CYGNA
ENERGY SERVICES
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

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

2222 - Per S. Burwell
1/1 See Attached

Attachments

1. L. M. Popplewell (TUGCO) letter to N. Williams (Cygna), "CPSES Cygna Review Questions (Pipe Supports)," June 28, 1984.

2. L. M. Popplewell (TUGCO) letter to N. Williams (Cygna), "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 (Cygna), "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 (Cygna), "Comanche Peak Steam Electric Station, Phase III Action Items," August 29, 1984.

16. J. B. George (TUGCO) letter to N. Williams (Cygna), CPPA #40439, "Comanche Peak Steam Electric Station, Cygna 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 (Cygna), 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

Distribution
N. Williams
J. Minichiello

CYGNA	
JOB NO:	84042
DATE LOGGED:	8/6/84
LOG NO:	#63
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1 Inc. CR Log

CYGNA Energy Services
101 California Street
San Francisco, CA 94111

Attention: Ms. Nancy Williams, Project Manager

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-1-003-004-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.

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

L. M. Popplewell
Engineering Manager

GG/amd

PROJECT FILE

TEXAS UTILITIES GENERATING COMPANY

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

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

ps Distribution
N. Williams
J. Minichiello
E. Wong
G. Bjorkman
84042 PF

July 2, 1984

CYGNA Energy Services
101 California Street
San Francisco, CA 9411[illegible]

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:

a) It is our interpretation of existing weld standards that the effective throat of a flare bevel weld (te) is 5/16R. Assuming R=2t, then te=5/8t. What justification does TUGCO have for using te=t in flare bevel weld design?

b) Please provide documentation which instructs engineers how to calculate the effective throat of a flare bevel weld with a fillet cap.

TUGCO Response:

a) 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, te=t is a reasonable value.*

b) 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 te. The example supplied to CYGNA for MS-1-003-013-C72K, shows this calculation is done.

TEXAS UTILITIES GENERATING COMPANY
P. O. BOX 1002 · GLEN ROSE, TEXAS 76043

* 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.

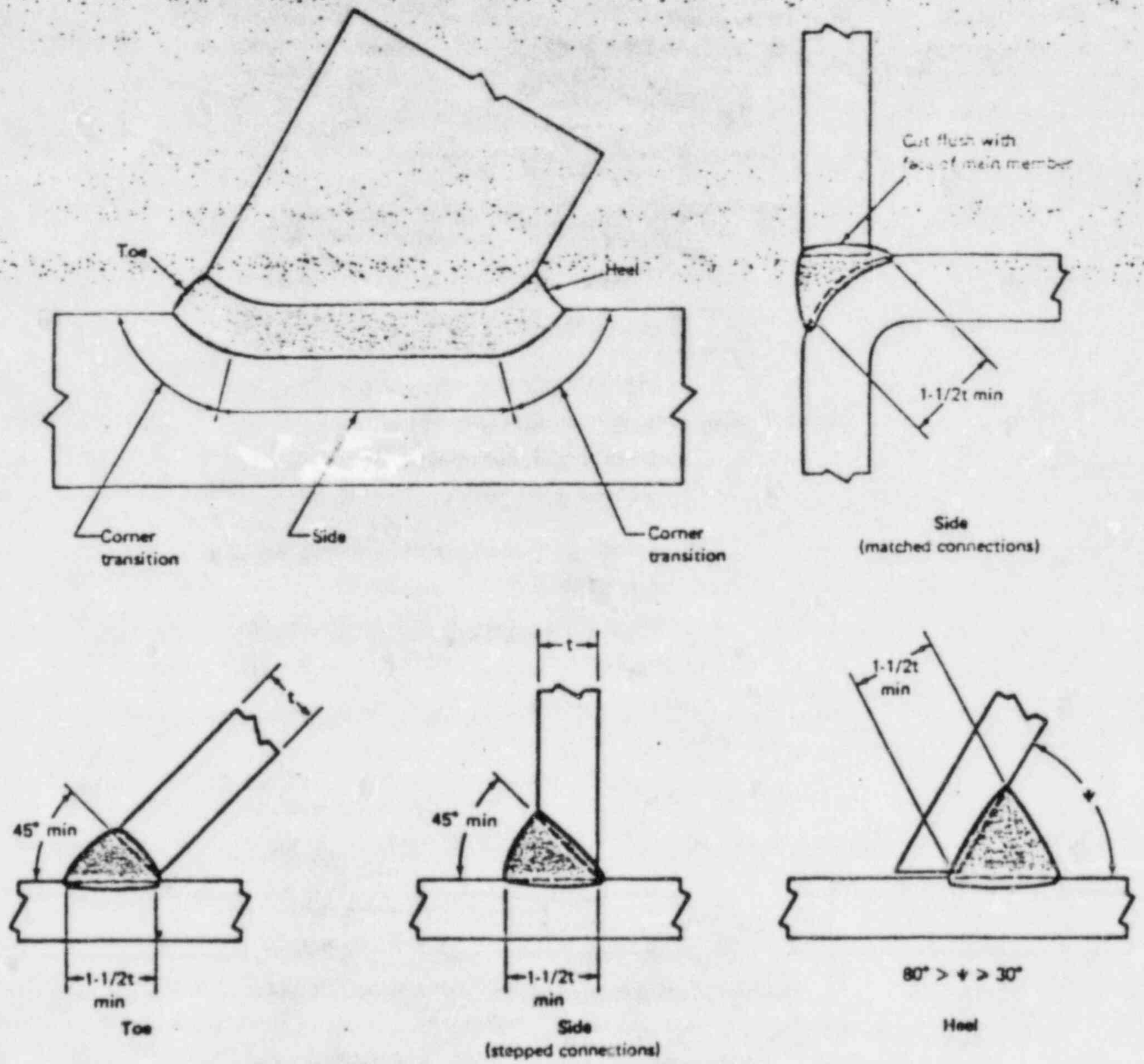
Very truly yours,

TEXAS UTILITIES GENERATING COMPANY

RPBaker for

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.

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New York, New York 10001
212 760- 4438
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Domestic: 127636/968694
International: 428813/234475

A Dravo Company

PROJECT FILE

Distribution
W. Williams
S. Bibo
D. Smedley
84042 PF

July 12, 1984

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	865
FILE:	2.1.1 Mc. CR
CROSS REF. FILE	2.1 Mc. CR Log

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

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

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 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.

R. E. Ballard

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. Bibo (CYGNA, MA) 1L +1A
D. Wade (TUSI Site) 1L +1A

DEPARTMENTAL MANAGEMENT AUDIT

DATE OF PREVIOUS AUDIT: AUGUST 27, 1975

NEXT AUDIT SCHEDULED FOR: MAY 1977

PERSONNEL AUDITED AND TITLE: E. HOROVITZ - SUPV. MECH. ENGINEERING

M. FITTER - SR. I&C ENGINEER

A. SCARIMBOLO - LEAD MECH DESIGN ENGR.

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

C. NEW ITEMS OR SUGGESTED IMPROVEMENTS (SEE PAGE 3A FOR ADDITIONAL ITEMS)

1- QA II-E should include specific instructions to file the original of the Tech. Description sign-off record form with the Tech. Description (audit check list item 3.2 C)

2- Exhibit 3 of QA II-B 3.1 (form F777, 3-75) should be revised to include space for inserting the issue date of the dwg (audit check list item 3.2 D).

D. PREVIOUS AUDIT STATUS:

	YES	NO
1. WERE DEFICIENCIES OF THE PREVIOUS AUDIT SATISFACTORILY RESOLVED?	✓	

REMARKS:

	YES	NO
2. WAS NECESSARY CORRECTIVE ACTION TAKEN TO PREVENT REPORTED DEFICIENCIES?	✓	

REMARKS:

	YES	NO
3. IS ADDITIONAL CORRECTIVE ACTION REQUIRED?	✓	

REMARKS: See item F, page 4.

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

C. NEW ITEMS OR SUGGESTED IMPROVEMENTS:

1. (3.0B) Procedure QAII-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) QAII-B.6 para. 6.4(d) should be clarified to resolve the difference in interpretations between QA and engineering.

3. QAII-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.

	YES	NO
2. WAS NECESSARY CORRECTIVE ACTION TAKEN TO PREVENT REPORTED DEFICIENCIES?	N/A	

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

	YES	NO
3. IS ADDITIONAL CORRECTIVE ACTION REQUIRED?	X	

REMARKS: Yes, as a result of new deficiencies found and noted hereafter.

DEPARTMENT Structural

AUDIT NO. 2 DATE June 1976

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 -Job Engineer Valdecaballeros

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

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

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

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:

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

REMARKS:

	YES	NO
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:

PROJECT FILE

TEXAS UTILITIES GENERATING COMPANY

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

CYGNA	
JOB NO.:	84042
DATE LOGGED:	8/6/84
LOG NO.:	#66
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1 Inc. CR. Log

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

July 12, 1984

CYGNA Energy Services
101 California Street
San Francisco, California 94111

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.

Very truly yours,

TEXAS UTILITIES GENERATING COMPANY
ENGINEERING DIVISION

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

Distribution
J. Minichiello
N. Williams
84042 PF

July 13, 1984

CYGNA	
JOB NO:	84042
DATE LOGGED:	8/6/84
LOG NO.:	#67
FILE:	2.1.1 Inc. CR
CROSS REF. FILE	2.1 Inc-CR Log

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:

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

HWM

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

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
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International: 428813/234475
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84042 PF

PROJECT FILE

July 13, 1984

CYGNA	
JOB NO:	84042
DATE LOGGED:	8/6/84
LOG NO.:	#68
FILE:	2.1.1 Inc. CR
CROSS REF FILE	2.1 Inc. CR Log

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 readible 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.

R. E. Ballard

Robert E. Ballard, Jr.
Director of Projects

HWMe

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

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127636/966261
International: 428813/234475
A Dravo Company

PROJECT FILE

NOTED AUG 06 1984 N.WILLIAMS

CYGNA
JOB NO.: 84042
DATE LOGGED: 8/6/84
LOG NO.: #69
FILE: 2.1.1 Inc. CR
CROSS REF. FILE 2.1 Inc. CR Log

Distribution
N. Williams
D. Smedley
S. Bibo
J. Minichiello
M. Shulman
84042 PF

July 27, 1984

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.

TRANSMITTED BY TELECOPY
7-27-84

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.

Pleas^ advise of any questions.

Very truly yours,

GIBBS & HILL, Inc.

R. E. Ballard

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)

PROJECT FILE

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-
Telex:
Domestic: 127636/958694
International: 428813/234475
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CYGNA
JOB NO : 84042
DATE LOGGED: 8/6/84
LOG NO.: #70
FILE: 2.1.1 Inc. CR
CROSS REF. FILE 2.1 Inc. CR Log

NOTED AUG 06 1984 N.WILLIAMS

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

GTN- 69303 July 31, 1984

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:

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. <u>Problem AB-1-150G, Rev. 0</u> - 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 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.

S M Marano

R. E. Ballard, Jr.
Director of Projects

HWM
FAC

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

PROJECT FILE

Gibbs & Hill, Inc.

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New York, New York 10001
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Domestic: 127636/968694
International: 428813/234475

A Dravo Company

CYGNA	
JOB NO:	84002
DATE LOGGED:	8/14/84
LOG NO.:	# 74
FILE:	2.1.1 Inc. Cr.
CROSS REF. FILE	2.1 Inc. Cr. 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.
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)
Westbrook (TUSI Site) 1L 1A (telecopy)

G. Bjorkman (CYGNA MA) 1L 1A
N. Williams (CYGNA CA) 1L 1A
D. Westbrook (TUSI Site) 1L 1A

TRANSMITTED BY TELECOPIER

Dravo

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 particiation percentages calculated for the 'x', 'y' and 'z' directions for the 300 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 undo 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 SAM)

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

2Pgs- [illegible] Williams

TEXAS UTILITIES SERVICES INC.

OFFICE MEMORANDUM

PROJECT FILE

To J. B. George

Glen Rose, Texas Sept. 6, 1983

CYGNA 84002

Subject COMANCHE PEAK STEAM ELECTRIC STATION
CPSES DOCUMENT CONTROL CENTER

DATE LOGGED: 8/7/84
LOG NO.: # 72
FILE: 2.1.1 Inc. CR
CROSS REF. FILE: 2.1 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.

BRJ #1609

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 inconsistancies 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. Merritt, Jr.
Asst. Project General Manager

JTM:pew

Rec. 8/27/84

Gibbs & Hill, Inc.

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New York, New York 10001
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A Dravo Company

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

August 23, 1984

CYGNA	
JOB NO	84042 TC
DATE LOGGED:	8/27/84
LOG NO.:	#78
FILE:	2.1.1 Doc. CR
CROSS REF. FILE	2.1 Doc. CR Log

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

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 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.

Robert E. Ballard, Jr.
Director of Projects

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

213

Gibbs & Hill, Inc.

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

Revision	Sheets Deleted	Sheets Added	Sheets Revised	Job Engineer Signature	Job Engineer Date
Original	X	X	X	H. W. Martin FOR C. J. CORCAN	8/22/84

CYGNA
JOB NO.: 84042.79
DATE LOGGED: 8/27/84
LOG NO.: # 213
FILE: 4.1.1 Tech. Files
CROSS REF. FILE: 2.1.1 Doc. CR (# 78)

F-167, 4-81

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	[illegible]	8/17/84								
Checker	[illegible]	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

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. 2

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	JOC	8/17/84									
Checker	[illegible]	8/31/84									

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 AFOREMENTIONED 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 #	1									
Preparer	Bac	8/11/84								
Checker	[illegible]	8/21/84								

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	Soc	8/11/84								
Checker	[illegible]	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	1-37W-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 GTN 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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	AOC	8/11/84								
Checker	[illegible]	8/2?/84								

No.	Prob. AB-	Equipment	S.I.F. Accounted For IN ORIGINAL ANALYSIS	S.I.F. Effect Accounted For	Comments
75	1-46A	Yes	Yes	N/A	N/A
-76	1-46E	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	1-52U	Yes	No	Yes	See Calc. Page 27
85	2-52U	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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	AAC	8/11/84								
Checker	[illegible]	8/27/84								

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 combined with AB-1-63B
124	1-63C	No	N/A	N/A	
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	1-68UH	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

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/11/84								
Checker	[illegible]	8/17/84								

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

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/11/84									
Checker	[illegible]	8/27/84									

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

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	Gac	8/11/84								
Checker	[illegible]	8/27/84								

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

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	JAC	8/11/84								
Checker	[illegible]	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

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. 11

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/15/84								
Checker	[illegible]	8/?/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 15000	1119 2126	687	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	2013 3825	687	1.9	
Emergency	9	$1.8\ S_h$ 27000	2239 4254	687	1.9	
Faulted	9	$2.4\ S_h$ 36000	2239 4254	687	1.9	
Normal and Upset	10	S_A 22500	2851 5417	687	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	3969 7541	687	1.9	

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

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. 12

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/15/84								
Checker	[illegible]	8/21/84								

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 15000	583 1108	99	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	962 1828	99	1.9	
Emergency	9	$1.3\ S_h$ 27000	1098 2086	99	1.9	
Faulted	9	$2.4\ S_h$ 27000	1098 2086	99	1.9	
Normal and Upset	10	S_A 22500	6593 12527	99	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	7176 13634	99	1.9	

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

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. 13

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/15/84									
Checker	[illegible]	8/21/84									

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 15000	577 1096	506	1.9	
Normal and Upset	9	1.2 S_h 18000	2315 4399	506	1.9	
Emergency	9	1.8 S_h 27000	2744 5214	506	1.9	
Faulted	9	2.4 S_h 36000	2744 5214	506	1.9	
Normal and Upset	10	S_A 22500	2475 4703	506	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	3053 5801	506	1.9	

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

Gibb's & 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	X		X		X		X		X
Preparer	Jac	8/11/84								
Checker	[illegible]	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 16600	2456 4666	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	4057 7712	1	1.9	
Emergency	9	$1.8\ S_h$ 29880	4447 8449	1	1.9	
Faulted	9	$2.4\ S_h$ 39840	4447 8449	1	1.9	
Normal and Upset	10	S_A 27650	1263 2400	1	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	3717 7066	1	1.9	

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

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/11/84								
Checker	[illegible]	8/13/84								

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 16600	3450 6555	51	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	9460	51	1.9	
Emergency	9	$1.8\ S_h$ 29880	5325 10118	51	1.9	
Faulted	9	$2.4\ S_h$ 39840	10118	51	1.9	
Normal and Upset	10	S_A 27650	1759	51	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	4375 8313	51	1.9	

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

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. 16

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	fac	8/11/84								
Checker	[illegible]	8/21/84								

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 16600	3777 7176	32	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	3899 7408	32	1.9	
Emergency	9	$1.8\ S_h$ 29880	3922 7452	32	1.9	
Faulted	9	$2.4\ S_h$ 39840	3922 7452	32	1.9	
Normal and Upset	10	S_A 27650	894 1699	32	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	4671 8875	32	1.9	

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

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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	X		X		X		X		X	
Preparer	AAC	8/11/84									
Checker	[signature]	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 16600	2526 4799	42	1.9	
Normal and Upset	9	1.2 S_h 19920	2837 5390	42	1.9	
Emergency	9	1.8 S_h 29880	[illegible] 5681	42	1.9	
Faulted	9	2.4 S_h 39840	2990 5681	42	1.9	
Normal and Upset	10	S_A 27821	3374 6411	42	1.9	
Normal and Upset	11	$S_A + S_h$ 44421	5901 11212	42	1.9	

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. 18

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/11/84								
Checker	[illegible]	8/21/84								

Problem AB-1-28, Rev. 1

MAXIMUM STRESS RESULTS

Plant Condition	Equation[1]	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h 16600	2458 4670	501	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	2778 5278	501	1.9	
Emergency	9	$1.8\ S_h$ 29880	2905 5520	501	1.9	
Faulted	9	$2.4\ S_h$ 39840	2905 5520	501	1.9	
Normal and Upset	10	S_A 27821	273 519	501	1.9	
Normal and Upset	11	$S_A + S_h$ 44421	2731 5189	501	1.9	

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 #	1	X		X		X		X		X
Preparer	tac	8/11/84								
Checker	[illegible]	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 16600	3620 6878	831	1.9	
Normal and Upset	9	1.2 S_h 19920	3807 7233	831	1.9	
Emergency	9	1.8 S_h 29880	[illegible] 7406	831	1.9	
Faulted	9	2.4 S_h 39840	[illegible] 7406	831	1.9	
Normal and Upset	10	S_A 27821	1301 2472	831	1.9	
Normal and Upset	11	$S_A + S_h$ 44421	4921 9350	831	1.9	

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. 20

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	JC	8/15/84									
Checker	[illegible]	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 16600	878 1668	44	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	1502 2854	44	1.9	
Emergency	9	$1.8\ S_h$ 29880	1708 3245	44	1.9	
Faulted	9	$2.4\ S_h$ 39840	1708 3245	44	1.9	
Normal and Upset	10	S_A 27650	1384 2630	44	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	2262 4298	44	1.9	

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

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. 21

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	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 16600	853 1621	44	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	3047 5789	44	1.9	
Emergency	9	$1.8\ S_h$ 29880	4199 7978	44	1.9	
Faulted	9	$2.4\ S_h$ 39840	4199 7978	44	1.9	
Normal and Upset	10	S_A 27650	4716 8960	44	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	5569 10581	44	1.9	

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. 22

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	AOC	8/13/84								
Checker	[illegible]	8/21/84								

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 18300	688 1307	278	1.9	
Normal and Upset	9	$1.2\ S_h$ 21960	1171 2225	278	1.9	
Emergency	9	$1.8\ S_h$ 32940	1281 2434	278	1.9	
Faulted	9	$2.4\ S_h$ 43920	1281 2434	278	1.9	
Normal and Upset	10	S_A 28075	3331 6329	278	1.9	
Normal and Upset	11	$S_A + S_h$ 46375	4019 7636	278	1.9	

Gibbs & Hill, Inc. Job No. 2323-0A6 Client TUSI

Subject Tapered Transition Joint S.I.F At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 23

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	[illegible]	8/17/84								
Checker	[illegible]	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 16600	1328 2523	450	1.9	
Normal and Upset	9	$1.2\ S_h$ 19920	[illegible] 11600	450	1.9	
Emergency	9	$1.8\ S_h$ 29880	[illegible] 13899	450	1.9	
Faulted	9	$2.4\ S_h$ 39840	13899	450	1.9	
Normal and Upset	10	S_A 27650	[illegible]3 20317	450	1.9	
Normal and Upset	11	$S_A + S_h$ 44250	12641 23980	450	1.9	

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. 24

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/15/89									
Checker	[illegible]	8/21/89									

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 15900	5384 10230	91	1.9	
Normal and Upset	9	1.2 S_h 19080	6838 12992	91	1.9	
Emergency	9	1.8 S_h 28620	7094 13479	91	1.9	
Faulted	9	2.4 S_h 38160	7094 13479	91	1.9	
Normal and Upset	10	S_A 27475	615 1169	91	1.9	
Normal and Upset	11	S_A+ S_h 43375	5999 11398	91	1.9	

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

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. 25

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	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 16200	2981 5664	128	1.9	
Normal and Upset	9	$1.2\ S_h$ 19440	4078 7748	128	1.9	
Emergency	9	$1.8\ S_h$ 29160	4463 8480	128	1.9	
Faulted	9	$2.4\ S_h$ 38880	4463 8480	128	1.9	
Normal and Upset	10	S_A 27550	1835 3487	128	1.9	
Normal and Upset	11	$S_A + S_h$ 43750	4816 9150	128	1.9	

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

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. 26

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[signature]	8/12/84								
Checker	[signature]	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 17200	2437 4630	262	1.9	
Normal and Upset	9	1.2 S_h 20640	5305 10080	262	1.9	
Emergency	9	1.8 S_h 30960	6104 11598	262	1.9	
Faulted	9	2.4 S_h 41280	6104 11598	262	1.9	
Normal and Upset	10	S_A 27800	7520 14288	262	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	9957 18918	262	1.9	

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

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. 27

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1	X		X		X		X		X	
Preparer	AOC	8/12/84									
Checker	[illegible]	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 17800	608 1155	1100	1.9	
Normal and Upset	9	1.2 S_h 21360	608 1155	1100	1.9	
Emergency	9	1.8 S_h 32040	608 1155	1100	1.9	
Faulted	9	2.4 S_h 42720	608 1155	1100	1.9	
Normal and Upset	10	S_A 26950	0 0	1100	1.9	
Normal and Upset	11	S_A + S_h 44750	608 1155	1100	1.9	

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

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	[illegible]	8/12/84								
Checker	[illegible]	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 15000	1729	97	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	3667	97	1.9	
Emergency	9	$1.8\ S_h$ 27000	5045	97	1.9	
Faulted	9	$2.4\ S_h$ 36000	5045	97	1.9	
Normal and Upset	10	S_A 22500	545 1036	97	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	1455 2765	97	1.9	

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. 29

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/17/84								
Checker	[illegible]	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 15000	733 1393	65	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	1361 2586	65	1.9	
Emergency	9	$1.8\ S_h$ 27000	1627 3091	65	1.9	
Faulted	9	$2.4\ S_h$ 36000	1627 3091	65	1.9	
Normal and Upset	10	S_A 22500	742 1410	65	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	1475 2803	65	1.9	

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.

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. 30

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	A.C	8/15/84									
Checker	[illegible]	8/27/84									

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 15000	4352 4406	472	1.425	
Normal and Upset	9	$1.2 S_h$ 18000	14033 18201 *	472	1.425	
Emergency	9	$1.8 S_h$ 27000	16486 21697	472	1.425	
Faulted	9	$2.4 S_h$ 36000	16486 21697	472	1.425	
Normal and Upset	10	S_A 22500	9010 17119	472	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	13362 21525	472	1.9 1.425	

* Exceeds allowable. See next page.

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

$P = 2500$ psi

$D_o = 1.9$ in.

$t_n = .281$ in.

S.I.F for Eq 8 & 9 = (1.9)(.75) = 1.425

S.I.F. for Eq 10 = 1.9

Eq 11 = Eq 8 + Eq 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. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 31

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SMC	8/17/84								
Checker	[illegible]	8/23/84								

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 15000	4352 4389	472	1.293	
Normal and Upset	9	1.2 S_h 18000	14033 16906	472	1.293	
Emergency	9	1.8 S_h 27000	16486 20078	472	1.293	
Faulted	9	2.4 S_h 36000	16486 20078	472	1.293	
Normal and Upset	10 (2)	S_A 22500	9010 15533	472	1.724	
Normal and Upset	11	$S_A + S_h$ 37500	13362 19922	472	1.724 1.293	

$S.I.F. = 1.3 + 0.0036 \frac{D_o}{t_n} + 3.6 \frac{\delta}{t_n}$ (ASME Code Section III, Subsection NC 1974, Fig NC-3673.2(b)-1 page 133

$\delta = 1/32$ 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 for Eq 8 & 9 = (1.724)(.75) = 1.293

S.I.F for Eq 10 = 1.724 Eq 11 = Eq 8 + Eq 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									
Preparer	EOC	8/13/84								
Checker	[illegible]	8/22/84								

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 15000	1955 3739	47	1.9	
Normal and Upset	9	1.2 S_h 18000	2312 4393	47	1.9	
Emergency	9	1.8 S_h 27000	2496 4742	47	1.9	
Faulted	9	2.4 S_h 36000	2496 4742	47	1.9	
Normal and Upset	10	S_A 22500	862 1638	47	1.9	
Normal and Upset	11	S_A+ S_h 37500	2830 5377	47	1.9	

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

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	[illegible]	8/22/84								

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 15000	1959 3722	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	2082 3956	1	1.9	
Emergency	9	$1.8\ S_h$ 27000	2161 4106	1	1.9	
Faulted	9	$2.4\ S_h$ 36000	2161 4106	1	1.9	
Normal and Upset	10	S_A 22500	1181 2244	1	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	3140 5966	1	1.9	

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

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. 34

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/12/84								
Checker	[illegible]	8/23/84								

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 15000	1954 3713	48	1.9	
Normal and Upset	9	1.2 S_h 18000	2068 3929	48	1.9	
Emergency	9	1.8 S_h 27000	2157 4098	48	1.9	
Faulted	9	2.4 S_h 36000	2157 4098	48	1.9	
Normal and Upset	10	S_A 22500	1266 2405	48	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	3220 6118	48	1.9	

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

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	Sac	8/12/84								
Checker	[illegible]	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 15000	2017 3832	1541	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	2292 4355	1541	1.9	
Emergency	9	$1.8\ S_h$ 27000	2486 4723	1541	1.9	
Faulted	9	$2.4\ S_h$ 36000	2486 4723	1541	1.9	
Normal and Upset	10	S_A 22500	2414 4587	1541	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	4432 8421	1541	1.9	

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

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	X		X		X		X		X	
Preparer	[illegible]	8/17/84									
Checker	[illegible]	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 15000	2583 4908	174	1.9	
Normal and Upset	9	1.2 S_h 18000	3990 7581	174	1.9	
Emergency	9	1.8 S_h 27000	4885 9282	174	1.9	
Faulted	9	2.4 S_h 36000	4885 9282	174	1.9	
Normal and Upset	10	S_A 22500	3484 6620	174	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	6000 11525	174	1.9	

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

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. 37

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/15/84								
Checker	[illegible]	8/21/84								

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 15000	2728 5183	1	1.9	
Normal and Upset	9	1.2 S_h 18000	3010 5719	1	1.9	
Emergency	9	1.8 S_h 27000	3065 5824	1	1.9	
Faulted	9	2.4 S_h 36000	3065 5824	1	1.9	
Normal and Upset	10	S_A 22500	399 758	1	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	3127 5941	1	1.9	

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. 38

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/15/84								
Checker	[illegible]	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 15000	1924 3656	24	1.9	
Normal and Upset	9	1.2 S_h 18000	2067 3927	24	1.9	
Emergency	9	1.8 S_h 27000	2096 3982	24	1.9	
Faulted	9	2.4 S_h 36000	2096 3982	24	1.9	
Normal and Upset	10	S_A 22500	468 889	24	1.9	
Normal and Upset	11	S_A+ S_h 37500	2392 4545	24	1.9	

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									
Preparer	[illegible]	8/12/84								
Checker	[illegible]	8/2?/84								

Problem AB-1-61D

MAXIMUM STRESS RESULTS

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

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

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. 40

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/16/84									
Checker	[illegible]	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 15000	782 1486	2103	1.9	
Normal and Upset	9	1.2 S_h 18000	2540 4826	2103	1.9	
Emergency	9	1.8 S_h 27000	2746 5217	2103	1.9	-
Faulted	9	2.4 S_h 36000	2746 5217	2103	1.9	
Normal and Upset	10	S_A 22500	122 232	2103	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	905 1720	2103	1.9	

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

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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. 41

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1	X		X		X		X		X	
Preparer	jac	8/15/84									
Checker	[illegible]	8/31/84									

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 15000	962 1828	1296	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	1421 2700	1296	1.9	
Emergency	9	$1.8\ S_h$ 27000	1689 3209	1296	1.9	
Faulted	9	$2.4\ S_h$ 36000	1689 3209	1296	1.9	
Normal and Upset	10	S_A 22500	1963 3730	1296	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	2925 5558	1296	1.9	

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

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. 42

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	GOC	8/15/84									
Checker	[illegible]	8/27/84									

Problem AB-1-63 C/B

MAXIMUM STRESS RESULTS

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

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

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. 43

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/15/84									
Checker	[illegible]	8/22/84									

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 15000	922 1752	760	1.9	
Normal and Upset	9	1.2 S_h 18000	1549 2943	760	1.9	
Emergency	9	1.8 S_h 27000	1704 3238	760	1.9	
Faulted	9	2.4 S_h 36000	1704 3238	760	1.9	
Normal and Upset	10	S_A 22500	1091 2073	760	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	2013 3825	760	1.9	

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. 44

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/15/84									
Checker	[illegible]	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 15000	1762 3348	1068	1.9	
Normal and Upset	9	1.2 S_h 18000	2037 3870	1068	1.9	
Emergency	9	1.8 S_h 27000	2202 4184	1068	1.9	
Faulted	9	2.4 S_h 36000	2202 4184	1068	1.9	
Normal and Upset	10	S_A 22500	1229 2335	1068	1.9	
Normal and Upset	11	$S_h + S_h$ 37500	2991 5683	1068	1.9	

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

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. 45

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method	1										
Preparer	GOC	8/15/84									
Checker	[illegible]	8/21/84									

Problem AB-1-64F

Note: Stresses taken from node 5837

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h 15000	1877 3566	5838	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	2193 4167	5838	1.9	
Emergency	9	$1.8\ S_h$ 27000	2420 4598	5838	1.9	
Faulted	9	$2.4\ S_h$ 36000	2420 4598	5838	1.9	
Normal and Upset	10	S_A 22500	871 1655	5838	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	2748 5221	5838	1.9	

Checking Method: [illegible]

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. 46

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	Jac	8/15/84								
Checker	[illegible]	8/21/84								

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 15000	5276 10024	500	1.9	
Normal and Upset	9	1.2 S_h 18000	5680 10792	500	1.9	
Emergency	9	1.8 S_h 27000	5797 11014	500	1.9	
Faulted	9	2.4 S_h 36000	13602 25844	500	1.9	
Normal and Upset	10	S_A 22500	13943 26492 *	500	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	19219 36516	500	1.9	

* Equation 10 exceeded however, equation 11 is less than 37500 psi. Therefore, o.k.

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

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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. 47

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/15/84								
Checker	[illegible]	8/21/84								

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 15000	3974 4175	260	1.425	
Normal and Upset	9	1.2 S_h 18000	6516 7798	260	1.425	
Emergency	9	1.8 S_h 27000	7597 9838	260	1.425	
Faulted	9	2.4 S_h 36000	19825 26763	260	1.425	
Normal and Upset	10	S_A 22500	14131 26849*	260	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	18166 31024	260	1.9 1.425	

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

Pressure stress = 3500 psi

Eq 11 = Eq 8 + Eq 10

Checking Method # 1. Line-by-line checking

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. 48

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/10/84								
Checker	[illegible]	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 15000	4059 7712	5905	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	4632 8801	5905	1.9	
Emergency	9	$1.8\ S_h$ 27000	4722 8972	5905	1.9	
Faulted	9	$2.4\ S_h$ 36000	4722 8972	5905	1.9	
Normal and Upset	10	S_A 22500	1692 3215	5905	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	5752 10929	5905	1.9	

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

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. 49

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	SC	8/15/84								
Checker	[illegible]	8/23/84								

Problem . AB-1-88C

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h 17800	1179 2240	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 21360	2348 4461	1	1.9	
Emergency	9	$1.8\ S_h$ 32040	2573 4889	1	1.9	
Faulted	9	$2.4\ S_h$ 42720	2573 4889	1	1.9	
Normal and Upset	10	S_A 27950	3197 6074	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	4376 8314	1	1.9	

Checking Method # 1. Line-by-line checking 2. Alternative Calculation Results compared 3. Identical Calculation Results compared

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. 50

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	[illegible]	8/13/84									
Checker	[illegible]	8/27/84									

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 17800	61 2206	1	1.9	
Normal and Upset	9	1.2 S_h 21360	2468 4689	1	1.9	
Emergency	9	1.8 S_h 32040	2745 5216	1	1.9	
Faulted	9	2.4 S_h 42720	2745 5216	1	1.9	
Normal and Upset	10	S_A 27950	3259 6192	1	1.9	
Normal and Upset	11	S_A + S_h 45750	4420 8398	1	1.9	

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JOC	8/13/84								
Checker	[illegible]	8/23/84								

Problem AB-1-86E

MAXIMUM STRESS RESULTS

Plant Condition	Equation	Allowable Stress	Calculated Stress	Node	S.I.F.	Description
Normal and Upset	8	S_h 17800	1194 2269	409	1.9	
Normal and Upset	9	1.2 S_h 21360	1941 3688	409	1.9	
Emergency	9	1.8 S_h 32040	2090 3971	409	1.9	
Faulted	9	2.4 S_h 42720	2090 3971	409	1.9	
Normal and Upset	10	S_A 27950	879 1670	409	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	2073 3939	409	1.9	

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

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. 52

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	sac	8/13/84								
Checker	[illegible]	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 17800	1035 1967	810	1.9	
Normal and Upset	9	1.2 S_h 21360	1192 2265	810	1.9	
Emergency	9	1.8 S_h 32040	1227 2331	810	1.9	
Faulted	9	2.4 S_h 42720	1227 2331	810	1.9	
Normal and Upset	10	S_A 27950	1759 3342	810	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	2794 5309	810	1.9	

Checking Method # 1. Line-by-line checking 2. Alternative Calculation Results compared

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	Jac	8/13/84								
Checker	[illegible]	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 17800	942 1790	1	1.9	
Normal and Upset	9	1.2 S_h 21360	1363 2590	1	1.9	
Emergency	9	1.8 S_h 32040	1501 2852	1	1.9	
Faulted	9	2.4 S_h 42720	1501 2852	1	1.9	
Normal and Upset	10	S_A 27950	786 1493	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	1729 3285	1	1.9	

Checking Method # 1. Line-by-line checking 2. Alternative Calculation Results compared

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	SAC	8/13/84								
Checker	[illegible]	8/27/84								

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 17800	917 1742	144	1.9	
Normal and Upset	9	$1.2\ S_h$ 21360	1123 2134	144	1.9	
Emergency	9	$1.8\ S_h$ 32040	1178 2238	144	1.9	
Faulted	9	$2.4\ S_h$ 42720	1178 2238	144	1.9	
Normal and Upset	10	S_A 27950	1229 2335	144	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	2146 4077	144	1.9	

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. 56

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	SAC	8/13/84								
Checker	[illegible]	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 17800	705 1340	43	1.9	
Normal and Upset	9	$1.2\ S_h$ 21360	1350 2565	43	1.9	
Emergency	9	$1.8\ S_h$ 32040	1508 2865	43	1.9	
Faulted	9	$2.4\ S_h$ 42720	1508 2865	43	1.9	
Normal and Upset	10	S_A 27950	735 1397	43	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	1440 2736	43	1.9	

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	[illegible]	8/13/84									
Checker	[illegible]	8/27/84									

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 17800	665 1264	222	1.9	
Normal and Upset	9	1.2 S_h 21360	1275 2423	222	1.9	
Emergency	9	1.8 S_h 32040	1391 2643	222	1.9	
Faulted	9	2.4 S_h 42720	1391 2643	222	1.9	
Normal and Upset	10	S_A 27950	427 811	222	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	1091 2073	222	1.9	

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									
Preparer	JOC	8/13/84								
Checker	[illegible]	8/23/84								

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 18400	802 1524	117	1.9	
Normal and Upset	9	1.2 S_h 22080	895 1701	117	1.9	
Emergency	9	1.8 S_h 33120	939 1784	117	1.9	
Faulted	9	2.4 S_h 44160	939 1784	117	1.9	
Normal and Upset	10	S_A 28100	890 1691	117	1.9	
Normal and Upset	11	$S_A + S_h$ 46500	1692 3215	117	1.9	

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	JOC	8/13/84								
Checker	[illegible]	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 18400	799 1518	84	1.9	
Normal and Upset	9	$1.2\ S_h$ 22080	958 1820	84	1.9	
Emergency	9	$1.8\ S_h$ 33120	1013 1925	84	1.9	
Faulted	9	$2.4\ S_h$ 44160	1013 1925	84	1.9	
Normal and Upset	10	S_A 28100	1120 2128	84	1.9	
Normal and Upset	11	$S_A + S_h$ 46500	1918 3644	84	1.9	

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

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 Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[signature]	8/13/84								
Checker	[signature]	8/22/84								

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 17200	804 1528	588	1.9	
Normal and Upset	9	1.2 S_h 20640	904 1718	588	1.9	
Emergency	9	1.8 S_h 30960	947 1799	588	1.9	
Faulted	9	2.4 S_h 41280	947 1799	588	1.9	
Normal and Upset	10	S_A 27800	1873 3559	588	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	2677 5086	588	1.9	

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	[signature]	8/13/84								
Checker	[signature]	9/23/84								

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 17800	1156 2196	387	1.9	
Normal and Upset	9	$1.2\ S_h$ 21360	7409 14077	387	1.9	
Emergency	9	$1.8\ S_h$ 32040	8953 17011	387	1.9	
Faulted	9	$2.4\ S_h$ 42720	8953 17011	387	1.9	
Normal and Upset	10	S_A 27950	478 908	387	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	1635 3107	387	1.9	

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	X		X		X		X		X	
Preparer	AOC	8/13/84									
Checker	[illegible]	8/22/84									

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 17800	1233 2343	433	1.9	
Normal and Upset	9	$1.2\ S_h$ 21360	7858 14930	433	1.9	
Emergency	9	$1.8\ S_h$ 32040	1085 17262	433	1.9	
Faulted	9	$2.4\ S_h$ 42720	9085 17262	433	1.9	
Normal and Upset	10	S_A 27950	1476 2804	433	1.9	
Normal and Upset	11	$S_A + S_h$ 45750	2708 5145	433	1.9	

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

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. 63

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/15/84								
Checker	[illegible]	8/21/84								

Problem AB-1-95

MAXIMUM STRESS RESULTS

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

Checking Method # 1. Line-by-line checking

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. 64

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	fac	8/16/84								
Checker	[illegible]	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 18760	1978 3758	1	1.9	
Normal and Upset	9	1.2 S_h 22512	2575 4893	1	1.9	
Emergency	9	1.8 S_h 33768	2836 5388	1	1.9	
Faulted	9	2.4 S_h 45024	2836 5388	1	1.9	
Normal and Upset	10	S_A 28190	1444 2744	1	1.9	
Normal and Upset	11	$S_A + S_h$ 46950	3422 6502	1	1.9	

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. 65

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

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 18760	1215 2309	17	1.9	
Normal and Upset	9	$1.2\ S_h$ 22512	1215 2309	17	1.9	
Emergency	9	$1.8\ S_h$ 33768	1215 2309	17	1.9	
Faulted	9	$2.4\ S_h$ 45024	1215 2309	17	1.9	
Normal and Upset	10	S_A 28190	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 46950	1215 2309	17	1.9	

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

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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. 66

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1	X		X		X		X		X	
Preparer	[illegible]	8/16/84									
Checker	[illegible]	8/27/99									

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 18760	1972 3747	1	1.9	
Normal and Upset	9	1.2 S_h 22512	2702 5134	1	1.9	
Emergency	9	1.8 S_h 33768	2940 5586	1	1.9	
Faulted	9	2.4 S_h 45024	2940 5586	1	1.9	
Normal and Upset	10	S_A 28190	1197 2274	1	1.9	
Normal and Upset	11	S_A+ S_h 46950	3169 6021	1	1.9	

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. 67

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	JAC	8/16/84								
Checker	[illegible]	8/27/84								

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 18760	1215 2309	17	1.9	
Normal and Upset	9	1.2 S_h 22512	1215 2309	17	1.9	
Emergency	9	1.8 S_h 33768	1215 2309	17	1.9	
Faulted	9	2.4 S_h 45024	1215 2309	17	1.9	
Normal and Upset	10	S_A 28190	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 46950	1215 2309	17	1.9	

Checking Method # 1 Line-by-line checking 2 Alternative Calculation Results compared

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. 68

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/21/84								

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 17200	1970 3743	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	2698 5126	1	1.9	
Emergency	9	$1.8\ S_h$ 30960	2942 5590	1	1.9	
Faulted	9	$2.4\ S_h$ 41280	2942 5590	1	1.9	
Normal and Upset	10	S_A 27800	1169 2221	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3140 5966	1	1.9	

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

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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. 67

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/27/84								

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 18760	1215 2309	17	1.9	
Normal and Upset	9	$1.2\ S_h$ 22512	1215 2309	17	1.9	
Emergency	9	$1.8\ S_h$ 33768	1215 2309	17	1.9	
Faulted	9	$2.4\ S_h$ 45024	1215 2309	17	1.9	
Normal and Upset	10	S_A 28190	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 46950	1215 2309	17	1.9	

Checking Method [illegible]

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. 68

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[signature]	8/16/84								
Checker	[signature]	8/28/84								

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 17200	1970 3743	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	2698 5126	1	1.9	
Emergency	9	$1.8\ S_h$ 30960	2942 5590	1	1.9	
Faulted	9	$2.4\ S_h$ 41280	2942 5590	1	1.9	
Normal and Upset	10	S_A 27800	1169 2221	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3140 5966	1	1.9	

Checking Method #
1. Line-by-line checking
2. Alternative Calculation Results compared
3. Identical Calculation Results compared
4. Compare inputs and results of ...

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. 69

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[signature]	2/16/84								
Checker	[signature]	2/23/84								

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 17200	1215 2309	17	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	1215 2309	17	1.9	
Emergency	9	$1.8\ S_h$ 30960	1215 2309	17	1.9	
Faulted	9	$2.4\ S_h$ 41280	1215 2309	17	1.9	
Normal and Upset	10	S_A 27800	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	1215 2309	17	1.9	

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 inputs and results of similar codes

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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. 70

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/21/84								

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 17200	1936 3678	1	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	2678 5088	1	1.9	
Emergency	9	$1.8\ S_h$ 30960	2-29 5565	1	1.9	
Faulted	9	$2.4\ S_h$ 41280	2929 5565	1	1.9	
Normal and Upset	10	S_A 27800	1484 2820	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3420 6498	1	1.9	

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

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. 71

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/22/84								

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 17200	1215 2309	17	1.9	
Normal and Upset	9	1.2 S_h 20640	1215 2309	17	1.9	
Emergency	9	1.8 S_h 30960	1215 2309	17	1.9	
Faulted	9	2.4 S_h 41280	1215 2309	17	1.9	
Normal and Upset	10	S_A 27800	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	1215 2309	17	1.9	

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

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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. 72

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

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 17200	1750 3705	1	1.9	
Normal and Upset	9	1.2 S_h 20640	2510 4769	1	1.9	
Emergency	9	1.8 S_h 30960	2747 5219	1	1.9	
Faulted	9	2.4 S_h 41280	2747 5219	1	1.9	
Normal and Upset	10	S_A 27800	1246 2367	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3186 6053	1	1.9	

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

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. 73

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	SOC	8/16/84									
Checker	[illegible]	8/27/84									

Problem AB-2-150I

MAXIMUM STRESS RESULTS

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

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

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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. 74

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1										
Preparer	SOC	8/16/84									
Checker	[illegible]	8/21/84									

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 17200	1993 3787	1	1.9	
Normal and Upset	9	1.2 S_h 20640	2731 5189	1	1.9	
Emergency	9	1.8 S_h 30960	2969 5641	1	1.9	
Faulted	9	2.4 S_h 41280	2969 5641	1	1.9	
Normal and Upset	10	S_A 27800	1152 2189	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3145 5976	1	1.9	

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. 75

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	JAC	8/16/84								
Checker	[illegible]	8/16/84								

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 17200	1215 2309	17	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	1215 2309	17	1.9	
Emergency	9	$1.8\ S_h$ 30960	1215 2309	17	1.9	
Faulted	9	$2.4\ S_h$ 41280	1215 2309	17	1.9	
Normal and Upset	10	S_A 27800	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	1215 2309	17	1.9	

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. 76

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible] C	8/16/89								
Checker	[illegible]	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 17200	1970 3743	1	1.9	
Normal and Upset	9	1.2 S_h 20640	2533 4813	1	1.9	
Emergency	9	1.8 S_h 30960	2767 5257	1	1.9	
Faulted	9	2.4 S_h 41280	2767 5257	1	1.9	
Normal and Upset	10	S_A 27800	1192 2265	1	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	3163 6010	1	1.9	

Checking Method # 1 Line by line checking 2 Alternative Calculation Results compared 3 [illegible]

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. 77

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1	X		X		X		X		X
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/[illegible]/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 17200	1215 2309	17	1.9	
Normal and Upset	9	$1.2\ S_h$ 20640	1215 2309	17	1.9	
Emergency	9	$1.8\ S_h$ 30960	1215 2309	17	1.9	
Faulted	9	$2.4\ S_h$ 41280	1215 2309	17	1.9	
Normal and Upset	10	S_A 27800	0 0	17	1.9	
Normal and Upset	11	$S_A + S_h$ 45000	1215 2309	17	1.9	

Checking Method # 1. Line-by-line checking 2. Alternative Calculation Results compared 3. Identical Calculation Results compared

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	[illegible]	8/13/84								
Checker	[illegible]	8/27/84								

Problem AB-1-153

MAXIMUM STRESS RESULTS

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

* 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. At 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	JOC	8/16/84								
Checker	[illegible]	8/23/84								

Problem AB-1-156

MAXIMUM STRESS RESULTS

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

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. 80

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date
Checking Method #	1									
Preparer	[illegible]	8/16/84								
Checker	[illegible]	8/21/84								

Problem AB-1-178B

MAXIMUM STRESS RESULTS

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

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. At Equipment

Calculation Number 2323-EQ-SIF Sheet No. 81

Revision	Original Issue	Date	Rev.	Date	Rev.	Date	Rev.	Date	Rev.	Date	
Checking Method #	1	X		X		X		X		X	
Preparer	JAC	8/16/84									
Checker	[illegible]	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 15000	296 562	231	1.9	
Normal and Upset	9	$1.2\ S_h$ 18000	296 562	231	1.9	
Emergency	9	$1.8\ S_h$ 27000	296 562	231	1.9	
Faulted	9	$2.4\ S_h$ 36000	296 562	231	1.9	
Normal and Upset	10	S_A 22500	0 0	231	1.9	
Normal and Upset	11	$S_A + S_h$ 37500	296 562	231	1.9	

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	X		X		X		X		X	
Preparer	SAC	8/17/84									
Checker	[illegible]	8/17/84									

Conclusion:

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

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

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

CYGNA
JOB NO.: 84042
DATE LOGGED: 8/27/84
LOG NO.: #79
FILE: 2.1.1 Inc. C/2
CROSS: 2.1 Inc. C/2 Log

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.

S M Maran

Robert E. Ballard, Jr.
Director of Projects

HWM

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

Attachment to GTN-69368

PROBLEM NUMBER	PIPE SIZE(S)	BUILDING(S)[1]	MF X	MF Y	MF Z	CURVES[2] A/B	NUMBER OF SUPPORTS
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

1. S = Safeguards C = Containment RI = Reactor Internal Structure
   A = Auxiliary F = Fuel

2. 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:
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International: 428813/234475

A Dravo Company

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

August 24, 1984

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

GTN-69373

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-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.

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, R[illegible]allard, HWMentel, SLim, [illegible]chler/CMJan, PTHuang, SM[illegible]arano/[illegible], TDHawkins/H[illegible]apinig, Outgoing

REC'D 8/28/84

84042

International: 428813/234475

A Dravo Company

GTN- 69339

August 10, 1984

DIST
N. WILLIAMS
J. MINICHIELLO
L. WEINGART
84042PF

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 TELECOPIER
8 - 10 - 84

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

Dravo

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.

S McMarano

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

Attachment to GTN-69339

Problem Number	Pipe Size(s)	Bldg(s)[1]	MF X	MF Y	MF 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-1-27-1	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
IN ORIG STUDY → 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

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

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

NOTED AUG 31 1984 N. WILLIAMS

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:	2.11 Inc. Cr.
CROSS REF. FILE	2.1 Inc. Cr Log

In addition to the above comments CYGNA had suggested making changes to six hanger drawings. All of the changes suggested except one had discrepencies 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

L.M. Popplewell
Project Engineering Manager

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

LMP/GG/bh

CPPA #40439

PROJECT FILE

TEXAS UTILITIES GENERATING COMPANY

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

CYGNA
JOB NO.: 84042
DATE LOGGED: 9/12/84
LOG NO.: #85
FILE: 2.1.1 Inc. CR
CROSS REF. FILE: 2.1 Inc. CR Log

August 16, 1984

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

Distribution
N. Williams
M. Shulman
J. Minichiello
C. Wong
L. Weingart
84042 PF

Attention: Ms. Nancy Williams, Project Manager

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

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 seperate 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 committments, 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,

6/28/84

J.B. George
Vice Pres./Project Gen. Manager

cc: David Wade
George Grace
Bill Horin
John Finneran
ARMS

JBG/GEG/jf

ATTACHMENT

ITEM	(PAGE)	DESCRIPTION
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^{0}. Offsetting of the hanger is done to accommodate the pipe movement if the swing angle exceeds 5^{0}, 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^{0}, 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 committment 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 centerline 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.

ITEM	(PAGE)	DESCRIPTION
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: 127636/968694
International: 428813/234475

A Dravo Company

NOTED SEP 17 1984

84042
9/20/84
#86
2.1.1 Inc. CR
REF FILE 2.1 Inc. CR Log

GTN- 69454

September 14, 1984

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

Distribution
N. Williams
J. Minichiello
84042 PF
M. Shulman

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.

S M Marano

Robert E. Ballard, Jr.
Director of Projects

RESc-HWMe: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 (TENERA Md) 1L 1A (telecopied)

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

9/14/84

Dravo

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.

Rec'd 891.. PROJECT FILE
EBASCO

EBASCO SERVICES INCORPORATED

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

Distribution
J. Minichiello
M. Shulman
G. Bjorkman
W. Williams
84042 PF

September 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

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 logitudinal 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:

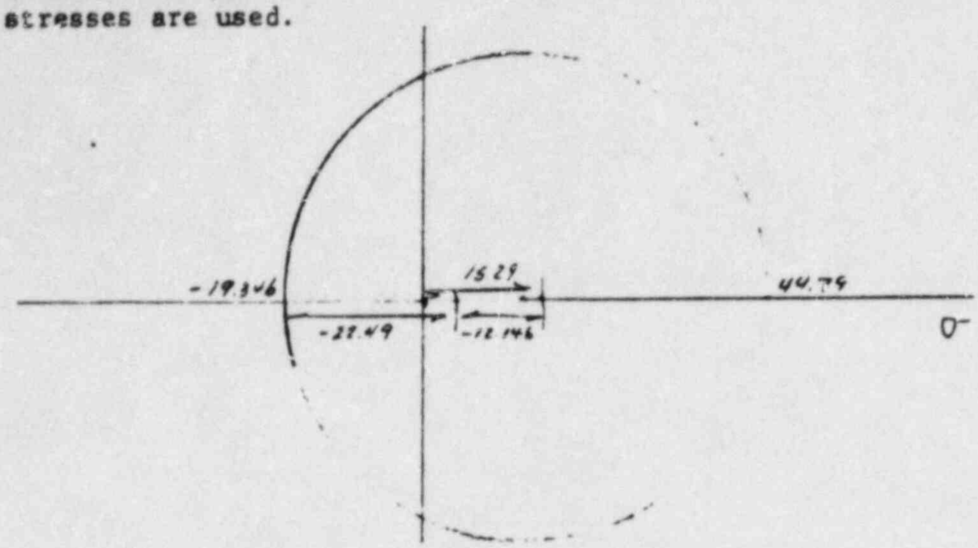
Longitudinal Pressure Stress	4.8 ksi
EQ. 9 Piping Moment stress	± 12.146 ksi
EQ. 12 Piping Moment stress	± 22.49 ksi

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:

(i) 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 $\cong$ 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 $\pm$ 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 ksi instead of the 32.54 ksi reported.

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

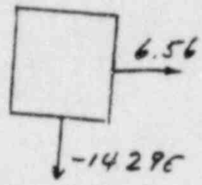
To explain the values appearing in Table N and O, we again will use an example and will employ the 4" sch 160 specimen as the example.

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



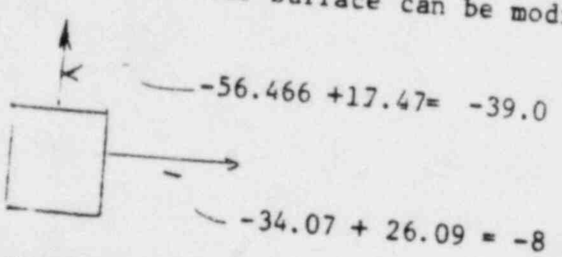
and hence is equal to 20.86

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.

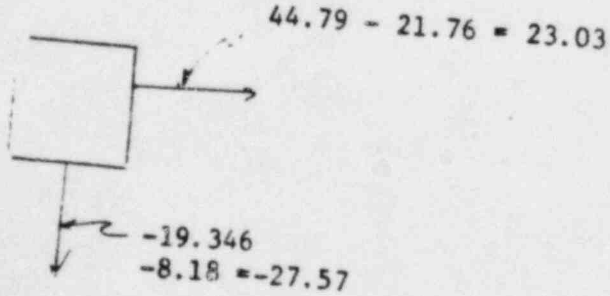
For the 4" sch 160 inside surface the circumferential and longitudinal stresses due to preload alone are given in the table on page 68 of Attachment 3 of the Affidavit as +21.76 ksi and +8.18 ksi respectively (for the outside face they are -26.091 and -13.47.

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 Long	4" ksi Circ	10" 40S ksi Long	10" 40S ksi Circ	10" 80 ksi Long	10" 80 ksi Circ	32" MS ksi Long	32" MS ksi Circ
Preload (P)	Inside	8.18	21.76	8.83	38.71	8.19	23.02	1.80	3.59
	Outside	-13.47	-26.09	-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	-60.64	-19.41	-34.90	-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	44.79	10.78	72.71	10.24	43.15	15.58	47.17
	Outside	-26.65	-34.07	-48.52	-73.46	-30.22	-44.38	-31.01	-34.10

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE

WESTINGHOUSE FORM 55213D

ATTACHMENT C

Subject: <u>Friction Test Preload Data</u>

Presented below are the preloads measured at th[illegible] torque values during the friction tests. Data rep[illegible] the sum of preload in the two U-bolt legs. Use o[illegible] 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

TORQUE	PRELOAD
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

TORQUE	PRELOAD
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

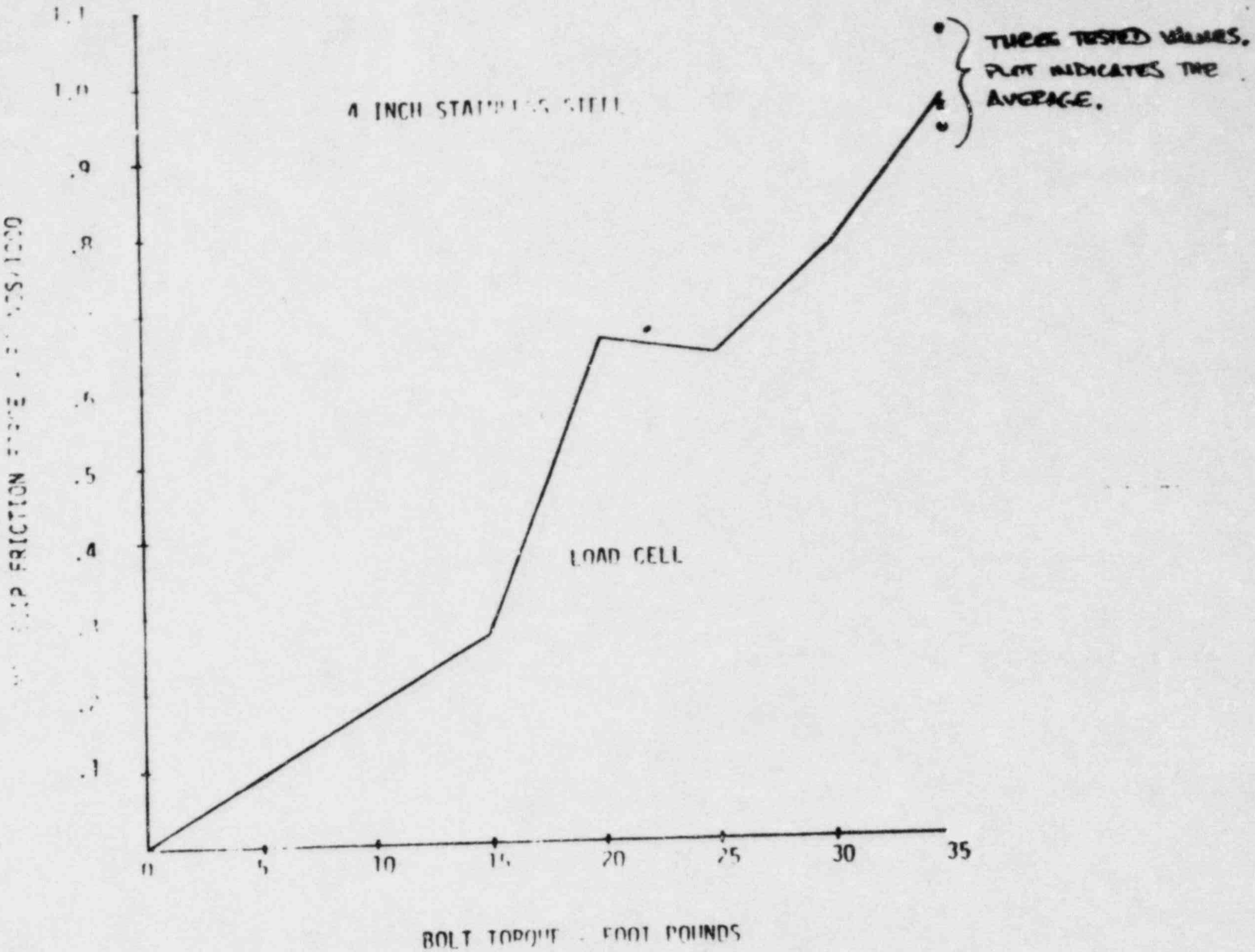

LOAD CELL
THREE TESTED VALUES. PLOT INDICATES THE AVERAGE.
.1
.4
.5
.8
.9
1.0
1.1
0
10
20
30
35
BOLT TORQUE - FOOT POUNDS

FIGURE 9

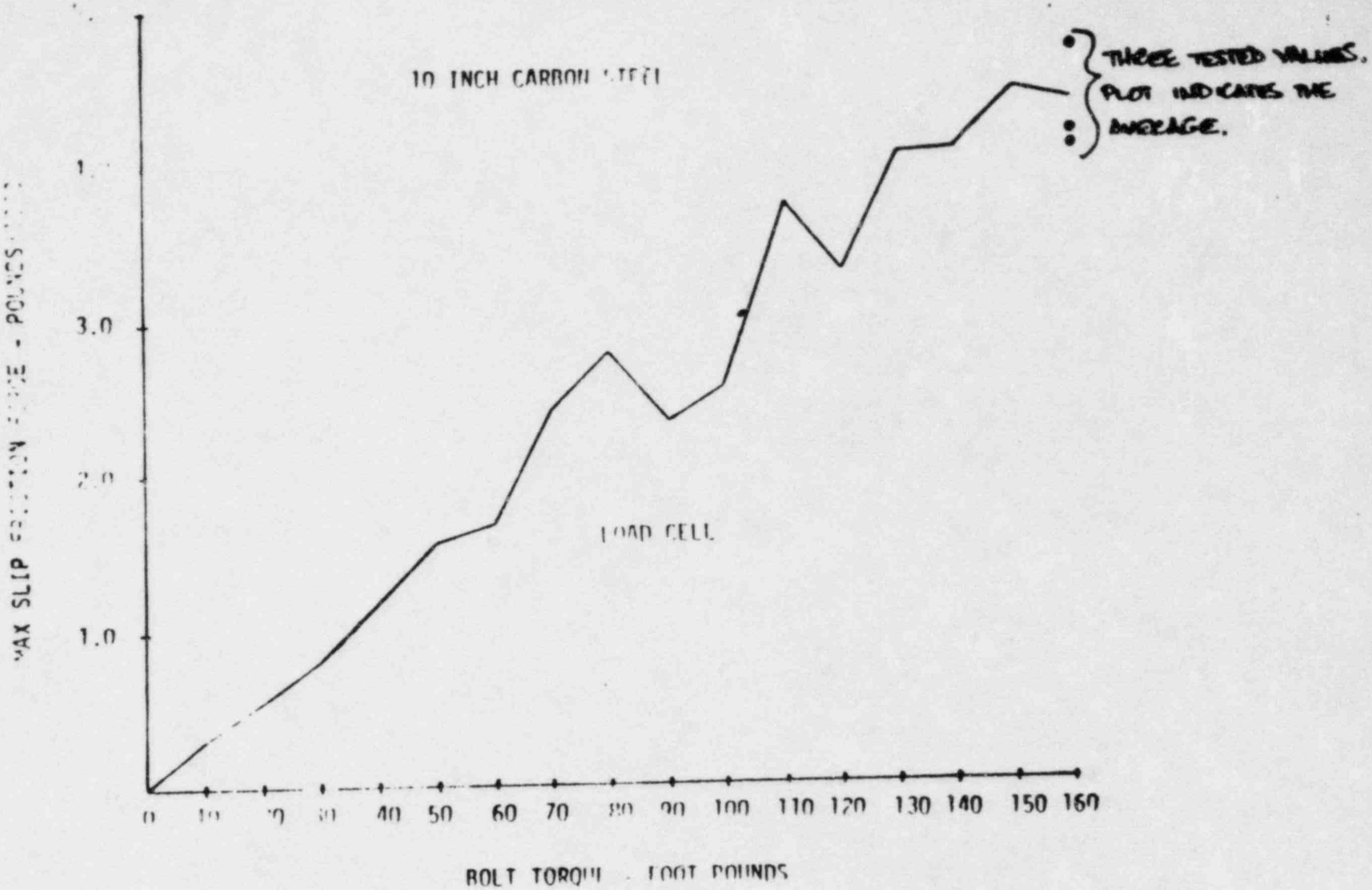
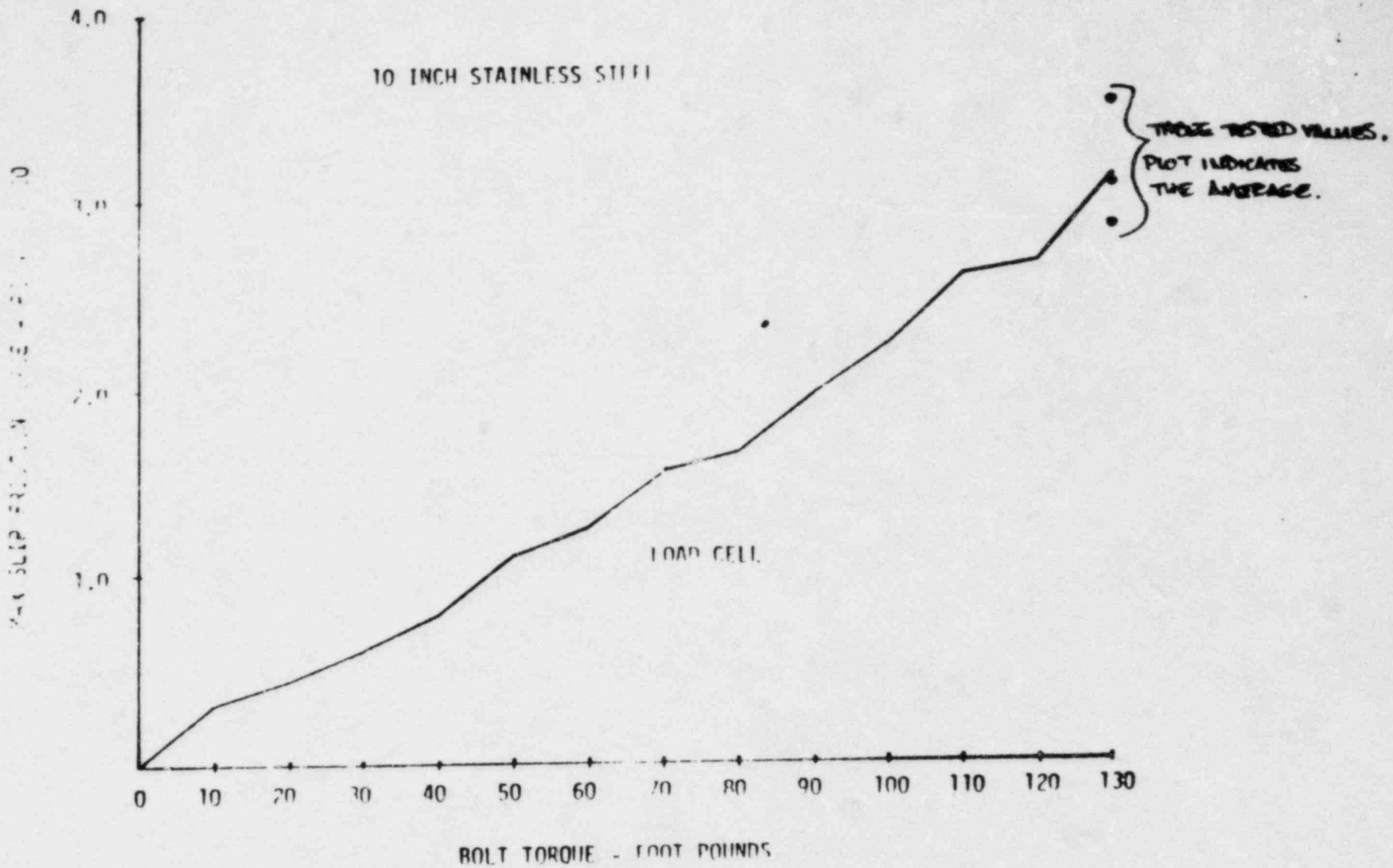

10 INCH CARBON
LOAD CELL
3.0
2.0
1.0
0
40
50
60
70
90
100
110
120
130
140
150
160
BOLT TORQU FOOT POUNDS
THREE TESTED VALUES.
PLOT INDICATES THE
AVERAGE.

FIGURE 10



4.0
3.0
2.0
1.0
10 INCH STAINLESS STEEL
THREE TESTED VALUES.
PLOT INDICATES
THE AVERAGE.
LOAD CELL
0
10
20
30
40
50
60
70
80
90
100
110
120
130
BOLT TORQUE - FOOT POUNDS

FIGURE 11

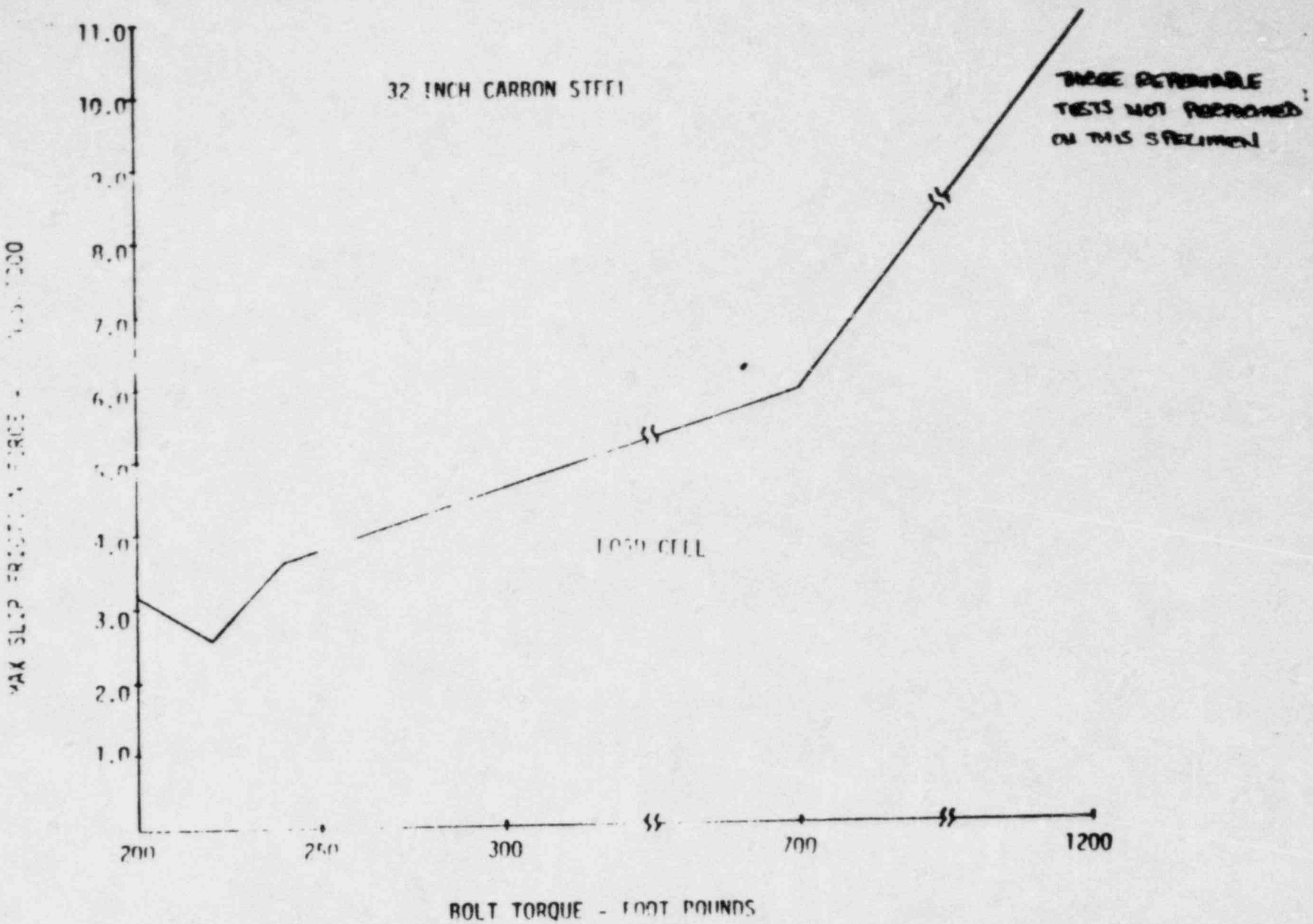

32 INCH CARBON STEEL
TESTS NOT PERFORMED
ON THIS SPECIMEN
11.0
10.0
8.0
7.0
6.0
4.0
3.0
2.0
1.0
200
300
700
1200
BOLT TORQUE - FOOT POUNDS

FIGURE 12

Gibbs & Hill, Inc.

11 Penn Plaza
New York, New York 10001
212 760-4438
Telex:
Domestic: 127636/668994
International: 428813/234475

A Dravo Company

PROJECT FILE

Distribution:
N Williams
J Minichiello
L Weingart
Project File
84042

August 17, 1984

GTN-69359

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

CYGNA	
JOB NO:	84042 Res
DATE LOGGED:	8/20/84
LOG NO:	#75
FILE:	2.1.1 Inc. Cr
CROSS REF. FILE	2.1 Inc. Cr log

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 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.

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.,

R. E. Ballard

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 x27563

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)