37500	7541			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 12

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	goc	8/15/84								
Checker	goc	8/17/84								

Problem AB-1-11A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	583	99	1.9	
		15000	1108			
Normal and Upset	9	$1.2 S_h$	962	99	1.9	
		18000	1828			
Emergency	9	$1.3 S_h$	1098	99	1.9	
		27000	2086			
Faulted	9	$2.4 S_h$	1098	99	1.9	
		27000	2086			
Normal and Upset	10	S_A	6373	99	1.9	
		22500	12527			
Normal and Upset	11	$S_A + S_h$	7176	99	1.9	
		37500	13634			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 13

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	fac	8/15/64								
Checker	MAA	8/21/64								

Problem AB-1-11B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	577	506	1.9	
		15000	1096			
Normal and Upset	9	$1.2 S_h$	2315	506	1.9	
		18000	4399			
Emergency	9	$1.8 S_h$	2744	506	1.9	
		27000	5214			
Faulted	9	$2.4 S_h$	2744	506	1.9	
		36000	5214			
Normal and Upset	10	S_A	2475	506	1.9	
		22500	4703			
Normal and Upset	11	$S_A + S_h$	3053	506	1.9	
		37500	5801			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. At Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 14

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/11/84								
Checker	JAC	8/27/84								

Problem AB-1-27, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2456	1	1.9	
		16600	4666			
Normal and Upset	9	$1.2 S_h$	4057	1	1.9	
		19920	7712			
Emergency	9	$1.8 S_h$	4447	1	1.9	
		29880	8449			
Faulted	9	$2.4 S_h$	4447	1	1.9	
		39840	8449			
Normal and Upset	10	S_A	1263	1	1.9	
		27650	2400			
Normal and Upset	11	$S_A + S_h$	3717	1	1.9	
		44250	7066			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 15

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	JAC	2/11/84								
Checker	SWP	2/2/84								

Problem AB-1-27, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2450	51	1.9	
		16600	6555			
Normal and Upset	9	$1.2 S_h$	2952	51	1.9	
		19920	9460			
Emergency	9	$1.8 S_h$	5325	51	1.9	
		29880	10118			
Faulted	9	$2.4 S_h$	7100	51	1.9	
		39840	10118			
Normal and Upset	10	S_A	1759	51	1.9	
		27650	1759			
Normal and Upset	11	$S_A + S_h$	4375	51	1.9	
		44250	8313			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 16

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	lac	8/11/84								
Checked	lac	8/11/84								

Problem AB-1-27, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	3777	32	1.9	
		16600	7176			
Normal and Upset	9	$1.2 S_h$	3899	32	1.9	
		19920	7408			
Emergency	9	$1.8 S_h$	3902	32	1.9	
		29880	7452			
Faulted	9	$2.4 S_h$	3902	32	1.9	
		39840	7452			
Normal and Upset	10	S_A	894	32	1.9	
		27650	1699			
Normal and Upset	11	$S_A + S_h$	4671	32	1.9	
		44250	8875			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 17

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/11/84								
Checker	JAC	8/11/84								

Problem AB-1-28, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2526	42	1.9	
		16600	4799			
Normal and Upset	9	$1.2 S_h$	2837	42	1.9	
		19920	5390			
Emergency	9	$1.8 S_h$	2110	42	1.9	
		29880	5681			
Faulted	9	$2.4 S_h$	2990	42	1.9	
		39840	5681			
Normal and Upset	10	S_A	3374	42	1.9	
		27821	6411			
Normal and Upset	11	$S_A + S_h$	5901	42	1.9	
		44421	11212			

Checking Method #

- 1 Line-by-line checking
- 2 Alternative Calculation Results compared
- 3 Identical Calculation Results compared
- 4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 1B

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Prepared	JOC	8/11/84								
Checked	MAA	8/21/84								

Problem AB-1-28, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2458	501	1.9	
		16600	4670			
Normal and Upset	9	$1.2 S_h$	2778	501	1.9	
		19920	5278			
Emergency	9	$1.8 S_h$	2905	501	1.9	
		29880	5520			
Faulted	9	$2.4 S_h$	2905	501	1.9	
		39840	5520			
Normal and Upset	10	S_A	273	501	1.9	
		27821	519			
Normal and Upset	11	$S_A + S_h$	2731	501	1.9	
		44421	5189			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 19

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method										
Prepared	JAC	8/11/84								
Checked	JAC	8/21/84								

Problem AB-1-28, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	3600	831	1.9	
		16600	6878			
Normal and Upset	9	$1.2 S_h$	3807	831	1.9	
		19920	7233			
Emergency	9	$1.8 S_h$	3598	831	1.9	
		29880	7406			
Faulted	9	$2.4 S_h$	3598	831	1.9	
		39840	7406			
Normal and Upset	10	S_A	1301	831	1.9	
		27821	2472			
Normal and Upset	11	$S_A + S_h$	4721	831	1.9	
		44421	9350			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 20

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	S-C	8/15/84								
Checker	JH/A	8/21/84								

Problem AB-1-30-1

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	878	44	1.9	
		16600	1668			
Normal and Upset	9	$1.2 S_h$	1502	44	1.9	
		19920	2054			
Emergency	9	$1.8 S_h$	1702	44	1.9	
		29880	3245			
Faulted	9	$2.4 S_h$	1702	44	1.9	
		39840	3245			
Normal and Upset	10	S_A	1384	44	1.9	
		27650	2630			
Normal and Upset	11	$S_A + S_h$	2262	44	1.9	
		44250	4298			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 21

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking	1									
Preparer	Joc	8/16/84								
Checker	WTH	8/21/84								

Problem AB-1-31

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	853	44	1.9	
		16600	1621			
Normal and Upset	9	$1.2 S_h$	3047	44	1.9	
		19920	5789			
Emergency	9	$1.8 S_h$	4199	44	1.9	
		29880	7978			
Faulted	9	$2.4 S_h$	4199	44	1.9	
		39840	7978			
Normal and Upset	10	S_A	4716	44	1.9	
		27650	8960			
Normal and Upset	11	$S_A + S_h$	5569	44	1.9	
		44250	10581			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A4 Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 22

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	AOC	8/12/64								
Checker	J/A	8/21/64								

Problem AB-1-34A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	685	278	1.9	
		18300	1307			
Normal and Upset	9	$1.2 S_h$	1171	278	1.9	
		21960	2225			
Emergency	9	$1.8 S_h$	1251	278	1.9	
		32940	2434			
Faulted	9	$2.4 S_h$	1501	278	1.9	
		43920	2434			
Normal and Upset	10	S_A	3331	278	1.9	
		28075	6329			
Normal and Upset	11	$S_A + S_h$	4019	278	1.9	
		46375	7636			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 23

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JAC	8/17/84								
Checked	JAC	8/21/84								

Problem AB-1-34C

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1328	450	1.9	
		16600	2523			
Normal and Upset	9	$1.2 S_h$	225	450	1.9	
		19920	11600			
Emergency	9	$1.8 S_h$	338	450	1.9	
		29880	13899			
Faulted	9	$2.4 S_h$	451	450	1.9	
		39840	13899			
Normal and Upset	10	S_A	1003	450	1.9	
		27650	20317			
Normal and Upset	11	$S_A + S_h$	12001	450	1.9	
		44250	23980			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 24

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	AC	8/15/84								
Checker	W	8/21/84								

Problem AB-1-A2A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	5204	91	1.9	
		15900	10230			
Normal and Upset	9	$1.2 S_h$	6230	91	1.9	
		19080	12992			
Emergency	9	$1.8 S_h$	7094	91	1.9	
		28620	13479			
Faulted	9	$2.4 S_h$	7094	91	1.9	
		38160	13479			
Normal and Upset	10	S_A	515	91	1.9	
		27475	1169			
Normal and Upset	11	$S_A + S_h$	5914	91	1.9	
		43375	11398			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 25

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	25-C	8/16/84								
Checker	25-C	8/21/84								

Problem AB-1-46B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2981	128	1.9	
		16200	5664			
Normal and Upset	9	$1.2 S_h$	4078	128	1.9	
		19440	7748			
Emergency	9	$1.8 S_h$	4463	128	1.9	
		29160	8480			
Faulted	9	$2.4 S_h$	4463	128	1.9	
		38880	8480			
Normal and Upset	10	S_A	1235	128	1.9	
		27550	3487			
Normal and Upset	11	$S_A + S_h$	4816	128	1.9	
		43750	9150			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Internal Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 26

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/12/84								
Checker	WMA	8/21/84								

Problem AB-1-47B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2437	262	1.9	
		17200	4630			
Normal and Upset	9	$1.2 S_h$	5305	262	1.9	
		20640	10080			
Emergency	9	$1.8 S_h$	6104	262	1.9	
		30960	11598			
Faulted	9	$2.4 S_h$	6104	262	1.9	
		41280	11598			
Normal and Upset	10	S_A	7520	262	1.9	
		27800	14288			
Normal and Upset	11	$S_A + S_h$	9957	262	1.9	
		45000	18918			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 27

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #										
Preparer	SAC	8/12/84								
Checker	WPA	8/21/84								

Problem AB-1-524

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	608	1100	1.9	
		17800	1155			
Normal and Upset	9	$1.2 S_h$	608	1100	1.9	
		21360	1155			
Emergency	9	$1.8 S_h$	608	1100	1.9	
		32040	1155			
Faulted	9	$2.4 S_h$	608	1100	1.9	
		42720	1155			
Normal and Upset	10	S_A	0	1100	1.9	
		26950	0			
Normal and Upset	11	$S_A + S_h$	608	1100	1.9	
		44750	1155			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 28

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method 1	1									
Prepared	ANC	8/12/84								
Checked	ANC	8/21/84								

Problem AB-1-5B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	710	97	1.9	
		15000	1729			
Normal and Upset	9	$1.2 S_h$	1930	97	1.9	
		18000	3667			
Emergency	9	$1.8 S_h$	2895	97	1.9	
		27000	5045			
Faulted	9	$2.4 S_h$	3860	97	1.9	
		36000	5045			
Normal and Upset	10	S_A	545	97	1.9	
		22500	1036			
Normal and Upset	11	$S_A + S_h$	1455	97	1.9	
		37500	2765			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 29

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/12/84								
Checker	JAC	8/21/84								

Problem AB-1-58

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	733	65	1.9	
		15000	1393			
Normal and Upset	9	$1.2 S_h$	1301	65	1.9	
		18000	2586			
Emergency	9	$1.8 S_h$	1627	65	1.9	
		27000	3091			
Faulted	9	$2.4 S_h$	1627	65	1.9	
		36000	3091			
Normal and Upset	10	S_A	742	65	1.9	
		22500	1410			
Normal and Upset	11	$S_A + S_h$	1475	65	1.9	
		37500	2803			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 30

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JAC	8/15/84								
Checked	JHM	9/22/84								

Problem AB-1-59D

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	4352	472	1.425	
		15000	4406			
Normal and Upset	9	$1.2 S_h$	14033	472	1.425	
		18000	18201 *			
Emergency	9	$1.8 S_h$	16486	472	1.425	
		27000	21697			
Faulted	9	$2.4 S_h$	16486	472	1.425	
		36000	21697			
Normal and Upset	10	S_A	9010	472	1.9	
		22500	17119			
Normal and Upset	11	$S_A + S_h$	13362	472	1.9	
		37500	21525			

* Exceeds allowable. See next page.

$$\text{Pressure Stress} = \frac{PD_o}{4t_n} = \frac{(2500)(1.9)}{(4)(.281)} = 4226 \text{ psi}$$

$$P = 2500 \text{ psi}$$

$$D_o = 1.9 \text{ in.}$$

$$t_n = .281 \text{ in.}$$

$$\text{S.I.F. for } E_f \text{ 819} = (1.9)(.75) = 1.425$$

$$\text{S.I.F. for } E_f \text{ 10} = 1.9$$

$$E_f \text{ 11} = E_f \text{ 8} + E_f \text{ 10}$$

Checking Method #

1 Line-by-line checking
2 Alternative Calculation Results compared
3 Identical Calculation Results compared

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 31

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	5-C	8/17/84								
Checker	7/6/84	8/22/84								

Problem AB-1-59D

Considering pipe mismatch to obtain a revised Stress Intensification Factor

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	4352	472	1.293	
		15000	4389			
Normal and Upset	9	$1.2 S_h$	14033	472	1.293	
		18000	16906			
Emergency	9	$1.8 S_h$	16486	472	1.293	
		27000	20078			
Faulted	9	$2.4 S_h$	16486	472	1.293	
		36000	20078			
Normal and Upset	10 (2)	S_A	9010	472	1.724	
		22500	15533			
Normal and Upset	11	$S_A + S_h$	13362	472	1.724 1.293	
		37500	19922			

$$S.I.F. = 1.3 + 0.0036 \frac{D_o}{t_n} + 3.6 \frac{\delta}{t_n} \quad (\text{ASME Code Section III, Subsection NC 1974, Fig NC-3673.2(b)-1 page 123})$$

$$\delta = 1/32 \text{ in}$$

$$S.I.F. = 1.3 + 0.0036 \left(\frac{1.9}{.281} \right) + 3.6 \left(\frac{.0313}{.281} \right)$$

$$S.I.F. = 1.724$$

$$S.I.F. \text{ for } E_2 \text{ 819} = (1.724) (.75) = 1.293$$

$$S.I.F. \text{ for } E_2 \text{ 10} = 1.724 \quad E_2 \text{ 11} = E_2 \text{ 8} + E_2 \text{ 10}$$

Checking Method #

- 1 Line-by-line checking
- 2 Alternative Calculation Results compared
- 3 Identical Calculation Results compared
- 4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 32

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	LOC	2/12/84								
Checked	J. Hill	5/22/84								

Problem AB-1-60

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1000	47	1.9	
		15000	3739			
Normal and Upset	9	$1.2 S_h$	2300	47	1.9	
		18000	4393			
Emergency	9	$1.8 S_h$	2900	47	1.9	
		27000	4742			
Faulted	9	$2.4 S_h$	2400	47	1.9	
		36000	4742			
Normal and Upset	10	S_A	800	47	1.9	
		22500	1638			
Normal and Upset	11	$S_A + S_h$	2830	47	1.9	
		37500	5377			

Checking Method #

- 1 Line-by-line checking
- 2 Alternative Calculation Results compared
- 3 Identical Calculation Results compared
- 4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 33

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/12/84								
Checker	JAC	8/12/84								

Problem AB-1-60

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1959	1	1.9	
		15000	3722			
Normal and Upset	9	$1.2 S_h$	2082	1	1.9	
		18000	3956			
Emergency	9	$1.8 S_h$	2101	1	1.9	
		27000	4106			
Faulted	9	$2.4 S_h$	2101	1	1.9	
		36000	4106			
Normal and Upset	10	S_A	1181	1	1.9	
		22500	2244			
Normal and Upset	11	$S_A + S_h$	3140	1	1.9	
		37500	5966			

Checking Method #

1. Line-by-line checking
 2. Alternative Calculation Results compared
 3. Identical Calculation Results compared
 4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 34

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	S-C	8/12/64								
Checker	SWH	6/22/69								

Problem AB-1-60

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1754	48	1.9	
		15000	3713			
Normal and Upset	9	$1.2 S_h$	2060	48	1.9	
		18000	3929			
Emergency	9	$1.8 S_h$	3157	48	1.9	
		27000	4098			
Faulted	9	$2.4 S_h$	3157	48	1.9	
		36000	4098			
Normal and Upset	10	S_A	1260	48	1.9	
		22500	2405			
Normal and Upset	11	$S_A + S_h$	3020	48	1.9	
		37500	6118			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 35

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	JAC	8/12/84								
Checker	PHM	8/17/84								

Problem AB-1-60

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2017	1541	1.9	
		15000	3832			
Normal and Upset	9	$1.2 S_h$	2292	1541	1.9	
		18000	4355			
Emergency	9	$1.8 S_h$	2486	1541	1.9	
		27000	4723			
Faulted	9	$2.4 S_h$	2486	1541	1.9	
		36000	4723			
Normal and Upset	10	S_A	2419	1541	1.9	
		22500	4587			
Normal and Upset	11	$S_A + S_h$	4432	1541	1.9	
		37500	8421			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 36

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JNC	8/12/84								
Checked	J/WH	8/27/84								

Problem AB-1-60

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2583	174	1.9	
		15000	4908			
Normal and Upset	9	$1.2 S_h$	3990	174	1.9	
		18000	7581			
Emergency	9	$1.8 S_h$	4885	174	1.9	
		27000	9282			
Faulted	9	$2.4 S_h$	4885	174	1.9	
		36000	9282			
Normal and Upset	10	S_A	3484	174	1.9	
		22500	6620			
Normal and Upset	11	$S_A + S_h$	6000	174	1.9	
		37500	11525			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 37

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared by	JAC	8/15/84								
Checked by	JGDM	8/15/84								

Problem - AB-1-61A-2

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2728	1	1.9	
		15000	5103			
Normal and Upset	9	$1.2 S_h$	3010	1	1.9	
		18000	5719			
Emergency	9	$1.8 S_h$	3065	1	1.9	
		27000	5824			
Faulted	9	$2.4 S_h$	3065	1	1.9	
		36000	5824			
Normal and Upset	10	S_A	349	1	1.9	
		22500	758			
Normal and Upset	11	$S_A + S_h$	3107	1	1.9	
		37500	5941			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 38

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	A-C	8/15/84								
Checker	S/G/A/A	8/22/84								

Problem AB-1-61A-2

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1924	24	1.9	
		15000	3656			
Normal and Upset	9	$1.2 S_h$	2067	24	1.9	
		18000	3927			
Emergency	9	$1.8 S_h$	2006	24	1.9	
		27000	3982			
Faulted	9	$2.4 S_h$	2006	24	1.9	
		36000	3982			
Normal and Upset	10	S_A	468	24	1.9	
		22500	809			
Normal and Upset	11	$S_A + S_h$	2392	24	1.9	
		37500	4545			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 39

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JAC	8/12/84								
Checker	JWm	4/11/84								

Problem AB-1-610

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	2433	462	1.9	
		15000	4623			
Normal and Upset	9	$1.2 S_h$	2702	462	1.9	
		18000	5134			
Emergency	9	$1.8 S_h$	2830	462	1.9	
		27000	5377			
Faulted	9	$2.4 S_h$	2830	462	1.9	
		36000	5377			
Normal and Upset	10	S_A	288	462	1.9	
		22500	547			
Normal and Upset	11	$S_A + S_h$	2720	462	1.9	
		37500	5168			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 40

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #										
Preparer	JAC	8/16/84								
Checker	JH/A	8/17/84								

Problem AB-2-62D

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	782	2103	1.9	
		15000	1486			
Normal and Upset	9	$1.2 S_h$	2540	2103	1.9	
		18000	4826			
Emergency	9	$1.8 S_h$	2746	2103	1.9	
		27000	5217			
Faulted	9	$2.4 S_h$	2746	2103	1.9	
		36000	5217			
Normal and Upset	10	S_A	122	2103	1.9	
		22500	232			
Normal and Upset	11	$S_A + S_h$	405	2103	1.9	
		37500	1720			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Interim Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 41

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared by	JAC	8/15/64								
Checked by	DJH	8/21/64								

Problem AB-1-62F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	962	1296	1.9	
		15000	1828			
Normal and Upset	9	$1.2 S_h$	1221	1296	1.9	
		18000	2700			
Emergency	9	$1.8 S_h$	1829	1296	1.9	
		27000	3209			
Faulted	9	$2.4 S_h$	1629	1296	1.9	
		36000	3209			
Normal and Upset	10	S_A	1963	1296	1.9	
		22500	3730			
Normal and Upset	11	$S_A + S_h$	2925	1296	1.9	
		37500	5558			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 42

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	60C	8/15/84								
Checker	7/12/84	8/17/84								

Problem AB-1-63C/B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	905	1	1.9	
		15000	1720			
Normal and Upset	9	$1.2 S_h$	1057	1	1.9	
		18000	2008			
Emergency	9	$1.8 S_h$	1109	1	1.9	
		27000	2107			
Faulted	9	$2.4 S_h$	1109	1	1.9	
		36000	2107			
Normal and Upset	10	S_A	203	1	1.9	
		22500	386			
Normal and Upset	11	$S_A + S_h$	1108	1	1.9	
		37500	2105			

Checking Method #

- 1 Line-by-line checking
- 2 Alternating Calculation Results compared
- 3 Identical Calculation Results compared
- 4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 43

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	S=C	8/15/64								
Checked	H/S	8/22/64								

Problem AB-1-64A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	922	760	1.9	
		15000	1752			
Normal and Upset	9	$1.2 S_h$	1549	760	1.9	
		18000	2943			
Emergency	9	$1.8 S_h$	1704	760	1.9	
		27000	3238			
Faulted	9	$2.4 S_h$	1704	760	1.9	
		36000	3238			
Normal and Upset	10	S_A	1091	760	1.9	
		22500	2073			
Normal and Upset	11	$S_A + S_h$	2013	760	1.9	
		37500	3825			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment +
 Calculation Number 2323-EQ-SIF Sheet No. 44

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	AS-C	8/15/84								
Checker	N/A	8/22/84								

Problem AB-1-64F

Note: Stresses taken from node 1067

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1762	1068	1.9	
		15000	3348			
Normal and Upset	9	$1.2 S_h$	2037	1068	1.9	
		18000	3870			
Emergency	9	$1.8 S_h$	2202	1068	1.9	
		27000	4184			
Faulted	9	$2.4 S_h$	2202	1068	1.9	
		36000	4184			
Normal and Upset	10	S_A	1229	1068	1.9	
		22500	2335			
Normal and Upset	11	$S_A + S_h$	2991	1068	1.9	
		37500	5683			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 45

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	GOC	8/15/84								
Checker	JH	8/17/84								

Problem AB-1-64F

Note: Stresses taken from node 5037

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1877	5038	1.9	
		15000	3566			
Normal and Upset	9	$1.2 S_h$	2193	5038	1.9	
		18000	4167			
Emergency	9	$1.8 S_h$	2420	5038	1.9	
		27000	4598			
Fauited	9	$2.4 S_h$	2420	5038	1.9	
		36000	4598			
Normal and Upset	10	S_A	871	5038	1.9	
		22500	1655			
Normal and Upset	11	$S_A + S_h$	2748	5038	1.9	
		37500	5221			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 46

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	SAC	8/15/84								
Checker	W/111	8/15/84								

Problem AB-1-76A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	5276	500	1.9	
		15000	10024			
Normal and Upset	9	$1.2 S_h$	5680	500	1.9	
		18000	10792			
Emergency	9	$1.8 S_h$	5797	500	1.9	
		27000	11014			
Fluted	9	$2.4 S_h$	13602	500	1.9	
		36000	25844			
Normal and Upset	10	S_A	13943	500	1.9	
		22500	26492 *			
Normal and Upset	11	$S_A + S_h$	19219	500	1.9	
		37500	36516			

* Equation 10 exceeded however, equation 11 is less than 37500 psi. Therefore, O.K.

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 47

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	5/15/84								
Checker	JFM	4/21/84								

Problem AB-1-76A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	3974	260	1.425	
		15000	4175			
Normal and Upset	9	$1.2 S_h$	6516	260	1.425	
		18000	7798			
Emergency	9	$1.8 S_h$	7597	260	1.425	
		27000	9838			
Faulted	9	$2.4 S_h$	19825	260	1.425	
		36000	26763			
Normal and Upset	10	S_A	14131	260	1.9	
		22500	26849*			
Normal and Upset	11	$S_A + S_h$	18106	260	1.9	
		37500	31024			

Equation 10 exceeded however, equation 11 is less than 37500 psi. Therefore O.K.

Pressure stress = 3500 psi

$E_{11} = E_{18} + E_{10}$

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 48

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/10/84								
Checker	AKM	8/21/84								

Problem AB-1-80B
 Note: Stresses taken from node 5908

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	4059	5905	1.9	
		15000	7712			
Normal and Upset	9	$1.2 S_h$	4032	5905	1.9	
		18000	8801			
Emergency	9	$1.8 S_h$	4722	5905	1.9	
		27000	8972			
Faulted	9	$2.4 S_h$	4722	5905	1.9	
		36000	8972			
Normal and Upset	10	S_A	1092	5905	1.9	
		22500	3215			
Normal and Upset	11	$S_A + S_h$	5752	5905	1.9	
		37500	10929			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 49

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SC	2/15/24								
Checker	0/21	2/22/24								

Problem AB-1-BBC

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1179	1	1.9	
		17800	2240			
Normal and Upset	9	$1.2 S_h$	2348	1	1.9	
		21360	4461			
Emergency	9	$1.8 S_h$	2573	1	1.9	
		32040	4889			
Faulted	9	$2.4 S_h$	2573	1	1.9	
		42720	4889			
Normal and Upset	10	S_A	3197	1	1.9	
		27950	6074			
Normal and Upset	11	$S_A + S_h$	4370	1	1.9	
		45750	8314			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 50

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/13/84								
Checker	NM	8/17/84								

Problem AB-1-88E

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	61	1	1.9	
		17800	2206			
Normal and Upset	9	$1.2 S_h$	2468	1	1.9	
		21360	4689			
Emergency	9	$1.8 S_h$	2745	1	1.9	
		32040	5216			
Faulted	9	$2.4 S_h$	2745	1	1.9	
		42720	5216			
Normal and Upset	10	S_A	2259	1	1.9	
		27950	6192			
Normal and Upset	11	$S_A + S_h$	4420	1	1.9	
		45750	8398			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 51

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/13/84								
Checker	Wm	8/23/84								

Problem AB-1-88E

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1194	409	1.9	
		17800	2269			
Normal and Upset	9	$1.2 S_h$	1941	409	1.9	
		21360	3688			
Emergency	9	$1.8 S_h$	2090	409	1.9	
		32040	3971			
Faulted	9	$2.4 S_h$	2090	409	1.9	
		42720	3971			
Normal and Upset	10	S_A	279	409	1.9	
		27950	1670			
Normal and Upset	11	$S_A + S_h$	2073	409	1.9	
		45750	3939			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 52

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/13/84								
Checker	HWm	8/22/84								

Problem AB-1-89

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1035	810	1.9	
		17800	1967			
Normal and Upset	9	$1.2 S_h$	1192	810	1.9	
		21360	2265			
Emergency	9	$1.8 S_h$	1227	810	1.9	
		32040	2331			
Faulted	9	$2.4 S_h$	1227	810	1.9	
		42720	2331			
Normal and Upset	10	S_A	1759	810	1.9	
		27950	3342			
Normal and Upset	11	$S_A + S_h$	2794	810	1.9	
		45750	5309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 53

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	2/13/84								
Checker	H/M	6/21/84								

Problem AB-1-B9

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Mode	S.I.F.	Description
Normal and Upset	8	S_h	1790	1	1.9	
		17800				
Normal and Upset	9	$1.2 S_h$	1363	1	1.9	
		21360	2590			
Emergency	9	$1.8 S_h$	1501	1	1.9	
		32040	2852			
Faulted	9	$2.4 S_h$	1501	1	1.9	
		42720	2852			
Normal and Upset	10	S_A	786	1	1.9	
		27950	1493			
Normal and Upset	11	$S_A + S_h$	1729	1	1.9	
		45750	3285			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 55

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/13/84								
Checker	J/m	8/22/84								

Problem AB-1-89

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	917	144	1.9	
		17800	1742			
Normal and Upset	9	$1.2 S_h$	1123	144	1.9	
		21360	2134			
Emergency	9	$1.8 S_h$	1178	144	1.9	
		32040	2238			
Faulted	9	$2.4 S_h$	1178	144	1.9	
		42720	2238			
Normal and Upset	10	S_A	1229	144	1.9	
		27950	2335			
Normal and Upset	11	$S_A + S_h$	2146	144	1.9	
		45750	4077			

Gibbs E Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 56

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	SAC	8/13/84								
Checker	Jess	4/17/89								

Problem AB-1-89

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	705	43	1.9	
		17800	1340			
Normal and Upset	9	$1.2 S_h$	1250	43	1.9	
		21360	2565			
Emergency	9	$1.8 S_h$	1508	43	1.9	
		32040	2865			
Faulted	9	$2.4 S_h$	1508	43	1.9	
		42720	2865			
Normal and Upset	10	S_A	735	43	1.9	
		27950	1397			
Normal and Upset	11	$S_A + S_h$	1440	43	1.9	
		45750	2736			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 57

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	E.C.	8/13/84								
Checker	N.M.	8/17/84								

Problem AB-1-89

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	665	222	1.9	
		17800	1264			
Normal and Upset	9	$1.2 S_h$	1275	222	1.9	
		21360	2423			
Emergency	9	$1.8 S_h$	1391	222	1.9	
		32040	2643			
Faulted	9	$2.4 S_h$	1391	222	1.9	
		42720	2643			
Normal and Upset	10	S_A	427	222	1.9	
		27950	811			
Normal and Upset	11	$S_A + S_h$	1091	222	1.9	
		45750	2073			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 58

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	J=C	8/13/84								
Checker	J/m	8/22/84								

Problem AB-1-90

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	802	117	1.9	
		18400	1524			
Normal and Upset	9	$1.2 S_h$	895	117	1.9	
		22080	1701			
Emergency	9	$1.8 S_h$	939	117	1.9	
		33120	1784			
Faulted	9	$2.4 S_h$	939	117	1.9	
		44160	1784			
Normal and Upset	10	S_A	890	117	1.9	
		28100	1691			
Normal and Upset	11	$S_A + S_h$	1692	117	1.9	
		46500	3215			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 59

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	SOC	8/13/84								
Checker	Wm	8/21/84								

Problem AB-1-90

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	799	84	1.9	
		18400	1518			
Normal and Upset	9	$1.2 S_h$	958	84	1.9	
		22080	1820			
Emergency	9	$1.8 S_h$	1013	84	1.9	
		33120	1925			
Faulted	9	$2.4 S_h$	1013	84	1.9	
		44160	1925			
Normal and Upset	10	S_A	1120	84	1.9	
		28100	2128			
Normal and Upset	11	$S_A + S_h$	1918	84	1.9	
		46500	3644			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 60

Revision	Original Date	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	SAC	2/13/84								
Checker	J/M	6/22/84								

Problem AB-1-92A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	804	588	1.9	
		17200	1528			
Normal and Upset	9	$1.2 S_h$	904	588	1.9	
		20640	1718			
Emergency	9	$1.8 S_h$	947	588	1.9	
		30960	1799			
Faulted	9	$2.4 S_h$	947	588	1.9	
		41280	1799			
Normal and Upset	10	S_A	1873	588	1.9	
		27800	3559			
Normal and Upset	11	$S_A + S_h$	2677	588	1.9	
		45000	5086			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint + S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 61

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/13/84								
Checker	GAH	4/5/84								

Problem AB-1-93A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1156	387	1.9	
		17800	2196			
Normal and Upset	9	$1.2 S_h$	7409	387	1.9	
		21360	14077			
Emergency	9	$1.8 S_h$	8953	387	1.9	
		32040	17011			
Faulted	9	$2.4 S_h$	8953	387	1.9	
		42720	17011			
Normal and Upset	10	S_A	478	387	1.9	
		27950	908			
Normal and Upset	11	$S_A + S_h$	1635	387	1.9	
		45750	3107			

Checking Method #

1 Line-by-line checking
 2 Alternative Calculation Results compared
 3 Identical Calculation Results compared
 4 Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF

Sheet No. 62

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	2/13/84								
Checker	JAC	6/27/84								

Problem AB-1-93A

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1233	433	1.9	
		17800	2343			
Normal and Upset	9	$1.2 S_h$	7858	433	1.9	
		21360	14930			
Emergency	9	$1.8 S_h$	1085	433	1.9	
		32040	17262			
Faulted	9	$2.4 S_h$	9085	433	1.9	
		42720	17262			
Normal and Upset	10	S_A	1476	433	1.9	
		27950	2804			
Normal and Upset	11	$S_A + S_h$	2708	433	1.9	
		45750	5145			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 63

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method 1	1									
Prepared	JAC	2/15/84								
Checker	WJH	2/21/84								

Problem AB-1-95

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Note	S.I.F.	Description
Normal and Upset	8	S_h	1092	70	1.9	
		15000	2075			
Normal and Upset	9	$1.2 S_h$	1890	70	1.9	
		18000	3591			
Emergency	9	$1.8 S_h$	2078	70	1.9	
		27000	3948			
Faulted	9	$2.4 S_h$	2078	70	1.9	
		36000	3948			
Normal and Upset	10	S_A	3456	70	1.9	
		22500	6566			
Normal and Upset	11	$S_A + S_h$	4548	70	1.9	
		37500	8641			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 64

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared by	JAC	8/16/84								
Checked by	WCH	8/22/84								

Problem AD-1-150F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1972	1	1.9	
		18760	3758			
Normal and Upset	9	$1.2 S_h$	2575	1	1.9	
		22512	4893			
Emergency	9	$1.8 S_h$	2836	1	1.9	
		33768	5388			
Faulted	9	$2.4 S_h$	2836	1	1.9	
		45024	5388			
Normal and Upset	10	S_A	1444	1	1.9	
		28190	2744			
Normal and Upset	11	$S_A + S_h$	3422	1	1.9	
		46950	6502			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment +

Calculation Number 2323-EQ-SIF Sheet No. 65

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JAC	2/16/84								
Checker	JPM	2/15/84								

Problem AB-1-150F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		18760	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		22512	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		33768	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		45024	2309			
Normal and Upset	10	S_A	0	17	1.9	
		28190	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		46950	2309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 66

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	WAC	8/16/84								
Checker	WAC	8/22/84								

Problem AB-2-150F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1972	1	1.9	
		18760	3747			
Normal and Upset	9	$1.2 S_h$	2702	1	1.9	
		22512	5134			
Emergency	9	$1.8 S_h$	2940	1	1.9	
		33768	5586			
Faulted	9	$2.4 S_h$	2940	1	1.9	
		45024	5586			
Normal and Upset	10	S_A	1197	1	1.9	
		28190	2274			
Normal and Upset	11	$S_A + S_h$	3169	1	1.9	
		46950	6021			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 67

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	JAC	8/16/89								
Checked	JAC	8/27/89								

Problem AB-2-150F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		18760	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		22512	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		33768	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		45024	2309			
Normal and Upset	10	S_A	0	17	1.9	
		28190	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		46950	2309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 68

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/16/94								
Checker	JAC	8/23/94								

Problem AB-1-150H

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1770	1	1.9	
		17200	3743			
Normal and Upset	9	$1.2 S_h$	2698	1	1.9	
		20640	5126			
Emergency	9	$1.8 S_h$	2942	1	1.9	
		30960	5590			
Faulted	9	$2.4 S_h$	2942	1	1.9	
		41280	5590			
Normal and Upset	10	S_A	1169	1	1.9	
		27800	2221			
Normal and Upset	11	$S_A + S_h$	3140	1	1.9	
		45000	5966			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 67

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Design	1									
Prepared	JAC	8/16/84								
Checked	JAC	8/22/84								

Problem AB-2-150F

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		18760	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		22512	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		33768	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		45024	2309			
Normal and Upset	10	S_A	0	17	1.9	
		28190	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		46950	2309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 68

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer		8/16/84								
Checker		8/23/84								

Problem AB-1-150H

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1570	1	1.9	
		17200	3743			
Normal and Upset	9	$1.2 S_h$	2695	1	1.9	
		20640	5126			
Emergency	9	$1.8 S_h$	2942	1	1.9	
		30960	5590			
Faulted	9	$2.4 S_h$	2942	1	1.9	
		41280	5590			
Normal and Upset	10	S_A	1169	1	1.9	
		27800	2221			
Normal and Upset	11	$S_A + S_h$	3140	1	1.9	
		45000	5966			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Computer produced results compared

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 69

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared	J.C.	2/16/84								
Checker	M.M.	2/17/84								

Problem AB-1-150 H

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		17200	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		20640	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		30960	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		41280	2309			
Normal and Upset	10	S_A	0	17	1.9	
		27800	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		45000	2309			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare input and results of computer with corresponding input and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 70

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/16/84								
Checker	JFM	8/17/84								

Problem AB-1-150I

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1936	1	1.9	
		17200	3678			
Normal and Upset	9	$1.2 S_h$	2678	1	1.9	
		20640	5088			
Emergency	9	$1.8 S_h$	2729	1	1.9	
		30960	5565			
Faulted	9	$2.4 S_h$	2929	1	1.9	
		41280	5565			
Normal and Upset	10	S_A	1464	1	1.9	
		27800	2820			
Normal and Upset	11	$S_A + S_h$	3420	1	1.9	
		45000	6498			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 71

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/16/84								
Checker	gpa	8/28/84								

Problem AB-1-150I

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		17200	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		20640	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		30960	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		41280	2309			
Normal and Upset	10	S_A	0	17	1.9	
		27800	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		45000	2309			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 72

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/16/84								
Checker	Wm	8/22/84								

Problem AB-2-150 I

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1750	1	1.9	
		17200	3705			
Normal and Upset	9	$1.2 S_h$	2510	1	1.9	
		20640	4769			
Emergency	9	$1.8 S_h$	2747	1	1.9	
		30960	5219			
Faulted	9	$2.4 S_h$	2747	1	1.9	
		41280	5219			
Normal and Upset	10	S_A	1246	1	1.9	
		27800	2367			
Normal and Upset	11	$S_A + S_h$	3186	1	1.9	
		45000	6053			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 73

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	S-C	8/16/84								
Checker	2/2/2	8/21/84								

Problem AB-2-150 I

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		17200	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		20640	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		30960	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		41280	2309			
Normal and Upset	10	S_A	0	17	1.9	
		27800	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		45000	2309			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipm. +

Calculation Number 2323-EQ-SIF Sheet No. 74

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	SAC	8/16/84								
Checker	NPA	8/31/84								

Problem AB-1-150J

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1993	1	1.9	
		17200	3787			
Normal and Upset	9	$1.2 S_h$	2731	1	1.9	
		20640	5189			
Emergency	9	$1.8 S_h$	2969	1	1.9	
		30960	5641			
Faulted	9	$2.4 S_h$	2969	1	1.9	
		41280	5641			
Normal and Upset	10	S_A	1152	1	1.9	
		27800	2189			
Normal and Upset	11	$S_A + S_h$	3145	1	1.9	
		45000	5976			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 75

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	J-C	2/16/84								
Checker	Wen	2/16/84								

Problem AB-1-150 J

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		17200	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		20640	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		30960	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		41280	2309			
Normal and Upset	10	S_A	0	17	1.9	
		27800	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		45000	2309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI
 Subject Tapered Transition Joint S.I.F. A+ Equipment
 Calculation Number 2323-EQ-SIF Sheet No. 76

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	J.C.	8/16/89								
Checker	J.H. 2	8/23/89								

Problem AB-2-150J

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1970	1	1.9	
		17200	3743			
Normal and Upset	9	$1.2 S_h$	2533	1	1.9	
		20640	4813			
Emergency	9	$1.8 S_h$	2767	1	1.9	
		30960	5257			
Faulted	9	$2.4 S_h$	2767	1	1.9	
		41280	5257			
Normal and Upset	10	S_A	1192	1	1.9	
		27800	2265			
Normal and Upset	11	$S_A + S_h$	3163	1	1.9	
		45000	6010			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 77

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	gac	2/16/84								
Checker	WAP	2/17/84								

Problem AB-2-150J

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	1215	17	1.9	
		17200	2309			
Normal and Upset	9	$1.2 S_h$	1215	17	1.9	
		20640	2309			
Emergency	9	$1.8 S_h$	1215	17	1.9	
		30960	2309			
Faulted	9	$2.4 S_h$	1215	17	1.9	
		41280	2309			
Normal and Upset	10	S_A	0	17	1.9	
		27800	0			
Normal and Upset	11	$S_A + S_h$	1215	17	1.9	
		45000	2309			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 78

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/13/84								
Checker	JAC	8/22/84								

Problem AB-1-153

MAXIMUM STRESS RESULTS

Plant Condition	Equation	(1) Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	4871	1151	1.9	
		15000	9255			
Normal and Upset	9	$1.2 S_h$	5124	1151	1.9	
		18000	9736			
Emergency	9	$1.8 S_h$	5259	1151	1.9	
		27000	9992			
Faulted	9	$2.4 S_h$	11568	1151	1.9	
		36000	21979			
Normal and Upset	10	S_A	14451	1151	1.9	
		22500	27457 *			
Normal and Upset	11	$S_A + S_h$	19322	1151	1.9	
		37500	36712			

* Equation 10 exceeded however, equation 11 is less than 37500 psi. Therefore O.K.

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 79

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared by	SAC	8/16/84								
Checked by	W.A.	8/21/84								

Problem AB-1-156

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Mode	S.I.F.	Description
Normal and Upset	8	S_h	1683	698	1.9	
		15000	3198			
Normal and Upset	9	$1.2 S_h$	2256	698	1.9	
		18000	4286			
Emergency	9	$1.8 S_h$	2429	698	1.9	
		27000	4615			
Faulted	9	$2.4 S_h$	2429	698	1.9	
		36000	4615			
Normal and Upset	10	S_A	5067	698	1.9	
		22500	9627			
Normal and Upset	11	$S_A + S_h$	6749	698	1.9	
		37500	12823			

Checking Method #

1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of computer with corresponding inputs and results of similar codes

F-166, 7-82

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 80

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/16/84								
Checker	JAH	8/21/84								

Problem AB-1-170B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	296	238	1.9	
		15000	562			
Normal and Upset	9	$1.2 S_h$	296	238	1.9	
		18000	562			
Emergency	9	$1.8 S_h$	296	238	1.9	
		27000	562			
Faulted	9	$2.4 S_h$	296	238	1.9	
		36000	562			
Normal and Upset	10	S_A	0	238	1.9	
		22500	0			
Normal and Upset	11	$S_A + S_h$	296	238	1.9	
		37500	562			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. A+ Equipment

Calculation Number 2323-EQ-SIF Sheet No. 81

Revision	Original	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Prepared by	JAC	8/16/84								
Checked by	WJH	8/23/84								

Problem AB-1-178 B

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h	296	231	1.9	
		15000	562			
Normal and Upset	9	$1.2 S_h$	296	231	1.9	
		18000	562			
Emergency	9	$1.8 S_h$	296	231	1.9	
		27000	562			
Faulted	9	$2.4 S_h$	296	231	1.9	
		36000	562			
Normal and Upset	10	S_A	0	231	1.9	
		22500	0			
Normal and Upset	11	$S_A + S_h$	296	231	1.9	
		37500	562			

Gibbs & Hill, Inc. Job No. 2323-046 Client TUSI

Subject Tapered Transition Joint S.I.F. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 82

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/17/84								
Checker	HAM	8/22/84								

Conclusion:

The results of this calculation are acceptable and responsive to the purpose of this calculation

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760- 4438
Telex:
Domestic: 127636/968694
International: 428813/234475
A Dravo Company

Rec. 8/27/84

Distribution

N. Williams
L. Weingart
J. Minichiello
84042 PF

August 23, 1984

GTN-69368

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
MASS PARTICIPATION

REF 1: GTN-69316 DTD 8/3/84
REF 2: GTN-69339 DTD 8/10/84

With regards to the outlined plan of action in reference 1, attached is the supplement to the problem sample established in reference 2. Attached is a list of the additional sample (15 problems). Whether or not these 15 problems will be utilized is dependent upon the results of the first sample.

Should you have any questions, contact either Henry W. Mentel (x6302) or Steve Lim (x5212).

Very truly yours,

GIBBS & HILL, Inc.

Robert E. Ballard, Jr.

Robert E. Ballard, Jr.
Director of Projects

REBa-HWMe:lc
1 Letter + 1 Attachment
CC: ARMS (B&R Site) OL
D. Wade (TUSI Site) 1L
G. Grace (TUSI Site) 1L
N. Williams (CYGNA CA) 1L 1A
G. Bjorkman (CYGNA MA) 1L 1A

Dravo

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/27/84
LOG NO.:	# 79
FILE:	2-1-1 Inc. CR
CROSS:	2-1 Inc. CR Log

Attachment to GTN-69368

PROBLEM NUMBER	PIPE SIZE(S)	BUILDING(S) ¹	MF			CURVES ²	NUMBER OF SUPPORTS
			X	Y	Z		
AB-1-11C	6, 8, 10	S	.249	.123	.522	A	25
AB-1-29K	6	C	.186	.585	.195	A	15
AB-1-37B	6, 8, 10	C	.603	.182	.573	A	22
AB-1-45Q	3/4, 1-1/2, 2	RI	.202	.120	.272	A	18
AB-1-51C-1	3	S, A, C	.043	.157	.234	A	22
AB-1-52Z	1, 2	S, A, C	.625	.133	.155	A	34
AB-1-64A	12, 8, 6, 4	S	.430	.111	.186	A	51
AB-1-68V-1	10	S	.150	.635	.559	A	6
AB-1-86B	10	F	.497	.123	.156	A	5
AB-1-90	3, 4	A	.597	.189	.161	A	29
AB-1-92A	3, 4	S	.207	.120	.181	A	12
AB-1-96A	2	S	.265	.023	.118	A	9
AB-1-150I	3, 6	A	.451	.108	.174	A	2
AB-1-166C	1-1/2	S	.085	.002	.213	A	5
AB-1-174	3/4, 4	S, C	.604	.141	.334	A	8
							263

Notes

- S = Safeguards C = Containment RI = Reactor Internal Structure
A = Auxiliary F = Fuel
- A = Unrefined Response Spectra
B = Refined Response Spectra

Rec. 8/27/84

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127636/968694
International: 428813/234475
A Dravo Company

Distribution
J. Minichiello
N. Williams
L. Weingart
84042 PF

August 24, 1984

GTN-69373

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project

Gentlemen:

CYGNA	
JOB NO :	84042
DATE LOGGED:	8/27/84
LOG NO.:	#80
FILE:	2.1.1 Inc. log
CROSS REF. FILE	2.1 Inc. log

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
MASS PARTICIPATION

REF 1: GTN-69339 DTD 8/10/84
REF 2: GTN-69368 DTD 8/23/84

Attached for review by TUGCo Pipe Support Engineering (PSE) are the results of the Mass Participation Fraction Sensitivity Study for 15 of the problems from the referenced samples (14 from reference 1 and 1 from reference 2). These problems are as follows:

AB-1-88X	AB-1-71B	AB-1-165F
AB-1-19B	AB-2-52U	AB-1-166B
AB-1-27-1	AB-1-61F	AB-1-167E-1
AB-1-29U	AB-1-96C	AB-1-178B
AB-1-29Y	AB-1-156	AB-1-51C-1

Marked on the printouts attached are those support mark numbers which require PSE review. Note that only those supports identified with the mark numbers require review and that it is only these which see a load increase (Note - support called out regardless of the magnitude of the increase). The loads to be utilized by PSE from the printouts are those labeled "ZPA" next to "U" (Upset) and "E" (Emergency) to the right of each mark number.

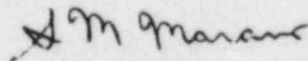
Dravo

August 24, 1984

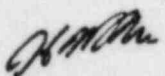
Based upon a cursory review, Gibbs & Hill feels that these load increases should not present a problem, however during the PSE review for design load margin if such is not the case, Gibbs & Hill should be notified for the purpose of consideration of additional refinement. At the completion of the review it is requested that the attached printouts be returned along with PSE documentation verifying the acceptability of the load increases.

Very truly yours,

GIBBS & HILL, Inc.



Robert E. Ballard, Jr.
Director of Projects



REBa-HWMe:lc
1 Letter

CC: ARMS (B&R Site) OL
J. Finneran (TUSI Site) 1L + Printouts
D. Wade (TUSI Site) 1L
G. Grace (TUSI Site) 1L
~~N. Williams (CYGNA CA) 1L~~
G. Bjorkman (CYGNA MA) 1L

KLScheppel, MAVivirito, RWallard, HWMentel
SMalarano/O, TDHawkins/Hapinig, Outgoing

Slim

chler/CMJan, PTHuang,

REC'D 8/28/84

International: 428813/234475

A Dravo Company

August 10, 1984

GTN- 69339

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Manager

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
MASS PARTICIPATION
REF: GTN-69316 DATED 8-3-84

With regards to the outlined plan of action in the reference GTN, the initial problem sample (15 problems) has been performed. Attached is a listed of the problem numbers.

Note the following

- 1) Of the fifty (50) problems exhibiting a mass fraction under 10 percent (18X, 28Y, 4Z) there are 39 unique problems. From these 39, 15 were selected for the first sample.
- 2) These 15 problems cover a range of pipe sizes from 3/4 inch up to and including 24 inch.
- 3) The auxiliary, containment, fuel and safeguard buildings are considered; with all original analysis being performed with unrefined response spectra curves.
- 4) A total of 320 supports are contained in these 15 problems.

TRANSMITTED BY TELETYPE

8-10-84

Dravo

CYGNA	
JOB NO :	84042
DATE LOGGED:	8/28/84
LOG NO. :	#81
FILE:	2.1.1 Enc. CR
CROSS REF. FILE	2.1 Enc. CR log

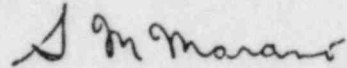
August 10, 1984

The next set of 15 problems is being prepared.

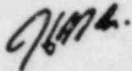
Should you have any questions, contact either Henry W. Mentel (x6302) or Steve Lim (x5218).

Very truly yours,

GIBBS & HILL, INC.



Robert E. Ballard, Jr.
Director of Projects



REBa-HWMe-SL:sce
1 Letter, 1 Attachment

cc: ARMS (B&R Site) OL
D. Wade (TUSI Site) 1L
D. Westbrook (TUSI Site) 1L
G. Bjorkman (CYGNA Ma) 1L, 1A
N. Williams (CYGNA Ca.) 1L, 1A
G. Grace (TUSI Site) 1L

Problem Number	Pipe Size(s)	Bldg(s) ¹	X	MF Y	Z	Curves ² A/B	Number of Supports
AB-1-88X	4	C	.373	.003	.547	A	5
AB-1-19B	4, 13, 1.5	C&S	.693	.071	.416	A	52
AB-1-27-17	16, 10, 6, 4	S	.818	.023	.717	A	46
AB-1-29U	6, 4	C	.170	.000	.328	A	46
AB-1-29Y	8, 6	C	.264	.010	.236	A	42
AB-1-71B	6	S	.355	.097	.600	A	10
AB-1-52U	2	A	.057	.082	.756	A	18
AB-1-61F	10	A	.020	.332	.198	A	7
AB-1-87C-1	10	F	.556	.099	.112	A	6
AB-1-96C	2	S	.240	.259	.045	A	9
AB-1-156	12	S	.356	.026	.284	A	5
AB-1-165F	3, 2, 3/4	S	.087	.000	.101	A	26
AB-1-166B	1.5	S	.099	.001	.217	A	5
AB-1-167E-1	24	S	.015	.208	.280	A	4
AB-1-178B	12, 6	A&C	.462	.058	.270	A	39
			5/18	12/28	1/4		320

Notes: 1) A= Auxiliary, C= Containment, F= Fuel, S= Safeguards

2) A= unrefined response spectra
B= refined response spectra

TEXAS UTILITIES GENERATING COMPANY

P. O. BOX 1002 · GLEN ROSE, TEXAS 76043

August 29, 1984

CYGNA Energy Services
101 California Street
Suite 1000
San Francisco, California 94111

Attention: Ms. Nancy Williams, Project Manager

Subject: Comanche Peak Steam Electric Station
Phase III Action Items.

Reference: 1) Phase III of the CYGNA Independent Assessment Program
2) TUGCO letter dated August 16, 1984, from J.B. George
(TUGCO) to N.H. Williams (CYGNA)

Dear Ms. Williams:

In reference 2, TUGCO committed to review and to provide a schedule of implementation for all recommendations proposed by CYGNA in Phase III of The Independent Assessment Program. These are provided below.

CYGNA Recommendations:

CYGNA suggested that the pipe stress group send all changes in support loads to the pipe support group.

TUGCO agrees that if any reanalysis or calculations are conducted by the Stress Analysis Group all load increases will be transmitted to Pipe Support Engineering. A change will be made to the 'as-built' procedure to ensure compliance.

CYGNA stated that pipe support designers note any simplifying assumptions when doing support designs.

TUGCO believes an engineer should list simplifying assumptions that are significant to the design of the support. The test of a well designed support is the capacity of the support to take the load, not the ease with which the design calculations can be followed. Nevertheless, we will reiterate to our engineering personnel the desirability of stating simplifying assumptions in the calculations.

CYGNA	
JOB NO :	84042
DATE LOGGED :	8/31/84
LOG NO. :	#82
FILE :	2.1.1 Bric. Cr
CROSS REF. FILE	2.1 Bric. Cr Log

Distribution
N. Williams
J. Minichiello
L. Weingart
C. Wong
84042 PF
G. Bjorkman
N. Williams

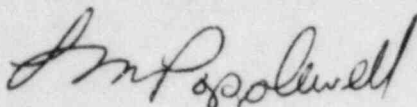
NOTED AUG 31 1984

In addition to the above comments CYGNA had suggested making changes to six hanger drawings. All of the changes suggested except one had discrepancies of such a minor nature that no changes were deemed warranted. (The change was completed for drawing MS-1-002-004-C72K.)

If there are any questions with the above recommendations, please contact Ms. J. Van Amerongen at (817) 897-4881, ext. 500.

Very truly yours,

Texas Utilities Generating Co.
Engineering Division

A handwritten signature in cursive script, appearing to read "L.M. Popplewell".

L.M. Popplewell
Project Engineering Manager

CC: J.C. Finneran
H. Harrison
D. Wade
J. Van Amerongen
H. Mentel

LMP/GG/bh

TEXAS UTILITIES GENERATING COMPANY

P. O. BOX 1002 · GLEN ROSE, TEXAS 76043

CYGNA		102
JOB NO :	84042	August 16, 1984
DATE LOGGED:	9/12/84	
LOG NO.:	#85	
FILE:	2.1.1 Enc. CR	
CROSS REF FILE	2.1 Enc. CR log	

CYGNA Energy Services
101 California St.
Suite 1000
San Francisco, California 94111

LOG NO.:

FILE:

CROSS REF FILE

Attention: Ms. Nancy Williams, Project Manager

Subject: Comanche Peak Steam Electric Station
CYGNA Phase III
Independent Assessment Program

Distribution

N. Williams

M. Shulman

J. Minichillo

C. Wong

J. Weingart

84042 PF

Dear Ms. Williams:

TUGCO has reviewed the CYGNA Phase III Independent Assessment Program Report and is providing the following general comments:

First, it is TUGCO's position that the Phase 3 review and resulting report should be independent of other CYGNA activities. Any reference in the Report to further CYGNA activity to be conducted as part of the Phase IV review is inappropriate. These are two separate phases with independently defined activities. The documents that result should be comprehensive of the activities that were conducted for each phase (or previous phases), not activities that will or may be conducted. All references in the Phase III Report to Phase IV should, therefore, be deleted. Moreover, CYGNA's reference to TUGCO's objectives in conducting an Independent Assessment Program, and references to SIT or CAT reviews, are outside the scope of CYGNA's evaluation. TUGCO's position is that all discussions relating to the program objectives should be limited to the objectives of the Phase III Report only.

Second, the report does not present a consistent position regarding CYGNA's "programmatic" findings. CYGNA states on page 1-5, "Except as reflected in the PFR's, CYGNA did not detect any type of a programmatic breakdown on the Comanche Peak Project." Then, in the conclusion, page 5-20, CYGNA repeats the statement from page 1-5 and also states, "CYGNA did not find any evidence of a programmatic breakdown at CPSES."

It appears CYGNA intends to state that they found no evidence of a "programmatic" breakdown at CPSES, although some isolated instances of potentially unsatisfactory technical judgements which require further analysis to resolve, were noted. The cited references should be revised to state clearly CYGNA's position.

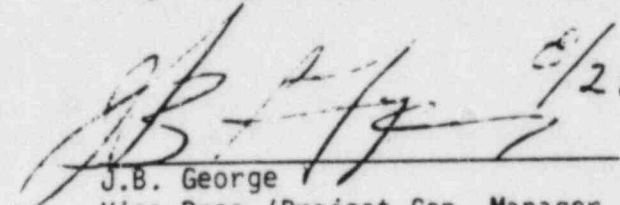
Third, in Appendix E, CYGNA did not specify which of its review criteria were TUGCO licensing commitments, which were developed by CYGNA based on requests or suggestions from the ASLB hearings or which were based on CYGNA's own judgement. The additional criteria (including those derived from the Walsh-Doyle allegations) which were not specifically part of the CPSES design criteria resulted in several "unsatisfactory" marks on the checklist. However, none of these unsatisfactory checks resulted in a potential finding and only four were raised to an observation of which two were considered isolated and one was not considered a valid observation. This indicates that CYGNA believes TUGCO's design practices resulted in acceptable designs, irrespective of their satisfaction of additional criteria which were

derived from the hearings. Accordingly, we recommend that CYGNA provide specific conclusions regarding the validity of the additional criteria resulting from the Walsh-Doyle allegations and the unsatisfactory checklist items that resulted from these additional criteria.

Finally, all recommendations proposed by CYGNA will be reviewed for appropriate action. The exact action to be taken and the schedule of implementation will be provided to CYGNA.

In addition to the above comments, a number of specific comments were identified during the review and are included in the attached list.

Very Truly Yours,

 9/28/84
J.B. George
Vice Pres./Project Gen. Manager

cc: David Wade
George Grace
Bill Horin
John Finneran
ARMS

JBG/GEG/jf

ATTACHMENT

<u>ITEM</u>	<u>(PAGE)</u>	<u>DESCRIPTION</u>
1.	(1-4)	The time period encompassed by the IAP indicated requires further clarification. Calculations and drawings for pipe supports, for example, were provided to CYGNA with dates that preceded 1980.
2.	(Exhibit 1.4) (6 of 8) (p. 5-8) (p. 5-19) (PS-02, Att. A, 1 of 1)	PS-02. The main steam supports that were identified with bumper supports that were considered unstable were those without cinched U-Bolts, that is support MS-002-003-C72R and MS-004-003-C72R, on stress problems AB-1-23B and AB-1-23D, respectively. TUGCO considers these support configurations isolated because there were only four of these type of supports in the plant. This concern is identified throughout this report.
3.	(4-4, Exhibit 4.4)	The quality assurance program reviewed was TUGCO's, not TUSI's.
4.	(5-6)	Reference to observation PI-00-01 is incorrect in this discussion of the pipe support review. PI-00-01 is a pipe stress observation, not a pipe support item.
5.	(5-13)	The sentence stating that "trending of the audits was performed by TUGCO on a quarterly basis" is unclear as to the exact action being considered. Reference should be made to Appendix G, not F.
6.	(Appendix C) (p. 13)	Item (d) did not include Mr. Wheaton as an affiant of this affidavit.
7.	(Appendix E) (5 of 19)	3.1. The correct code of record is ASME BPV Code section III, sub-section NF, 1974 Edition through Winter 1974 Addenda.
8.	(7 of 19)	No stiffness requirements must be met at CPSES in designing a class 2 and 3 pipe support. The applicable criterion is the 1/16" deflection guideline. The review criterion used here is not a requirement at CPSES and should be identified as an additional criterion that CYGNA developed. Furthermore, the criterion that was used is an acceptable industry standard.
9.	(7 of 19)	The criterion used at CPSES is that the allowable total diametrical gap for rigid frames is 1/8" plus or minus 1/16". In addition, the last sentence regarding proper thermal tolerances requires further clarification. It is unclear as to what CYGNA intends to state.

ITEM	(PAGE)	DESCRIPTION
10.	(8 of 19)	4.1.5-At CPSES, the criteria for rod hangers is that the maximum swing angle is equal to or less than 5°. Offsetting of the hanger is done to accommodate the pipe movement if the swing angle exceeds 5°, not if the total movement of the pipe is two inches.
11.	(8 of 19)	4.1.6-For snubbers, offsetting is done to accommodate pipe movement if the swing angle exceeds 5°, not if the total movement of the pipe is two inches. Midpoint of thermal travel is not required to be at the midpoint of the snubbers total travel.
12.	(11 of 19)	4.2-CYGNA states that the friction load is the product of a friction factor and the dead and thermal loads, but cannot be less than the dead load. TUGCO disagrees with this statement because the product can be lower than the dead load. Loads generated by thermal expansion include temperatures from maximum and minimum operating conditions, not the normal operating temperatures as CYGNA has stated.
13.	(Appendix G) (PS-01, 1 of 1)	Attachment E should read EE.
14.	(PS-08) (1 of 1)	The requirement that is referred in this observation is not part of the committed to ASME Code '74 Edition through Winter '74 Addenda.
15.	(Appendix J) (Note 1)	CYGNA states that TUGCO and NPSI committed to reviewing each welded attachment analysis against final pipe support loads. The commitment made in item 3 of the June 8th Telecon is not being done as a result of a CYGNA request, but rather as part of the normal design practice performed by NPSI. (Note, the referenced communication report is in error.)
16.	(Note 12)	Typographical error in item (d) which reads 'T=1.45"', it should be 'T=1.25"'.
17.	(PS-05)	#25. Unsatisfactory is marked without explanation as to why the MS-46A specification was not met.
18.	(PS-024) (2 of 10)	#4. Gaps considered unsatisfactory, but no explanation was provided.
19.	(PS-036)	#4. Gap considered unacceptable without explanation.
20.	(3 of 10)	#6, #7, and #8. Support is a rigid support. These items are criteria for spring supports, rod hangers and snubbers and should be marked "N/A".

ITEM	(PAGE)	DESCRIPTION
21.	(PS-069) (1 of 10)	#2. This support is considered stable without "bumpers" since the U-Bolts are cinched. See comment 2.
22.	(PS-070) (1 of 9)	#2. This support does not have "bumpers", therefore, there would not be any calculations for the "bumper" portion.
23.	(PS-071) (8 of 10)	#21. Engineers were directed to decrease the section properties by 5%, not increase them. All 12 effected supports were reviewed and are satisfactory.
24.	(PS-080) (2 of 8)	#4. Gap accommodation for thermal and seismic movements in the unrestrained direction is not applicable to a trapeze support. CYGNA has marked this criterion as unsatisfactory without an explanation.
25.	(PS-081) (9 of 9)	#24. Unsatisfactory mark indicated without explanation regarding whether the appropriate buckling lengths was used in the calculation.
26.	(PS-083) (10 of 10)	#25. Item 25 explanation refers back to itself.
27.	(PS-087) (2 of 10)	#1. Sketch is accurate. Plan elevation is center-line of pipe.
28.	(PS-089) (4 of 9)	#10. U-Bolt was satisfactory in accordance with ITT-DRS-137S which is an acceptable method for qualifying the U-Bolt.
29.	(PS-099) (1 of 8)	#2. U-Bolts are cinched; therefore, bumpers are not required for stability. See comment 2.
30.	(PS-099) (5,6, of 8)	#14, #15. These items regarding standard embedments and support attachments were considered unsatisfactory and the comments referenced Item 1 which stated that a higher applied load was used for design, a conservative assumption, please provide appropriate explanation of these unsatisfactory marks.
31.	(PS-100) (1 of 9)	#1. Attachment 1 is part of an NCR and is used only as a reference document in the calculations. There are actually two welds 2-3/4" long, so the designer used a 5" weld length as a conservative input for the calculation.
32.	(PS-106) (7 of 9)	#18. No explanation of unsatisfactory mark regarding inclusion of inertia loads.

<u>ITEM</u>	<u>(PAGE)</u>	<u>DESCRIPTION</u>
33.	(PS-106) (7 of 9)	#20. Stiffness is not required to be determined for a spring support.
34.	(PS-107) (7 of 8)	Typographical error: checks are not aligned correctly.
35.	(8 of 8)	#24. Typographical error: checks are not aligned correctly.
36.	(PS-115) (5 of 9)	#11. Hilti-bolt was qualified with a factor of safety of 4.8, not 4.0.

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127832/968994
International: 428813/234475
A Drive Company

NOTED SEP 17 1984

September 14, 1984

GTN- 69454

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
MASS PARTICIPATION

REF 1: CYGNA LTR 84042.016 DTD 8/25/84
REF 2: GTN-69316 DTD 8/3/84
REF 3: GTN-69279 DTD 7/20/84

By copy of this letter to Nancy Williams of CYGNA Energy Services, please find attached the plan of action for the review of the overall effect of low mass participation fractions. This plan was verbally discussed with Nancy Williams on Friday, September 7, 1984.

Should you have any questions, call this office.

Very truly yours,

GIBBS & HILL, Inc.

R. E. Ballard, Jr.

Robert E. Ballard, Jr.
Director of Projects

HW
RES:-HWM:lc
1 Letter

CC: ARMS (B&R Site) OL 1A
D. Wade (TUSI Site) 1L 1A (telecopied)
R. Iotti (Ebasco NY) 1L 1A
N. Williams (CYGNA CA) 1L 1A
G. Bjorkman (CYGNA MA) 1L 1A
H. Levin (ENERA Md) 1L 1A (telecopied)

Approved

M. A. Vivirito
M. A. Vivirito
VP Power Engineering

Dravo

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9/20/84
#86
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2.1 inc. CR Log

Distribution

N. Williams

J. Minichiello

84042 PF

M. Shulman

SEISMIC ANALYSIS OF PIPING
EFFECT OF HIGHER ORDER MODES/MASS PARTICIPATION

Plan of action for review of the overall effect of low mass participation fractions.

Based upon CYGNA's response (CYGNA letter 84042.016 dated August 25, 1984) to Gibbs & Hill's revised mass participation fraction sensitivity study (outlined in G&H letter GTN-69316 dated August 3, 1984) Gibbs & Hill has elected to revise its plan of action, with various expansions in detail and scope, as detailed below.

The pertinent facets of the plan are:

- A) That, as opposed to a sampling approach, Gibbs & Hill intends to perform a full scale evaluation of all of the large bore piping stress analyses originally in Gibbs & Hill's scope of as-built analysis (272 stress problems)
- B) These 272 stress problems will be selectively screened and accounted for as detailed below.
- C) All subsequent analyses will be performed on Gibbs & Hill's IBM ADLPIPE Version D, which is automated to account for the effect of higher order modes (specifically the "ZPA" effect).

The detailed steps of the plan are as follows:

- 1) Evaluation of the sample of five (5) problems established in GTN-69176 (utilizing unrefined response spectra curves for comparison with the original as-built).
- 2) Based upon the results of these first five (5) problems, develop preliminary plots correlating percent increase in support loads with percent mass participation.
- 3) Completion of verification of Gibbs & Hill's IBM ADLPIPE Version D.
- 4) Expand the sample of five (5) with approximately 30 representative problems (essentially those established in GTN-69339 and 69368), including a full-range variation in mass participation, pipe size, geometry, location, etc.

- 5) Using the total sample of approximately 35 problems, finalize the load increase versus mass participation plots. Based upon consideration of this data and support margin information, criteria will be developed including parameters such as minimum mass necessary to include 90 percent of response, line sizes/support types with sufficient margins, margins due to other loads/load combination, to screen all large bore problems and identify candidate supports requiring additional review.
- 6) Those problems/supports identified as requiring additional review would be re-run using ADLIPIPE Version D to evaluate the significance of potential load changes (runs would be made utilizing the refined response spectra curves).
- 7) If potential problem supports are identified, further refinement is possible in the applicable response spectra, i.e., use of localized curves relative to the specific piping and piping support location, as opposed to floor elevation response spectra.

The above plan will answer the global question of the effect of low mass participation on piping supports since all piping stress problems and their related supports will either be screened out as not being a problem or be fully evaluated.

EBASCO SERVICES INCORPORATED

Two World Trade Center, New York, N.Y. 10048

Rec'd 8/11/84 **PROJECT FILE**
EBASCOSeptember 18, 1984
3-2-17 (6.2)
ETCY-1

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

Distribution
J. Minichello
M. Skulman
G. Bjorkman
W. Williams
84042 PF

Subject: Comanche Peak Steam Electric Station
U-Bolt Cinching Testing/Analyses Program-Phase 3 Open Items
Additional Information as follow-up to Meeting of 9/13/84

Reference: Letter 84042.015 from N.H. Williams to J.B. George dated August 23, 1984.

Dear Miss Williams:

Enclosed please find the information which we agreed to provide as follow-up to the meeting of 9/13/84 at the Ebasco offices in New York.

The information is provided in the form of three attachments.

Attachment A is a numerical example of how the stresses in Tables H, I, N and O of the Affidavit were obtained. This example was discussed during the meeting and provides an answer to question 1 of the Attachment to the referenced letter.

Attachment B is a summary table of the maximum element stresses obtained by the finite element analyses. The stresses are given for all load cases and for all specimens analyzed. This table is necessary to perform calculations such as that given in Attachment A for all other pipes/U-bolt specimens.

Attachment C is a copy of the friction test data handed out during the meeting, which is provided in reply to questions 14 and 15 of the Attachment to the referenced letter.

Finally, we would like to clarify an item in your question 12. For the 10" sch 40 stainless pipe u-bolt specimen, your referenced letter quoted a value of preload of 3606 which is very low for the applied torque of 100 ft. lbs. This value of preload was obtained from p. 66 of Attachment 1 to our Affidavit.

If you refer to p 64 and 65, articles 5.0 and 6.0 you will note that the creep test was performed right after the thermal cycling test without retorquing the

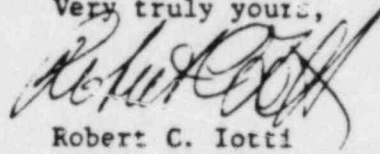
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u-bolt ie the u-bolt nut torques placed prior to the thermal cycling test were maintained at the beginning of the creep test. The torque corresponding to the value of 3606 lbs is therefore not 100 ft-lbs but whatever torque remained at the end of the thermal cycling test which was begun with 100 ft. lb torque. Therefore, the 3606 lb preload should not be included in the variation of preload with torque.

Please call if you have additional questions.

Very truly yours,



Robert C. Iotti
Chief Engineer Applied Physics

RCI:ab

cc: Mr. D. Wade (TUGCO)
Mr. J. Van Amerongen (Ebasco/TUGCO)
Mr. R. Ballard (G&H)
Mr. W.H. Horin (Bishop/Cook)
J. Finneran (TUGCO)
W. Lapay (Westinghouse)

ATTACHMENT A

1. Please provide a detailed numerical breakdown of how the stresses in Tables H, I, N and O of the Affidavit (reference 3) were obtained. The easiest way to show how the stress intensity is obtained is to refer to the figure VII-2 of Attachment 3 of the Affidavit which defines it as the maximum of either the absolute difference between the major principal stress or minor principal stress and zero, or the algebraic difference of the two principal stresses, and to apply this figure to an actual example. The example chosen is the 4" sch 160 pipe. For the elements having the largest circumferential and longitudinal stresses, the finite element analyses determined that the principal stresses are virtually identical to the circumferential and longitudinal stresses (see Attachment 3 of Affidavit at page 57). The longitudinal, circumferential, major and minor principal stresses for the highest stressed piping element of the 4" sch 160 pipe are given for both the inside and outside surfaces and for the maximum load case in the table of p. 58 of Attachment 3 to the Affidavit. These values are reported below:

	Long. stress(ksi)	Circum. Stress(ksi)	Princ. Stress (ksi)	
			Major	Minor
4" sch 160 inside	10.49	44.79	44.78	10.50
Outside	-26.65	-34.07	-26.63	-34.08

where the negative sign denotes compressive stresses.

A confirmation of the max. circumferential stress can be found in the table of page 71 of Attachment 3 of the Affidavit for element 627. Note that on that table, there is no distinction regarding the surface at which the maximum stresses occur. For instance, the 44.79 ksi tensile circumferential stress occurs on the inside surface, while the -26.65 ksi compressive longitudinal stress occurs on the outside surface of element 627. To the local stresses computed by the finite element analysis one must add the longitudinal equation 9 pressure and piping moment stresses. These are available from the table on page 56 of attachment 3 of the Affidavit.

They are:

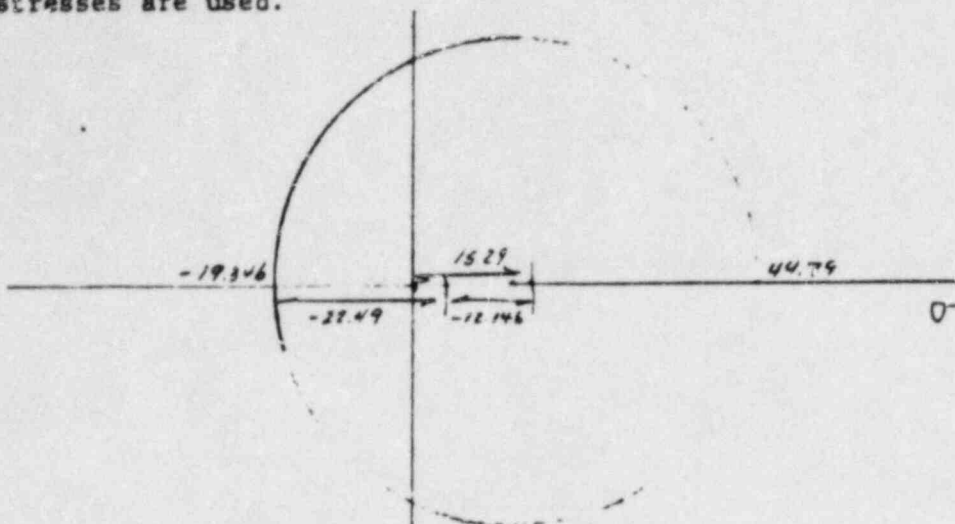
Longitudinal Pressure Stress	4.8 ksi
EQ. 9 Piping Moment stress	+ 12.146 ksi
EQ. 12 Piping Moment stress	+ 22.49 ksi

Adding the longitudinal pressure to the stresses previously tabulated we obtain:

Principal Stresses		
	Major (Circumferential)	Minor (Longitudinal)
4" sch 160 Inside	44.79	15.29
Outside	-34.07	-21.85

To add the piping moment stresses to the longitudinal (minor principal) stresses, we choose the sign which will produce the largest stress intensity.

This is seen in a Mohr circle depicted below, where inside surface stresses are used.



Thus the total stress intensity is given by $44.79 - (-19.346) = 64.136$ ksi, which is the total stress intensity given on page 59 of Attachment 3 of the Affidavit or in table H of page 60 of the Affidavit.

For comparison purposes the stress intensity derived for the outside surface is:

Maj. Princ. (Circumferential) stress = -34.07

Minor Princ. (Longitudinal) stress = $-26.63 + 4.8 + 12.146 + 22.49 = -56.466$

The max. stress intensity is thus 56.47 ksi.

Using the alternative signs would have produced a stress intensity of $34.07 + 12.8 = 47.5$ ksi which is lower.

As shown above, the highest stress intensity occurs on the inside surface.

To determine the primary and secondary stress intensities, several alternatives are available. The most straightforward determines the primary stress intensity from the principal primary stresses and derives the secondary stress intensity by subtraction of the primary from the total. For the example chosen we proceed as follows:

- (1) The secondary portion of the circumferential stress is obtained as the stress due to thermal expansion by subtracting the circumferential stress due to preload + thermal given on page 59 of Attachment 3 of the Affidavit as -39305 psi, from the circumferential stress due to preload alone, which is given in the preceeding page as -26091 psi. These occur on the outside surface. The primary circumferential stress becomes $-34.07 + 13.214 = -20.856$ ksi.

- (ii) The primary longitudinal stress is similarly derived by considering only the equation 9 piping moment stress, ie neglecting the equation 12 stress and subtracting the difference between the longitudinal stress due to preload + thermal and that due to preload only which equals -6.5 ksi. The longitudinal stress thus becomes $-21.85 - 12.146 + 6.5 = -27.496$ ksi.
- (iii) Thus the primary stress intensity is -27.5 ksi and the secondary stress intensity becomes $56.47 - 27.5 = 28.97$ ksi.

Similarly we obtain the primary and secondary stress intensities for the inside surface.

- (i) Primary circumferential $44.79 - 10.81 \approx 33.98$
(10.81 is difference between preload + thermal and preload only circumferential stresses for inside surface and these do not appear in any table, but are available from the computer output)
- (ii) Primary Longitudinal = $15.29 + 12.146 - 4.24 = 1.096$ where again 4.24 is the difference between the longitudinal stress due to preload + thermal and that due to preload only.

Please note that the primary stress intensity is thus 35.1 ksi instead of the value of 31.6 reported on page 59 of the Attachment 3 to the Affidavit.

- (iii) The secondary stress intensity then becomes

$$64.14 - 35.1 = 29.04 \text{ ksi instead of the } 32.54 \text{ ksi reported.}$$

The difference between the numbers occurred when inadvertently the outside secondary circumferential stress was subtracted from the inside total circumferential stress.

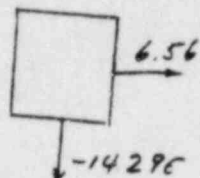
To explain the values appearing in Table N and O, we again will use an example and will employ the 4" sch 160 specimen as the example.

To determine the primary membrane portion of the U-bolt preload, push, and pressure stress, the stress state at the inside and outside of the pipe element surface is averaged. This stress state includes the mechanical longitudinal stresses due to the other (non-local loads).

As previously explained the primary circumferential stress on the outside surface is -20.856 ksi, and the corresponding primary circumferential stress on the inside surface is 33.98 ksi, with an average circumferential stress of 6.56 ksi.

The primary longitudinal stress on the outside surface is -27.496 ksi and that of the inside surface is -1.096 ksi, resulting in an average stress of -14.296 ksi.

The resulting stress intensity is then computed from the stressblock



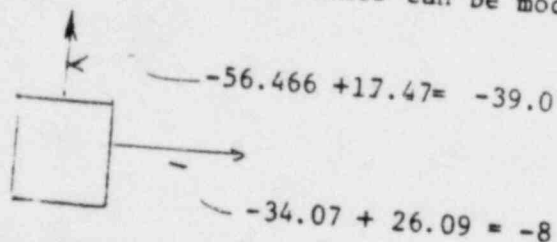
and hence is equal to 20.86

Round off errors in this calculation results in the difference from the 20.99 reported in table N.

The values listed in Table O are Equation 10 values and include primary plus secondary stress intensities derived on the basis that loads which are noncyclic in nature need not be considered. Thus the stress intensities derived previously for Table I are amended to subtract the portion of the stress that is due to preload.

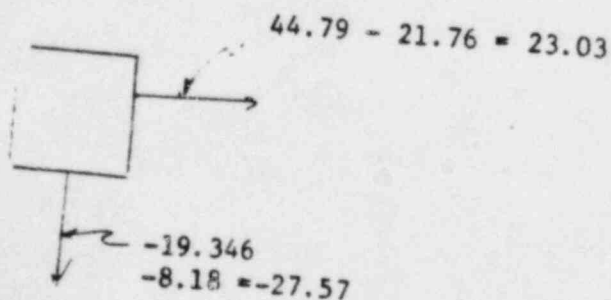
For the 4" sch 160 inside surface the circumferential and longitudinal stresses due to preload alone are given in the table on page 68 of Attachment 3 of the Affidavit as +21.76 ksi and +8.18 ksi respectively (for the outside face they are -26.091 and -13.47).

The stress block for the outside surface can be modified to read



With the stress intensity (eq. 10) being -39.0 ksi.

The stress block for the inside surface is then



ATTACHMENT B

Tabulation of Inside and Outside Surface
maximum stresses for all Load Cases

Loading stress used to develop the Attachment 1 stress
tables are listed below.

Load CASE	SURFACE	4" Ksi		10" 40S Ksi		10" 80 Ksi		32" 15 Ksi	
		Long	CIRC	Long	CIRC	Long	CIRC	Long	CIRC
Preload (P)	Inside	8.18	21.76	8.83	38.71	8.19	23.02	1.80	3.59
	Outside	-13.47	-26.01	-25.25	-48.53	-16.27	-29.89	-3.41	-4.92
P+THERMAL (TH)	Inside	12.42	32.57	11.16	48.08	8.74	27.05	8.35	15.57
	Outside	-19.97	-39.3	-33.22	-62.64	-19.41	-34.92	-14.81	-21.57
P+TH+PRESSURE (PR)	Inside	12.85	42.91	11.59	58.59	9.10	32.96	11.33	34.39
	Outside	-20.68	-31.41	-34.43	-54.65	-19.95	-30.86	-19.82	-15.53
P+TH+PR+Push	Inside	10.22	44.71	10.78	72.71	10.24	43.15	19.58	47.17
	Outside	-26.65	-34.07	-48.32	-73.46	-30.22	-44.38	-31.01	-34.10
REV NO	REV DATE	AUTHOR		DATE CHK'D BY		DATE CHK'D BY		DATE	

ATTACHMENT C

Subject: Friction Test Preload Data

Presented Below are the preloads measured at the torque values during the friction tests. Data represent the sum of preload in the two U-bolt legs. Use one-half of value indicated to approximate preload per leg.

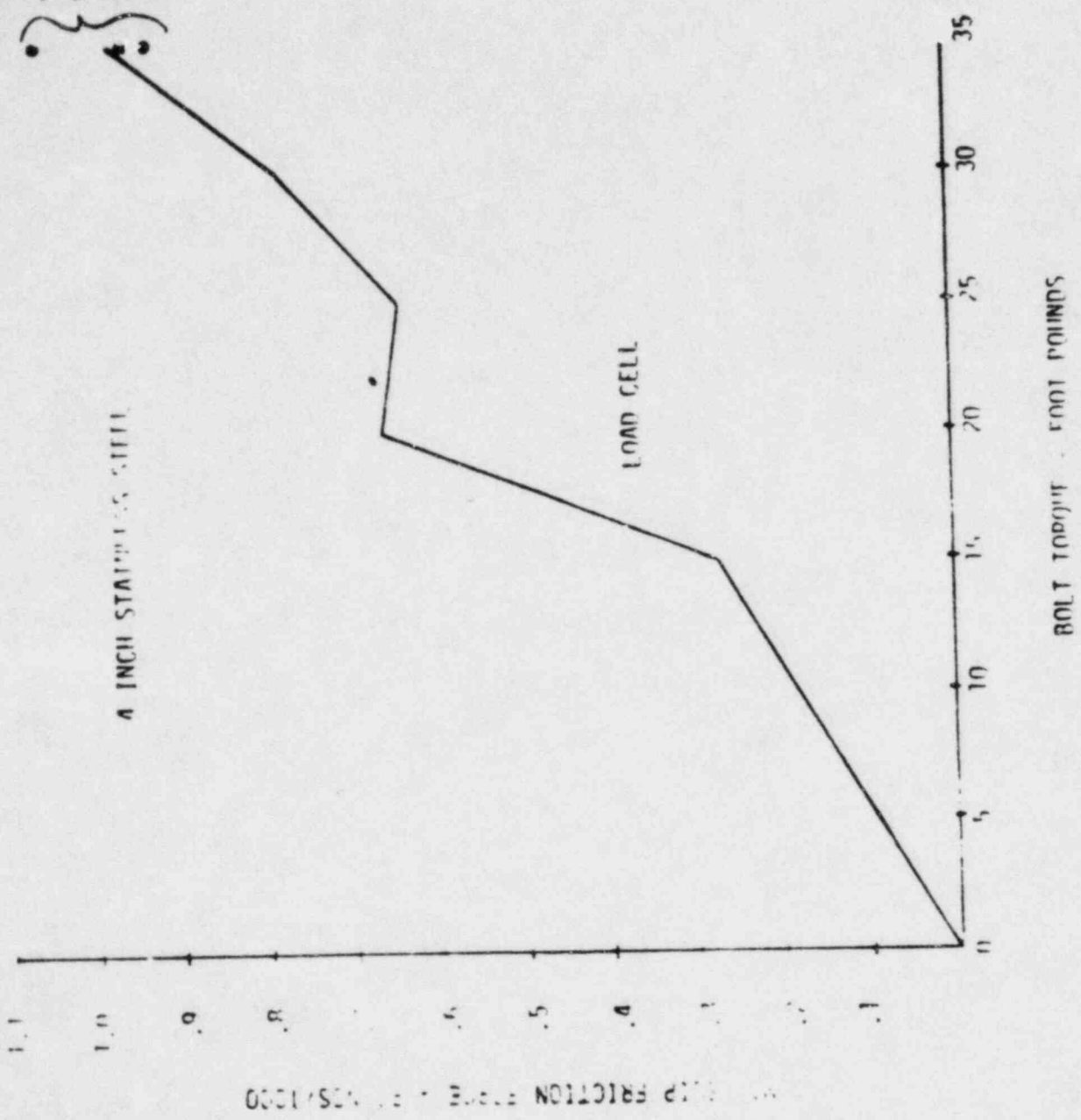
Thus the stress intensity equals 50.60 ksi. The value reported on Table 0 is 50.8 ksi.

10" SS

<u>TORQUE</u>	<u>PRELOAD</u>
10 ft-lb	1358 lb
20	2209
30	3459
40	4131
50	4804
60	6661
70	8743
80	9448
90	9736
100	10920
110	12458
120	13354
130	15373
130	16654
130	17934

32" CS

<u>TORQUE</u>	<u>PRELOAD</u>
40 ft-lb	736 lb
60	603
100	1981
120	1507
140	2583
180	3618
200	6503
220	7493
240	8785
700	28422
1170	34019



THREE TESTED VALUES.
 PLAT INDICATES THE
 AVERAGE.

FIGURE 9

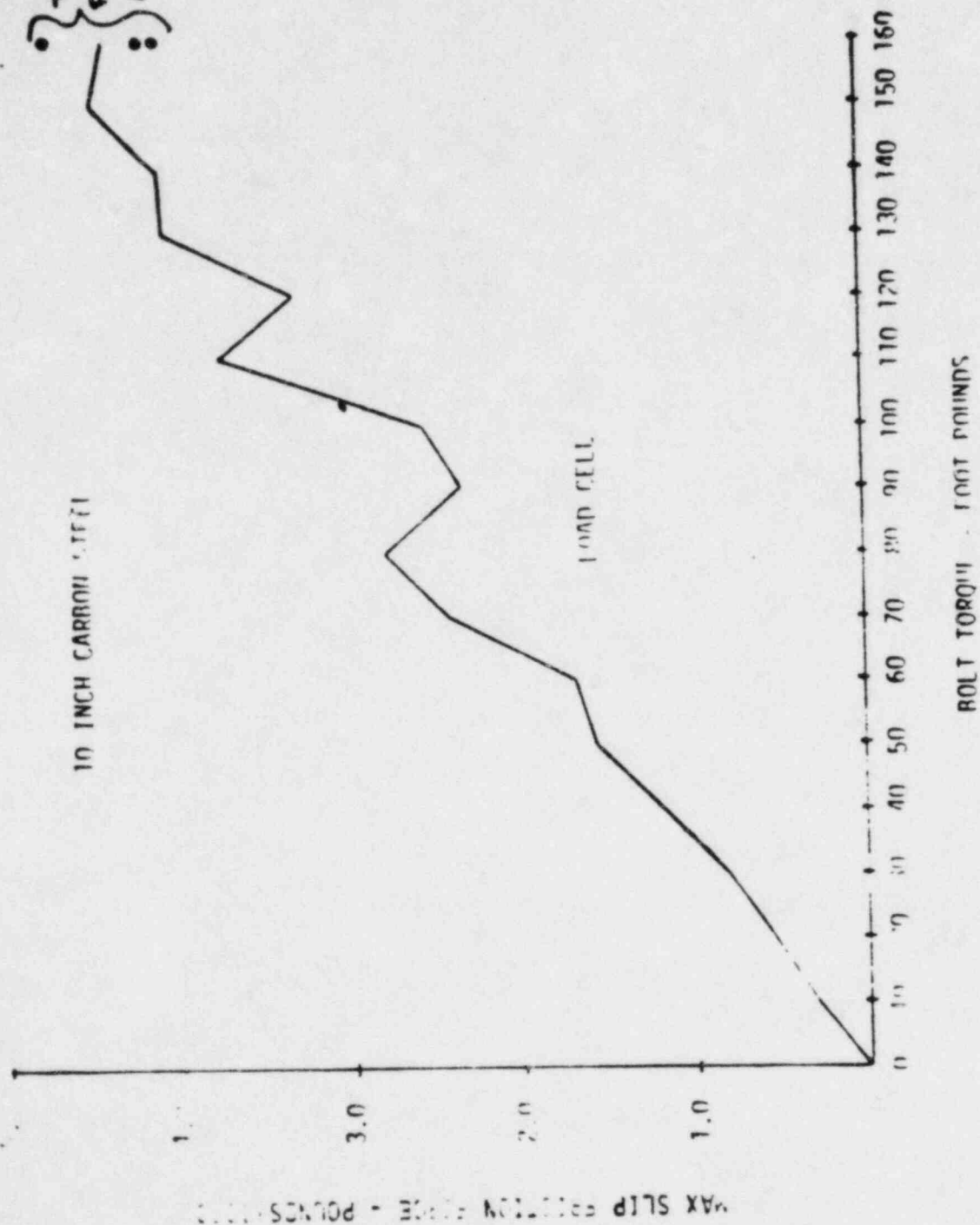


FIGURE 10

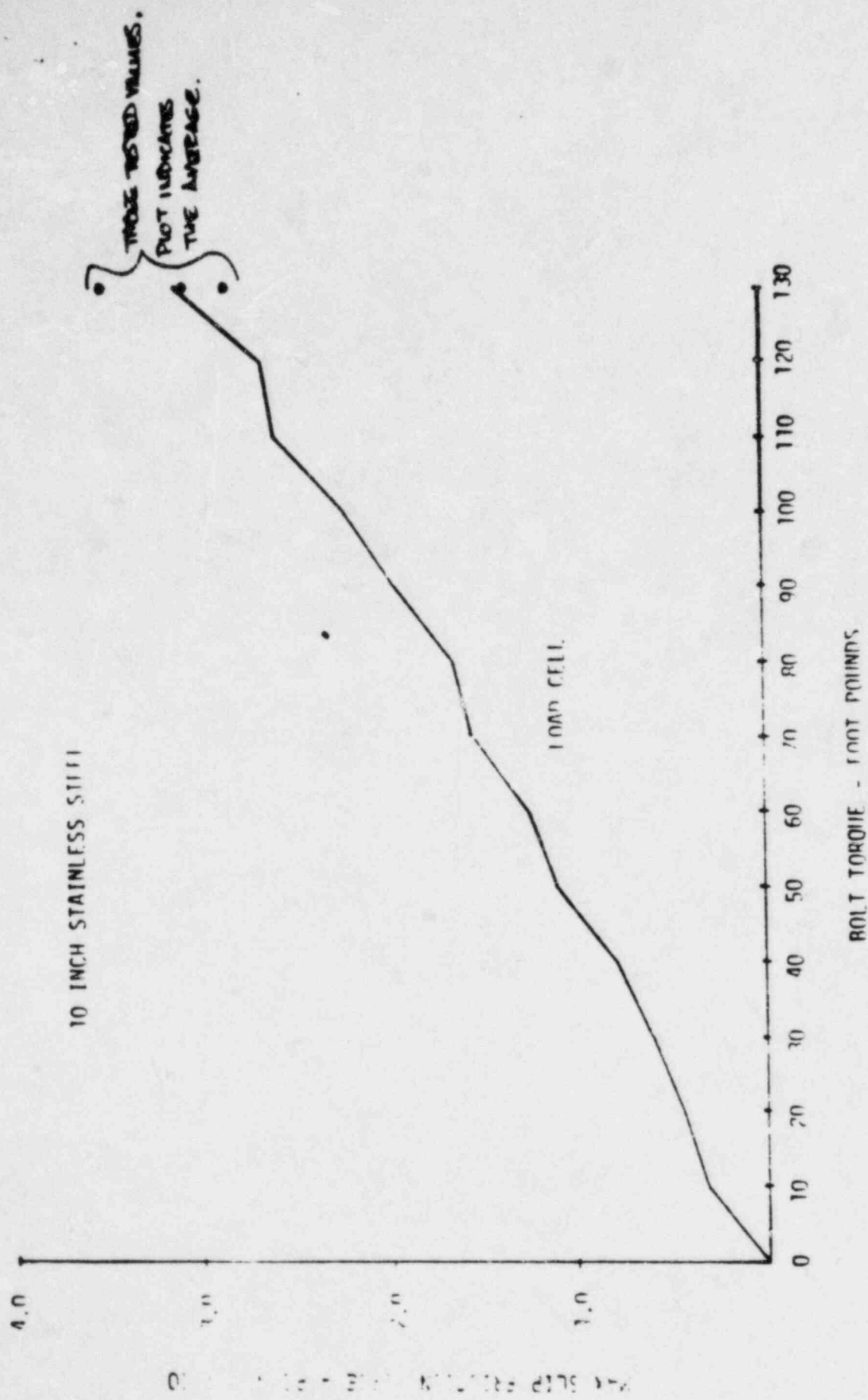


FIGURE 11

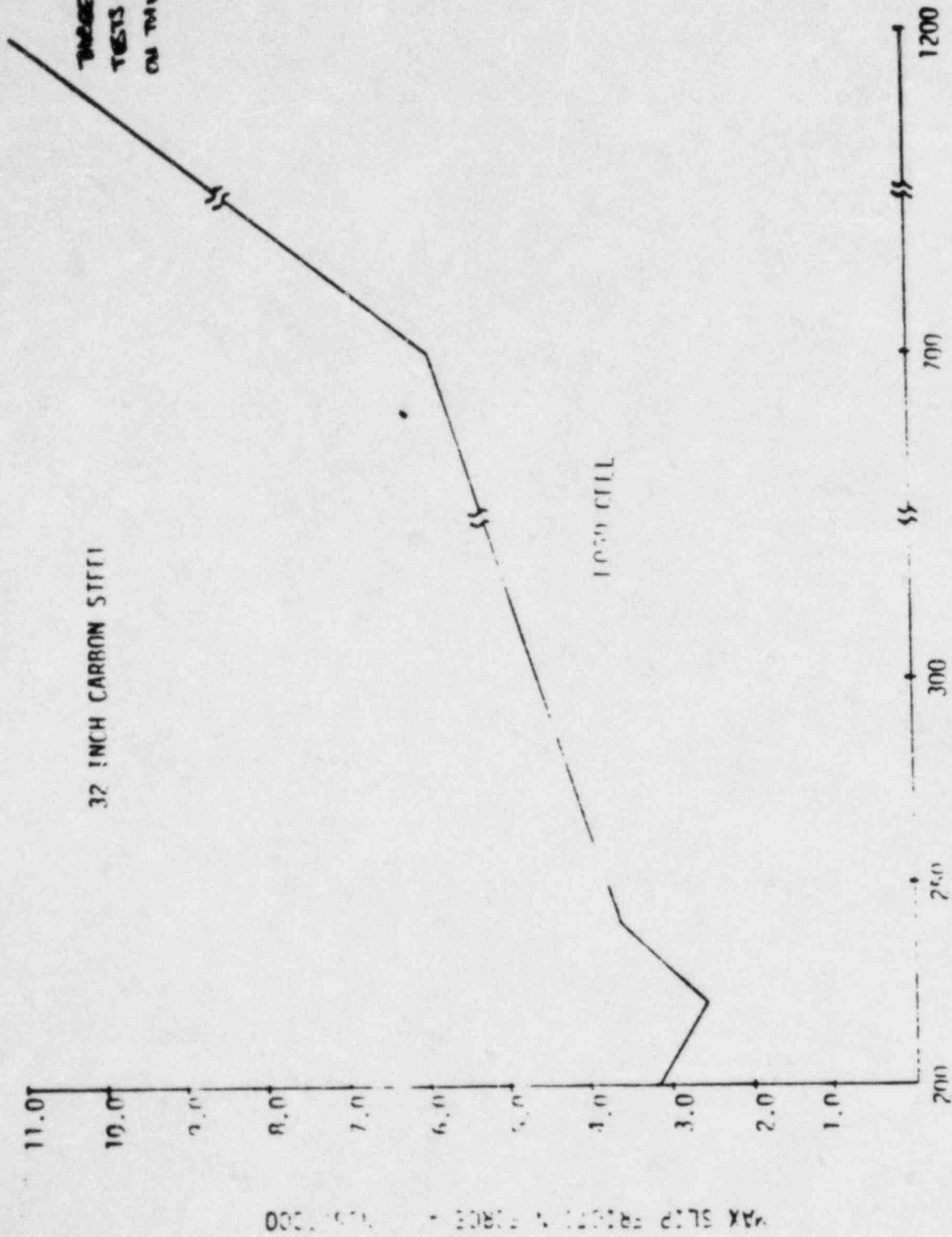


FIGURE 12

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127636/488994
International: 428613/294475

A Drawo Company

PROJECT FILE

Distributions:

*N Williams
J Minichello*

August 17, 1984 L Weingart

Project File

84042

GTN-69359

Texas Utilities Generating Company
Post Office Box 1002
Glen Rose, Texas 76043

Attention: Mr. J. B. George
Vice President/Project Gen. Mgr.

Gentlemen:

CYGNA	
JOB NO:	<i>84042</i>
DATE LOGGED:	<i>8/20/84</i>
LOG. MGR.	<i>#75</i>
FILE:	<i>2.1.1 Mc. CR</i>
CROSS REF. FILE	<i>2.1 Mc. CR log</i>

TEXAS UTILITIES GENERATING COMPANY
COMANCHE PEAK STEAM ELECTRIC STATION
G&H PROJECT NO. 2323
TRANSITION JOINT SIF AT EQUIPMENT NOZZLE CONNECTIONS
REF 1: GTN-69338 DATED 8/10/84
REF 2: GTN-69303 DATED 7/31/84

By copy of this letter to Nancy Williams of CYGNA, please be advised that the subject G&H expanded review has been completed and all issued analyses are found to be acceptable.

Gibbs & Hill has reviewed all the as-built analysis problem flow diagrams in the G&H New York scope (272) and has determined that 119 analyses do not contain equipment and therefore do not require that an SIF be considered. ADLPIPE computer input, output and calculation book reviews showed that 100 analyses considered stress intensification factors at the equipment nozzle connections and are acceptable.

Additional hand analysis was required on 44 problems which were determined to be acceptable. The results are contained in calculation 2323-EQ-SIF to be issued by August 22, 1984.

For expediency, equipment and weld end preparation detail drawings were not reviewed. Had they been utilized, the magnitude of the additional hand analysis performed might have been minimized.

Gibbs & Hill, Inc.

GTN-69359

-2-

August 17, 1984

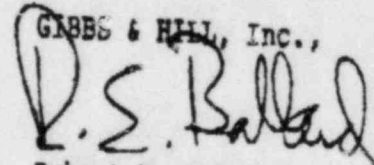
The remaining nine (9) analyses were found to be acceptable, either by correlation, weld type or by the use of flexible type connectors (see reference 2).

Checking of the calculation is now in progress. A copy of the calculation will be provided upon completion of the checking.

If you have any questions please contact H. W. Mentel (x6302) or F. A. Colucci (x5203).

Very truly yours,

GIBBS & HILL, Inc.,



Robert E. Ballard, Jr.
Director of Projects

REBa-HWMe-FAC:lc

1 Letter

CC: ARMS (B&R Site) OL

D. H. Wade (TUSI Site) 1L (telecopy)

N. Williams (CYGNA CA) 1L (telecopy)

G. Grace (TUSI Site) 1L

TO: DOCUMENT CONTROL

FROM: S. B. Burwell x 27563

SUBJECT: Cygna Review (Phase 3) Comanche Peak

Attached is the following document:

October 3, 1984 - 84042,030

Responses to Cygna Design Control, Pipe Support
and Pipe Stress Questions.

Cygna (Williams) to CASE (Ellis)